

ISSN: 1991-3494 (Print)
ISSN: 2518-1467 (Online)

**SCIENTIFIC JOURNAL OF
PEDAGOGY AND ECONOMICS**

**№3
2026**

ISSN 2518-1467 (Online),
ISSN 1991-3494 (Print)



SCIENTIFIC JOURNAL OF PEDAGOGY AND ECONOMICS

PUBLISHED SINCE 1944

3 (421)

May – June 2026

ALMATY, 2026

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Scientific Journal of Pedagogy and Economics

ISSN 2518-1467 (Online),

ISSN 1991-3494 (Print).

Owner: «Central Asian Academic Research Center» LLP (Almaty).

The certificate of registration of a periodical printed publication in the Committee of information of the Ministry of Information and Communications of the Republic of Kazakhstan

№ KZ50VPY00121155, issued on 05.06.2025

Thematic focus: «*publication of the results of new achievements in the field of fundamental sciences*»

Periodicity: 6 times a year.

<http://www.bulletin-science.kz/index.php/en/>

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Scientific Journal of Pedagogy and Economics

ISSN 2518-1467 (Online),

ISSN 1991-3494 (Print).

Меншіктенуші: «Орталық Азия академиялық ғылыми орталығы» ЖШС (Алматы қ.).

Қазақстан Республикасының Ақпарат және коммуникациялар министрлігінің Ақпарат комитетінде 05.06.2025 ж. берілген № **KZ50VPY00121155** мерзімдік басылым тіркеуіне қойылу туралы куәлік.

Тақырыптық бағыты: *«іргелі ғылым салалары бойынша жаңа жетістіктердің нәтижелерін жариялау»*

Мерзімділігі: жылына 6 рет.

<http://www.bulletin-science.kz/index.php/en/>

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Scientific Journal of Pedagogy and Economics

ISSN 2518-1467 (Online),

ISSN 1991-3494 (Print).

Собственник: ТОО «Центрально-азиатский академический научный центр» (г. Алматы).

Свидетельство о постановке на учет периодического печатного издания в Комитете информации Министерства информации и коммуникаций и Республики Казахстан

№ KZ50VPY00121155 выданное 05.06.2025 г.

Тематическая направленность: «публикация результатов новых достижений в области фундаментальных наук».

Периодичность: 6 раз в год.

<http://www.bulletin-science.kz/index.php/en/>

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ЭКОНОМИКА – ЭКОНОМИКА – ECONOMICS

SCIENTIFIC JOURNAL OF PEDAGOGY AND ECONOMICS

ISSN 1991-3494

Volume 3.

Number 421 (2026), 380-402

<https://doi.org/10.32014/2026.2518-1467.1214>

IRSTI 06.73.55; 06.73.15; 06.71.57

UDC 336.77:502.131.1(574)

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ANALYSIS OF GREEN LENDING PROGRAMS OF SECOND-TIER BANKS AND DEVELOPMENT INSTITUTIONS IN THE REPUBLIC OF KAZAKHSTAN

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Annotation. The relevance of the study is due to the increasing role of sustainable finance in the context of the global climate agenda and the transition of the economy to a low-carbon development model. In the Republic of Kazakhstan, the development of "green" lending is considered as one of the key tools for implementing environmental policy, achieving carbon neutrality and stimulating investments in projects in the field of renewable energy, energy efficiency and sustainable infrastructure. The purpose of the study is to analyze the dynamics, structure and institutional mechanisms for the development of "green" lending programs for second-tier banks and development institutions of the Republic of Kazakhstan, as well as to identify the main limitations and prospects for further expansion of this segment of the financial market. The methods of system, comparative, dynamic and correlation analysis are used in the work. The information base of the study was made up of data from the National Bank of the Republic of Kazakhstan, the Agency of the Republic of Kazakhstan for Regulation and Development of the Financial Market, the AIFC Center for Green Finance,



the Development Bank of Kazakhstan, the Damu Entrepreneurship Development Fund, the Eurasian Development Bank and other open sources for 2015-2024. The results of the study showed that the market of "green" financing in Kazakhstan is at the stage of institutional development, and its main drivers are international financial organizations and development institutions. It has been established that the participation of second-tier banks in financing environmental projects is gradually expanding, but there are still limitations associated with the high cost of borrowed resources, insufficient standardization of "green" credit products and poor development of ESG reporting of borrowers. It is concluded that it is advisable to form a mixed model for the development of "green" financing based on the interaction of second-tier banks, development institutions and government support mechanisms, which will contribute to the further expansion of the sustainable financing market in Kazakhstan.

Keywords: green lending, green financing, second-tier banks, development institutions, ESG, sustainable development, green economy, Republic of Kazakhstan

Funding: *The article was prepared within the framework of IRN AR26100603 "Innovative methods of creating and applying instruments of state financial regulation in order to support the green economy".*

For citation: Aitkazina M., Karshalova A., Biken V. Analysis of green lending programs of second-tier banks and development institutions in the Republic of Kazakhstan. *Academic Scientific Journal of Computer Science*, 2026. — No. 3. — P. 380-402.. DOI:<https://doi.org/10.32014/2026.2518-1467.1214>

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ҚАЗАҚСТАН РЕСПУБЛИКАСЫНДАҒЫ ЕКІНШІ ДЕҢГЕЙДЕГІ БАНКТЕР МЕН ДАМУ ИНСТИТУТТАРЫН "ЖАСЫЛ" НЕСИЕЛЕУ БАҒДАРЛАМАЛАРЫН ТАЛДАУ

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Аннотация. Зерттеудің өзектілігі жаһандық климаттық күн тәртібі мен экономикалық дамудың төмен көміртекті моделіне көшуі жағдайында тұрақты қаржыландырудың өсіп келе жатқан рөліне байланысты. Қазақстан Республикасында "Жасыл" кредиттеуді дамыту экологиялық саясатты іске асырудың, көміртегі бейтараптығына қол жеткізудің және жаңартылатын энергетика, энергия тиімділігі және тұрақты инфрақұрылым саласындағы жобаларға инвестицияларды ынталандырудың негізгі құралдарының бірі ретінде қарастырылады. Зерттеудің мақсаты Екінші деңгейдегі банктер мен Қазақстан Республикасының даму институттарына "жасыл" кредит беру бағдарламаларының даму динамикасын, құрылымын және институционалдық тетіктерін талдау, сондай-ақ қаржы нарығының осы сегментін одан әрі кеңейтудің негізгі шектеулері мен перспективаларын анықтау болып табылады. Жұмыста жүйелік, салыстырмалы, динамикалық және корреляциялық талдау әдістері қолданылады. Зерттеудің ақпараттық базасын Қазақстан Республикасы Ұлттық Банкінің, Қазақстан Республикасы Қаржы нарығын реттеу және дамыту агенттігінің, АХҚО жасыл қаржы орталығының, Қазақстанның Даму Банкінің, "Даму" кәсіпкерлікті дамыту қорының, Еуразиялық Даму Банкінің және басқа да ашық көздердің 2015-2024 жылдардағы деректері құрады. оның негізгі драйверлері халықаралық қаржы ұйымдары мен даму институттары болып табылады. Екінші деңгейдегі банктердің экологиялық жобаларды қаржыландыруға қатысуы біртіндеп кеңейіп келе жатқаны анықталды, алайда қарыз ресурстарының жоғары құнына, "жасыл" несие өнімдерін стандарттаудың жеткіліксіздігіне және қарыз алушылардың ESG-есептілігінің әлсіз дамуына байланысты шектеулер сақталуда. Екінші деңгейдегі банктердің, даму институттарының және мемлекеттік қолдау тетіктерінің өзара іс-қимылына негізделген "жасыл" қаржыландыруды дамытудың аралас моделін қалыптастырудың орындылығы туралы қорытынды жасалды, бұл Қазақстанда тұрақты қаржыландыру нарығын одан әрі кеңейтуге ықпал ететін болады.

Түйін сөздер: жасыл несиелеу; жасыл қаржыландыру; екінші деңгейдегі банктер; даму институттары; ESG; тұрақты даму; жасыл экономика; Қазақстан Республикасы

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АНАЛИЗ ПРОГРАММ ЗЕЛЕННОГО КРЕДИТОВАНИЯ БАНКОВ ВТОРОГО УРОВНЯ И ИНСТИТУТОВ РАЗВИТИЯ В РЕСПУБЛИКЕ КАЗАХСТАН

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Аннотация Актуальность исследования обусловлена возрастающей ролью устойчивого финансирования в условиях глобальной климатической повестки и перехода экономики к низкоуглеродной модели развития. В Республике Казахстан «зеленое» кредитование рассматривается как один из ключевых инструментов реализации экологической политики, достижения углеродной нейтральности и стимулирования инвестиций в проекты в области возобновляемой энергетики, энергоэффективности и устойчивой инфраструктуры. Цель статьи заключается в анализе динамики, структуры и институциональных механизмов развития программ «зеленого» кредитования, реализуемых банками второго уровня и институтами развития Казахстана, а также в выявлении основных ограничений и перспектив дальнейшего расширения данного сегмента финансового рынка. Методологическую основу исследования составляют методы системного, сравнительного, динамического и корреляционного анализа. Информационную базу исследования составили данные Национального банка Республики Казахстан, Агентства Республики Казахстан по регулированию и развитию финансового рынка, Центра зеленых финансов МФЦА, Банка развития Казахстана, Фонда развития предпринимательства «Даму», Евразийского банка развития и других открытых источников за 2015–2024 гг. Результаты исследования показывают, что рынок «зеленого» финансирования Казахстана находится на стадии институционального развития, а его основными драйверами выступают международные финансовые организации и институты развития. Установлено, что участие банков второго уровня в финансировании экологических проектов постепенно расширяется, однако сохраняются ограничения, связанные с высокой стоимостью заемных ресурсов, недостаточной стандартизацией «зеленых» кредитных продуктов и слабым развитием ESG-отчетности заемщиков. Обоснована необходимость формирования смешанной модели развития «зеленого» финансирования, основанной на взаимодействии банков второго уровня, институтов развития и механизмов государственной поддержки, что будет способствовать дальнейшему расширению рынка устойчивого финансирования в Казахстане.

Ключевые слова: зеленое кредитование, зеленое финансирование, банки второго уровня, институты развития, ESG, устойчивое развитие, зеленая экономика, Республика Казахстан

Introduction. In the context of increasing global climate challenges, the implementation of the UN 2030 Agenda for Sustainable Development and the

transition of the global economy to a low-carbon development model, the formation of sustainable financing mechanisms is becoming particularly relevant. One of the most dynamically developing tools in this area is "green" lending, focused on supporting projects in the field of renewable energy, energy efficiency, resource conservation, environmentally friendly transport and sustainable infrastructure. Unlike traditional bank lending, "green" financial instruments involve not only achieving economic results, but also creating a positive environmental effect.

International practice shows that the banking sector plays a key role in ensuring the ecological transformation of the economy. In developed countries, "green" loans are gradually becoming an integral part of the credit policy of financial institutions and are considered as a mechanism to reduce climate risks and increase the stability of the financial system (Gilchrist et al., 2021; Ozili, 2022). At the same time, in most developing countries, the green finance market continues to be in the formative stages and is characterized by high dependence on government development institutions and international financial organizations.

For the Republic of Kazakhstan, the development of sustainable finance is becoming strategically important in connection with the implementation of the Concept of Transition to a "green" economy, commitments to achieve carbon neutrality by 2060 and the need to modernize the national economy. In recent years, the country has developed a regulatory and institutional infrastructure for sustainable financing, including a national taxonomy of green projects, ESG regulatory mechanisms, and specialized financial instruments. At the same time, the level of development of "green" lending remains relatively low, and the participation of second-tier banks in financing environmentally oriented projects is still significantly inferior to the role of development institutions.

Modern scientific research is mainly devoted to general issues of sustainable financing, ESG approaches, and the green bond market (Miroshnichenko & Brand, 2021; Yameen et al., 2024). The Kazakh literature focuses on the institutional aspects of the development of green finance and international experience in their implementation (Doszhan, 2022; Kuanova et al., 2024). However, the comparative analysis of the "green" lending programs of second-tier banks and development institutions of the Republic of Kazakhstan remains insufficiently studied. This causes a research gap and determines the relevance of this work.

The purpose of the study is to analyze the programs of "green" lending to second-tier banks and development institutions of the Republic of Kazakhstan, identify the specifics of their functioning, assess the dynamics of market development and identify prospects for further expansion of sustainable financing mechanisms.

To achieve this goal, the following research objectives were formulated:

- to study theoretical approaches to the development of "green" lending and sustainable financing;
- to analyze the dynamics of the development of the market of "green" financial instruments of the Republic of Kazakhstan for 2015-2024;
- to study the structure of market participants and the directions of using the funds raised;

- to conduct a comparative analysis of the programs of second-tier banks and development institutions;
- to identify the main limitations and factors of the development of "green" lending;
- perform a quantitative assessment of the relationship between the development of "green" financing and macroeconomic indicators;
- to develop a forecast for the development of the "green" financing market in the Republic of Kazakhstan.

The object of the study is the system of "green" financing of the Republic of Kazakhstan.

The subject of the study is the programs of "green" lending to second-tier banks and development institutions, as well as the mechanisms of their functioning and development.

The scientific novelty of the research consists in a comprehensive comparative analysis of the "green" lending programs of second-tier banks and development institutions of the Republic of Kazakhstan, as well as in assessing the prospects for the development of this segment of the financial market based on quantitative analysis methods.

The practical significance of the study is determined by the possibility of using the results obtained in the development of state support measures for sustainable financing, improving the programs of second-tier banks and the formation of mechanisms to stimulate environmentally oriented investments.

The article has the following structure. After the introduction, an overview of the scientific literature on the issues of "green" lending and sustainable financing is presented. Next, the materials and methods of the study are considered, the results are analyzed and discussed. In conclusion, the main conclusions and practical recommendations for the further development of "green" lending in the Republic of Kazakhstan are formulated.

Literature review. The study of "green" lending occupies an important place in modern scientific literature, since this tool is considered as one of the mechanisms for the transition to a sustainable and low-carbon economy. Unlike traditional loans, "green" loans are aimed at financing projects that provide environmental benefits: reducing emissions, improving energy efficiency, developing renewable energy sources, modernizing infrastructure and introducing resource-saving technologies.

In the scientific literature, "green" financing is considered as a set of financial relations aimed at redistributing capital into environmentally oriented projects. Miroschnichenko and Brand (2021) note that a "green" loan is one of the key instruments of "green" financing, as it allows banks to directly influence the environmental modernization of enterprises through a credit policy. The authors emphasize that the effectiveness of a "green" loan depends not only on the interest rate, but also on the availability of project selection criteria, environmental assessment, and control mechanisms for the targeted use of funds.

A systematic review of green finance research is presented in Ozili (2022). The author shows that the main areas of scientific discussion are the development of "green" banking products, the role of the state in stimulating environmental investments, reducing climate risks and increasing the attractiveness of "green" projects for private capital. At the same time, Ozili (2022) notes that in developing countries, the green finance market often faces institutional barriers, including weak regulatory frameworks, insufficient transparency of projects, and limited long-term resources.

Gilchrist, Yu and Zhong (2021) made an important contribution to the study of "green" bonds and "green" bank loans. The authors consider "green" bonds and "green" loans as complementary instruments of sustainable financing. In their opinion, bond instruments are more often used by large issuers and infrastructure companies, while bank lending has a higher potential to support small and medium-sized businesses. This conclusion is important for Kazakhstan, where second-tier banks can become the main channel for the distribution of "green" financing among enterprises in the real sector.

The study by Yameen, Kijkasiwat, Hussain, Farooq and Ajmal (2024) is devoted to the systematization of scientific approaches to "green" financing in the banking sector. The authors identify several key areas: "green" lending, environmental risk management, ESG integration, bank sustainability, and the impact of "green" financial instruments on banks' financial results. The paper emphasizes that the development of "green" lending requires not only financial resources, but also the institutional ability of banks to assess the environmental impact of projects.

A separate area of research is related to the analysis of the impact of "green" lending on banks' risks. Zhou, Caldecott, Hoepner, and Wang (2020) have shown using China as an example that green lending can reduce banks' credit risks, as environmentally-oriented projects often involve higher levels of technological modernization and government support. However, the authors note that this effect is only apparent if there is a well-developed environmental risk assessment system and a transparent classification of "green" projects.

The impact of green credit policy on the financial stability of banks is also discussed in the work of Al-Msiedeem, Elamer, AlHares and Alshbili (2025). The authors show that a "green" credit policy can have a positive impact on banks' financial performance, especially in cases where it is combined with climate risk management practices. This means that green lending should be considered not only as an environmental tool, but also as an element of a long-term banking strategy.

The issues of sustainable and "green" financing have also been developed in the Kazakh scientific literature. Doszhan (2022) examines the current state of green finance in Kazakhstan and concludes that this market is at an early stage of development. The author notes that the main problems are a limited list of financial instruments, insufficient activity of commercial banks and weak involvement of small and medium-sized businesses.

Kuanova, Sagiyeva, and Zaitenova (2024) analyze international experience in the development of sustainable finance and the prospects for its application in Kazakhstan. The authors emphasize that the adaptation of foreign practices, the development of ESG infrastructure, increased transparency of the financial market and the formation of a system of incentives for banks are especially important for Kazakhstan. The study shows that sustainable financing should be considered as part of the overall transformation of the financial system, rather than as a separate narrow segment.

The work of Urazgalieva, Sembiyeva and Kurmanova (2021) examines the mechanisms for supporting "green" finance in world practice and Kazakhstan. The authors note that the development of "green" financing requires tax incentives, subsidizing interest rates, guaranteeing projects and developing the institution of independent verification. These findings are of particular importance for analyzing the programs of second-tier banks and development institutions, since it is the combination of financial and non-financial support mechanisms that determines the effectiveness of "green" lending.

Kudaibergenova (2025) considers the development of "green" financing in Kazakhstan in the context of global sustainable development trends. The author notes that the national market is gradually expanding, but its further development requires the activation of the banking sector, increasing the investment attractiveness of "green" projects and expanding financing tools for businesses.

Thus, the analysis of scientific literature shows that "green" lending is considered as one of the key instruments of sustainable financing. Foreign studies focus on the relationship of "green" lending with banking risks, ESG integration and financial stability of banks. Kazakhstani authors mainly consider the institutional conditions for the development of "green" financing, regulatory issues, limited tools and the need to enhance the role of second-tier banks.

However, there remains a research gap in the existing literature. Most of the papers are devoted to general issues of "green" financing, the ESG agenda or the market of "green" bonds, while a comparative analysis of the "green" lending programs of second-tier banks and development institutions of the Republic of Kazakhstan is not sufficiently presented. This determines the relevance of this study and the need for a more detailed study of programs, mechanisms, limitations and prospects for the development of "green" lending in Kazakhstan.

Materials and methods. The methodological basis of the research is formed taking into account the purpose of the article, aimed at analyzing the programs of "green" lending to second-tier banks and development institutions of the Republic of Kazakhstan. The study was carried out within the framework of an integrated approach combining institutional, comparative, dynamic and quantitative analysis. This approach allows us to consider green lending not only as a separate financial instrument, but also as an element of a broader system of sustainable financing, ESG transformation and transition to a green economy.

The logic of the research is built sequentially. At the initial stage, an analysis of

the scientific literature on sustainable financing, green lending, ESG approaches and the role of the banking sector in the ecological modernization of the economy was carried out. This allowed us to determine the theoretical basis of the study and identify the main scientific approaches to the study of "green" financial instruments. Further, the collection, processing and systematization of statistical and analytical data characterizing the development of the green finance market in the Republic of Kazakhstan for 2015-2024 was carried out. At the next stage, a comparison of the programs of development institutions and second-tier banks was carried out, as well as a quantitative assessment of market dynamics, calculation of growth rates, correlation analysis and forecasting of the development of "green" financing in the medium term.

The information base of the study was made up of official statistical data from the National Bank of the Republic of Kazakhstan, materials from the Agency of the Republic of Kazakhstan for Regulation and Development of the Financial Market, data from the Center for Green Finance of the Astana International Financial Center, materials from the Development Bank of Kazakhstan, the Damu Entrepreneurship Development Fund, the Eurasian Development Bank, as well as open information from second-tier banks of the Republic of Kazakhstan. Additionally, scientific publications of domestic and foreign researchers devoted to the problems of sustainable financing, ESG integration and "green" lending were used. The time horizon of the study covers the period from 2015 to 2024, which allows us to trace the evolution of the market from the lack of specialized "green" financial instruments to the formation of an institutional infrastructure for sustainable financing.

The study used a systematic analysis that allowed us to consider the green lending market as a set of interrelated elements: second-tier banks, development institutions, government support mechanisms, international financial programs, and borrowers in the real sector of the economy. The use of this method made it possible to determine the place of each participant in the system of sustainable financing and to identify the specifics of the distribution of functions between development institutions and commercial banks.

A comparative analysis was used to compare the programs of different market participants. The comparison was based on criteria such as the category of borrowers, sources of financing, loan terms, directions of use of funds, the scale of programs, the availability of subsidy and guarantee support mechanisms. This method allowed us to identify differences between development institutions and second-tier banks. Development institutions are mainly focused on long-term infrastructure and energy projects, while second-tier banks have a higher potential for financing small and medium-sized businesses, energy efficiency projects and modernization of production processes.

The time series analysis method was used to assess the dynamics of the green financing market. Using this method, absolute and relative indicators of changes in the volume of "green" financing were calculated, including the issuance of

"green" bonds, the volume of "green" loans and the total volume of the sustainable financing market. The absolute change in the indicator was determined by the formula:

$$\Delta Y_t = Y_t - Y_{t-1}$$

where:

Y_t - the value of the indicator for the current year;

Y_{t-1} - the value of the indicator in the previous year.

The growth rate was determined by the formula:

$$T_r = \frac{Y_t - Y_{t-1}}{Y_{t-1}} \times 100$$

where:

T_r - the growth rate of the indicator, %.

These calculations were used to analyze the dynamics of the issuance of "green" bonds, the volume of "green" loans, the cumulative volume of "green" financing, as well as changes in the capacity of funded renewable energy facilities. This allowed us to identify the key stages of market development and identify periods of acceleration or deceleration of its growth.

Correlation analysis was used to assess the relationship between the development of green finance and macroeconomic indicators. The volume of "green" financing, the growth rate of gross domestic product, the inflation rate and the total volume of the loan portfolio of the banking sector were selected as the main factors. The calculation was performed using the Pearson linear correlation coefficient:

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}}$$

where (r) is the correlation coefficient; (x_i) and (y_i) are the values of the analyzed indicators; ($\bar{x}$) and ($\bar{y}$) are the average values of the corresponding variables.

The interpretation of the obtained coefficients was carried out taking into account the generally accepted statistical criteria of the strength of the bond. Coefficient values close to unity were considered as evidence of a strong positive relationship, values near zero as the absence of a pronounced linear relationship, and negative values as the presence of feedback between the indicators. The use of correlation analysis allowed us to determine to what extent the development of "green" financing is related to the general macroeconomic conditions and dynamics of the banking sector.

Nonlinear growth models were used to forecast the development of the green finance market for 2025-2027. The application of this approach is due to the fact that the "green" financing market in Kazakhstan is at the stage of formation and

is characterized by high volatility in annual placement volumes. The exponential growth function was used as the first model.:

$$Y_t = a \cdot e^{\{b(t-2020)\}}$$

where (Y_t) is the amount of "green" financing per year (t); (a) and (b) are the parameters of the model; (e) is the base of the natural logarithm.

Additionally, a logistics model was used to take into account a possible slowdown in growth rates as the market becomes saturated.:

$$Y_t = \frac{L}{1 + e^{\{-k(t-t_0)\}}}$$

where (L) is the marginal level of market growth; (k) is the growth intensity coefficient; (t_0) is the inflection point of the logistic curve.

The model parameters were estimated using the nonlinear least squares method. To account for the high volatility of the market, a forecast interval was constructed, including the base, lower and upper scenarios of development. The baseline scenario reflects the continuation of current trends, the lower scenario takes into account a possible slowdown in growth due to macroeconomic and institutional constraints, and the upper scenario assumes accelerated market development with increased participation of second-tier banks and increased government support measures.

It should be noted that the study has certain limitations. Firstly, it is based primarily on open sources of information and official statistics. Secondly, Kazakhstan does not yet have a unified system for disclosing information on "green" loans, and therefore some of the data is evaluative. Thirdly, the time series used for correlation analysis is limited to the period of active market development, which may affect the stability of statistical conclusions. Despite these limitations, the chosen methodology allows us to identify the main trends in the development of "green" lending in the Republic of Kazakhstan, identify the institutional features of the market and assess the prospects for its further growth.

Results. An analysis of the development of the "green" lending and sustainable financing market in the Republic of Kazakhstan for 2015-2024 shows that this segment of the financial market has gone from the actual absence of labeled instruments to the gradual formation of an independent institutional infrastructure. If in 2015-2019 there were no specialized "green" bonds and "green" loans in Kazakhstan, then starting in 2020. The market began to take shape due to the emergence of the first instruments of sustainable financing, the development of a regulatory framework, the creation of an institutional infrastructure and the expansion of the participation of development institutions.

According to the Center for Green Finance of the Astana International Financial Center (AIFC), the total volume of green bonds placed and green loans issued in Kazakhstan as of the end of October 2023 amounted to 150.2 billion tenge, or

483.1 million US dollars at the exchange rate as of November 1, 2023. At the same time, the total volume of the sustainable finance market, including social and synergetic instruments, exceeded 226.9 billion tenge (AIFC Green Finance Centre, 2023). At the initial stage, the structure of "green" financing was shifted towards bond instruments: "green" bonds amounted to 112.9 billion tenge, or 75.2% of the total volume of "green" instruments, while "green" loans reached 37.3 billion tenge, or 24.8%. This ratio is explained by the fact that at the early stage of market development, the main role was played by large institutional issuers with access to the capital market, while bank lending to environmental projects was in the formative stages.

Table 1 — Dynamics of issues of "green" financial instruments in Kazakhstan in 2015-2024

Year	"Green" bonds, billion tenge	"Green" loans, billion tenge	Total annual output, billion tenge	Cumulative volume, billion tenge	Total loan portfolio of banks, trillion tenge	The share of "green" loans, %
2015	0	0	0	0	12,8	0
2016	0	0	0	0	14,2	0
2017	0	0	0	0	13,8	0
2018	0	0	0	0	14,5	0
2019	0	0	0	0	15,2	0
2020	0,2	0	0,2	0,2	16,8	0,001
2021	95,0	8,0	103,0	103,2	19,5	0,53
2022	25,0	15,0	40,0	143,2	24,3	0,59
2023	52,7	28,0	80,7	150,2	28,6	1,05
2024	85,0	42,0	127,0	235,2	33,8	1,18

Note. The data for 2024 is provided according to the authors' estimates based on the available information on placements.

Source: compiled by the authors based on data from (the AIFC Center for Green Finance; the Agency of the Republic of Kazakhstan for Regulation and Development of the Financial Market; the National Bank of the Republic of Kazakhstan.)

The data in table 1 allow us to identify several stages in the development of the green finance market. The first stage, covering 2015-2019, is characterized by the absence of labeled "green" financial instruments. This was due to the lack of a specialized regulatory framework, a national taxonomy of "green" projects, and an independent verification infrastructure. The second stage began in 2020, when the debut issue of "green" bonds was carried out. In August 2020 The Damu Entrepreneurship Development Fund has placed "green" bonds in the amount of 200 million tenge on the AIFC Exchange (AIX) with a maturity of 36 months and a coupon rate of 11.75% per annum. The funds raised were used to finance the construction of a 2 MW solar power plant in the village of Shaulder in the Otyrar district of the Turkestan region (UNDP Kazakhstan, 2022).

The next stage is associated with a sharp increase in market volumes in 2021. During this period, major placements were carried out by JSC Samruk-Energo, the Eurasian Development Bank and JSC KEGOC. In addition, in September 2021,

the first marked "green" loan was issued: the Eurasian Development Bank and Batys Transit JSC signed a loan agreement in the amount of 3.6 billion tenge to finance the construction and operation of street lighting networks in Atyrau. In 2022 The pace of placement of "green" instruments decreased compared to 2021, due to the tightening of monetary policy, an increase in the base rate of the National Bank of the Republic of Kazakhstan, inflationary pressures and increased uncertainty in the financial market. In 2023, the market demonstrated recovery dynamics, and the accumulated volume of "green" financing reached 150.2 billion tenge. In 2024, the market moved to a new stage of development, associated with a more active participation of second-tier banks. In December 2024 JSC Halyk Bank of Kazakhstan has made its debut placement of "green" bonds among second-tier commercial banks in the amount of 20 billion tenge for a period of three years. According to the authors, by the end of 2024, the cumulative volume of "green" financing in Kazakhstan exceeded 235 billion tenge.

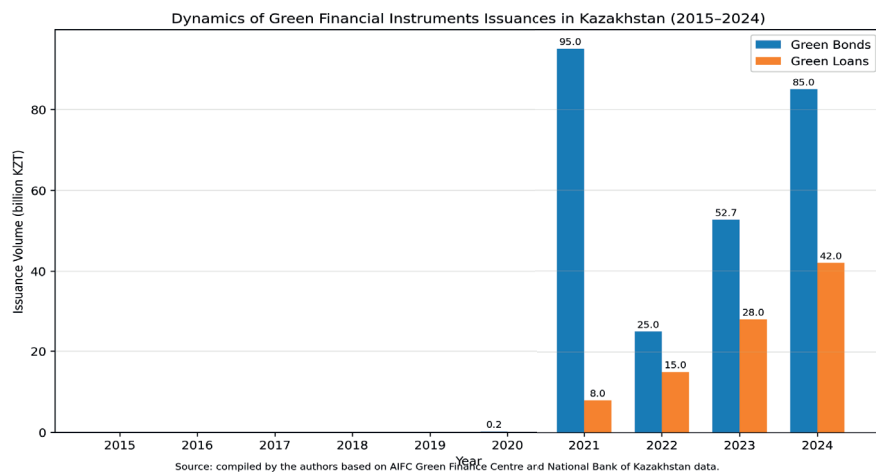


Figure 1 — Dynamics of issues of "green" financial instruments in Kazakhstan in 2015-2024, billion tenge

Source: compiled by the authors based on data from the (AIFC Center for Green Finance).

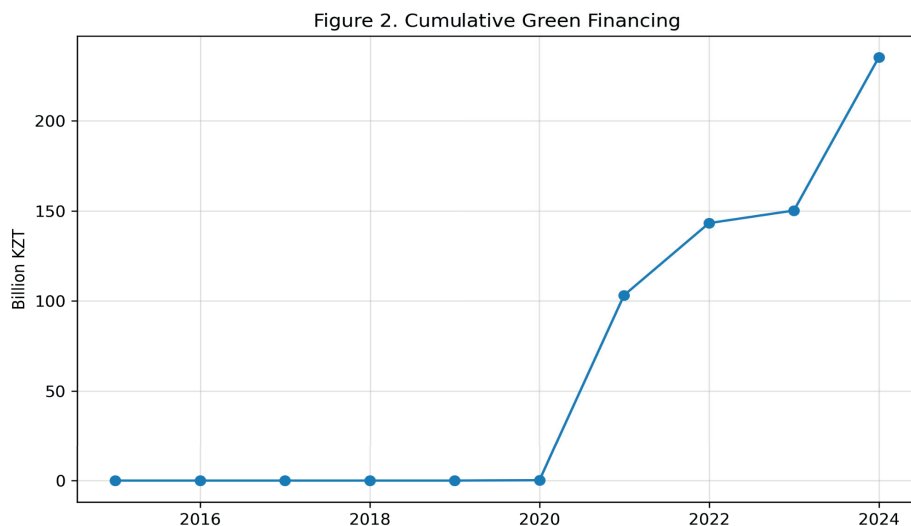


Figure 2 — Cumulative volume of "green" financing in Kazakhstan in 2015-2024, billion tenge
Source: compiled by the authors based on data from the (AIFC Center for Green Finance).

Turning to the structure of market participants, it should be noted that Kazakhstan's green finance market remains highly dependent on international financial institutions and organizations with state participation. As of October 2023, the dominant position was occupied by international financial institutions - the Asian Development Bank and the Eurasian Development Bank, whose combined share in the volume of issues was 43.3%. In second place were energy companies with state participation - JSC Samruk-Energo and JSC KEGOC, whose share reached 32.0%. State-owned financial institutions, including the Development Bank of Kazakhstan JSC and the Damu Entrepreneurship Development Fund, formed 16.6% of the market, while private financial institutions occupied 8.1%.

Table 2 — Structure of issuers of "green" financing in Kazakhstan as of October 2023

Category of issuers	Representatives	Volume of placements, billion tenge	Share, %
International financial institutions	ADB, EDB	65,0	43,3
Energy companies with state participation	JSC "Samruk-Energy", JSC "KEGOC"	48,0	32,0
Government financial institutions	DBK JSC, FRP Damu	25,0	16,6
Private financial institutions	Halyk Bank of Kazakhstan JSC	12,2	8,1
Total		150,2	100,0

Note. The categorization was carried out by the authors based on data on specific issuers.
Source: compiled by the authors based on data from the (AIFC Center for Green Finance).

The data in table 2 show that the market of "green" financing in Kazakhstan is still largely based on state and international development institutions. The private

sector, including second-tier banks, began to become more actively involved in this process only in 2023-2024. This indicates the need for further development of incentive mechanisms, including subsidizing interest rates, guaranteeing green projects, and unifying ESG disclosure requirements. There is a relatively balanced distribution between the key sectors of the low-carbon economy in terms of the use of "green" financing. Energy efficiency projects account for about 32% of the total amount of funds raised, renewable energy projects - 31%, and the remaining part belongs to mixed "green" projects. Energy efficiency projects include modernization of urban infrastructure, construction and operation of street lighting networks, reconstruction of power grids, reduction of energy consumption and reduction of greenhouse gas emissions.

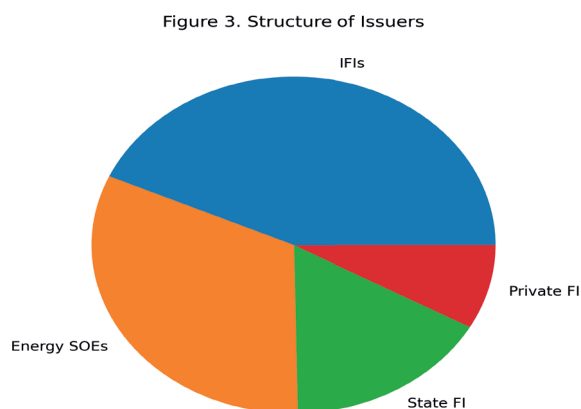


Figure 3 — The structure of issuers and the directions of using the funds of "green" financing in Kazakhstan

Source: compiled by the authors based on data from the (AIFC Center for Green Finance).

A special place in the "green" lending system is occupied by the Damu Entrepreneurship Development Fund, which is one of the key development institutions in the field of supporting small and medium-sized businesses. Within the framework of a joint project with the United Nations Development Program in Kazakhstan "Sustainable cities for low-carbon development", a mechanism for subsidizing projects in the field of energy conservation of urban infrastructure was developed. As of 2023 Within the framework of this program, 94 projects of entrepreneurs were approved for the amount of loans of 17 billion tenge, and subsidy agreements were signed for 32 projects worth 2 billion tenge. The mechanism provides for subsidizing the interest rate on loans up to 10% at a lending rate of up to 19%, which allows reducing the final interest rate for the borrower to no more than 9%. The subsidy period is up to 3 years with the possibility of prolongation up to 6 years. This tool is important for small and medium-sized businesses, since the high cost of borrowed capital remains one of the main barriers to the implementation of environmental projects.

Along with the Damu Fund, the Development Bank of Kazakhstan plays a strategic role in financing major infrastructure and energy projects. As of December 31, 2024, the share of renewable energy projects in DBK's loan portfolio was 4.4%, and the share of projects corresponding to the national taxonomy of "green" projects reached 11.6% (Development Bank of Kazakhstan, 2024). The capacity of renewable energy projects financed by the bank increased from 559.8 MW at the end of 2023 to 709.8 MW at the end of 2024. The absolute increase was 150 MW, or 26.8%. This indicates that DBK not only forms a portfolio of "green" projects, but also provides a specific production result in the form of an increase in the installed capacity of renewable energy facilities.

The Eurasian Development Bank, which is one of the largest international issuers of green bonds in the Kazakh market, also plays a significant role in the market. In September 2021, the EDB placed the debut issue of three-year green bonds in tenge in the amount of 20 billion tenge at a coupon rate of 10.5% per annum. In 2023, the bank continued to actively place sustainable financing instruments, including bonds worth 25 billion tenge and 50 billion tenge. The funds raised were used for projects in Kazakhstan, including energy and infrastructure modernization.

Among the second-tier banks, Halyk Bank of Kazakhstan JSC is the most prominent market participant. In December 2024, the bank became the first commercial bank in Kazakhstan to place green bonds worth 20 billion tenge. This event is important for the development of the market, as it demonstrates the transition of "green" financing from a predominantly quasi-governmental and international segment to the commercial banking sector. In addition, the bank participates in energy efficiency and renewable energy support programs implemented jointly with the Damu Foundation, and also finances environmental transport projects, including the purchase of compressed natural gas buses and the development of the electric vehicle market.

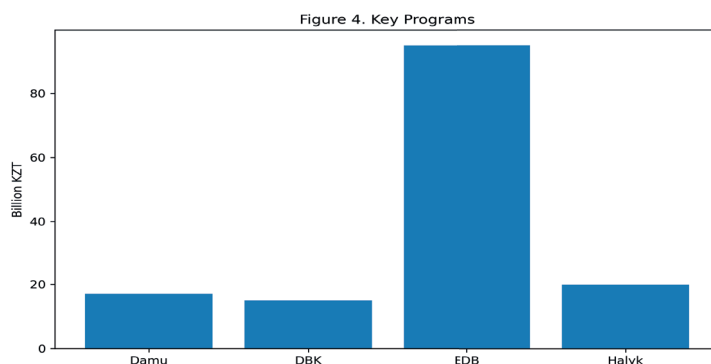


Figure 4 — Volumes of "green" lending and financing programs for key development institutions and second-tier banks in the Republic of Kazakhstan, billion tenge

Source: compiled by the authors on the basis of data from the (AIFC Center for Green Finance; DBK; FRP Damu).

To assess the current state of "green" lending in Kazakhstan, a comparison was made with international indicators. According to the AIFC Center for Green Finance, the share of the "green" portfolios of second-tier banks and the Development Bank of Kazakhstan in the total loan portfolios of banks amounted to approximately 1.15%, or 301.2 billion tenge, as of mid-2023. For comparison, in countries with developed green lending practices, the average share of green loans in total lending exceeds 10%. An 8-10-fold gap indicates a significant growth potential for this segment in Kazakhstan.

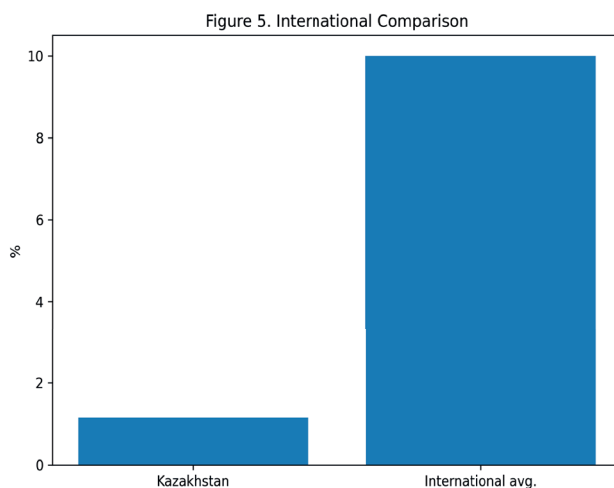


Figure 5 — The share of "green" lending in the total loan portfolio of banks in the Republic of Kazakhstan and international comparison

Source: compiled by the authors based on data from the AIFC Center for Green Finance and national regulators.

In order to identify the key macroeconomic factors influencing the dynamics of "green" financing, a correlation analysis was conducted for 2020-2024. The volume of "green" financing, GDP growth rates, inflation and the overall loan portfolio of the banking sector are used as factors.

Table 3 — Matrix of paired correlations of "green" financing and macroeconomic indicators for 2020-2024

Indicator	"Green" financing	GDP growth	Inflation	Loan portfolio
"Green" financing	1,000	0,853	−0,025	0,688
GDP growth	0,853	1,000	0,480	0,718
Inflation	−0,025	0,480	1,000	0,365
Loan portfolio	0,688	0,718	0,365	1,000

Note. The calculations were performed by the authors using the Pearson correlation coefficient.
Source: the authors' own calculations based on data from the (National Bank of the Republic of Kazakhstan; International Monetary Fund and the Agency of the Republic of Kazakhstan for Regulation and Development of the Financial Market).

The results of the correlation analysis show a high positive correlation between the volume of "green" financing and the GDP growth rate ($r = 0.853$). This indicates the close connection of this segment with the general macroeconomic dynamics. During periods of accelerated economic growth, there has been an increase in the volume of placements, which may be explained by an improved investment climate, increased investor confidence, and increased demand for long-term financial resources. A moderate positive correlation between the volume of "green" financing and the total loan portfolio of the banking sector ($r = 0.688$) confirms that the development of "green" lending is taking place in line with the general expansion of bank lending, however, this segment is developing with a certain lag, as it requires specialized project expertise, ESG assessment and confirmation of the environmental impact. At the same time, the close to zero correlation between "green" financing and inflation ($r = -0.025$) indicates the absence of a direct linear relationship between inflationary processes and the volume of "green" instruments. This may be explained by the multidirectional impact of inflation: on the one hand, it increases the cost of borrowed capital, on the other hand, it encourages enterprises to invest in energy efficiency to reduce operating costs.

To predict the volume of "green" financing in the medium term for 2025-2027, two alternative specifications of nonlinear models were applied: the exponential growth model and the logistic model. The use of nonlinear models is due to the high volatility of annual placement volumes and the dependence of the market on individual large transactions. The exponential model has the following form:

$$Y_t = a \cdot e^{b(t-2020)}$$

The logistic model is specified as follows:

$$Y_t = \frac{L}{1 + e^{-k(t-t_0)}}$$

where (Y_t) is the amount of annual "green" financing in the year (t); (a), (b), (L), (k), (t_0) are the estimated parameters of the model.

Table 4 — Forecast of the volume of "green" financing in the Republic of Kazakhstan for 2025-2027

Indicator	2025 y.	2026 y.	2027 y
Exponential forecast, billion tenge	170,2	236,7	329,1
Logistics forecast, billion tenge	170,2	236,6	329,0
The lower limit of the forecast, billion tenge	136,1	189,3	263,3
The upper limit of the forecast, billion tenge	204,2	284,0	394,9
Note. The calculations were performed by the authors using the nonlinear OLS method. The confidence interval is built taking into account the high volatility of the market. Source: the authors' own calculations.			

The obtained forecast values show that if the current pace of institutional development is maintained, the volume of "green" financing in Kazakhstan may increase from 170.2 billion tenge in 2025 to 329.1 billion tenge in 2027. Even the lower limit of the forecast assumes growth to 263.3 billion tenge by 2027, which indicates the high potential of the market. However, the implementation of this scenario depends on the increased participation of second-tier banks, the availability of long-term resources, the introduction of unified ESG reporting standards and the practical application of the national "green" taxonomy.

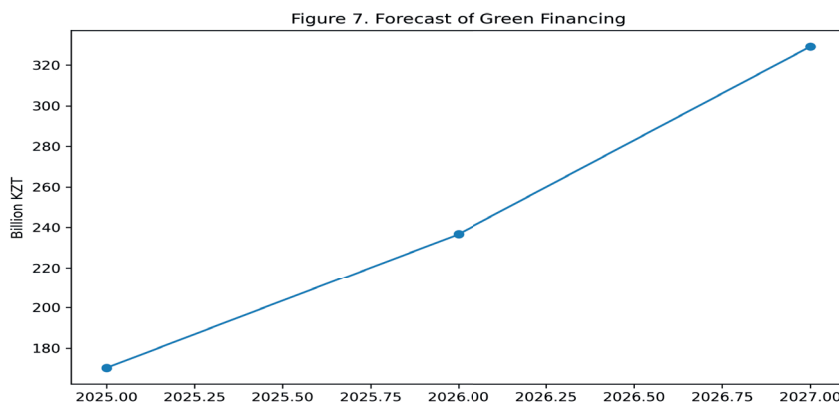


Figure 6 — Forecast of the volume of "green" financing in Kazakhstan for 2025-2027, billion tenge
Source: the authors' own calculations.

Summarizing the results obtained allows us to conclude that the "green" lending market in Kazakhstan has moved from the initial stage of formation to the stage of institutional development. If there were no labeled "green" instruments in 2015-2019, by 2024 a market had formed with the participation of international financial organizations, development institutions, energy companies and second-tier banks. International financial institutions and organizations with state participation remain the main drivers of market development, which is explained by the availability of long-term resources, project expertise and the ability to finance large infrastructure projects. At the same time, second-tier banks are gradually beginning to play a more active role in the development of "green" financing, and the debut placement of "green" bonds by a commercial bank in 2024 was an important signal of the expansion of banking participation in this segment.

At the same time, the development of green lending is hampered by a number of systemic constraints, including the high cost of borrowed capital, lack of long-term resources, weak ESG reporting by borrowers, lack of a uniform disclosure standard, and insufficient preparedness of small and medium-sized businesses to meet the requirements of green financing. Forecast calculations show a high potential for market growth: if current trends continue, the volume of "green" financing may exceed 329 billion tenge by 2027. However, achieving this level

requires expanding the participation of second-tier banks, improving subsidy mechanisms, developing guarantee instruments, and integrating the national "green" taxonomy into the lending procedures of financial institutions. Thus, the programs of "green" lending to second-tier banks and development institutions of the Republic of Kazakhstan have significant potential for further expansion, and the most promising is a mixed model based on the interaction of second-tier banks, development institutions and international financial organizations.

Discussion. The obtained research results make it possible to expand existing ideas about the mechanisms of development of "green" lending in emerging financial markets and confirm a number of provisions presented in modern scientific literature. The analysis showed that the development of the "green" financing market in the Republic of Kazakhstan is taking place in stages and is characterized by a gradual transition from institutional formation to the expansion of the practical application of sustainable financing tools.

The results of the study confirm the conclusions of Miroschnichenko and Brand (2021), according to which "green" lending is one of the most effective mechanisms for stimulating the ecological modernization of the economy. The authors note that banks are able to have a direct impact on the environmental transformation of enterprises through credit policy. The data obtained during the study indicate that in Kazakhstan this function is still implemented mainly by development institutions, while the participation of second-tier banks remains limited.

The revealed market structure is consistent with the conclusions of Gilchrist, Yu, and Zhong (2021), who indicate that large institutional participants with access to long-term financial resources dominate the early stages of sustainable finance development. In Kazakhstan, the Development Bank of Kazakhstan, the Damu Entrepreneurship Development Fund and the Eurasian Development Bank plays a similar role. It is these organizations that provide financing for capital-intensive projects in the field of renewable energy, infrastructure and energy efficiency.

The analysis showed that the share of second-tier banks in the total volume of "green" financing remains relatively low. This situation is typical for most emerging economies, as confirmed by Ozili research (2022). The author notes that limited long-term resources, underdeveloped ESG infrastructure and a high level of uncertainty prevent the active spread of "green" loans in the banking sector. The results obtained indicate that these restrictions are fully characteristic of the Republic of Kazakhstan.

The results of the study are consistent with the conclusions of Yameen, Kijkasiwat, Hussain, Farooq and Ajmal (2024), according to which the development of a "green" banking sector is impossible without integrating ESG approaches into the risk management and decision-making system. An analysis of Kazakh practice has shown that the implementation of ESG principles is still in the formative stages, and uniform standards for environmental impact assessment and information disclosure continue to develop. In this regard, the expansion of "green" lending requires further improvement of the institutional environment.

An important result of the study is the revealed relationship between the volume of "green" financing and the general macroeconomic conditions. The high positive correlation between the volume of "green" financial instruments and the growth rate of the economy indicates that the development of sustainable financing depends on investment activity and the general state of the financial system. This conclusion is consistent with the results of Zhou, Caldecott, Hoepner, and Wang (2020), who showed that the effectiveness of a green credit policy increases in conditions of macroeconomic stability and a well-developed environmental risk assessment system.

The analysis made it possible to establish that Kazakhstan is still significantly inferior to countries with a developed system of sustainable financing in terms of the penetration of "green" loans into the banking sector. The low share of "green" assets in the total loan portfolio of banks indicates the presence of significant potential for further growth. In this regard, the findings of the study confirm the position of Kuanova, Sagieva and Zaitenova (2024), who emphasize the need to adapt the international experience of sustainable financing to the specifics of the national economy.

The results also revealed a number of systemic limitations that hinder the further development of the market. The most significant problems include limited long-term financial resources, high cost of borrowed capital, insufficient standardization of "green" loan products, weak ESG reporting by borrowers, and insufficient business awareness of existing support tools. Urazgalieva, Sembiyeva and Kurmanova (2021), which highlights the need for comprehensive government support for the development of «green» finance, identified similar problems in the study.

The conclusion about the expediency of forming a mixed model for the development of "green" lending deserves special attention. The conducted research has shown that the model of interaction between second-tier banks, development institutions and state support mechanisms seems to be the most effective. This model allows combining the advantages of various market participants: commercial banks' access to a wide customer base, the availability of long-term resources from development institutions, and the ability to reduce financial risks through government support tools.

The practical significance of the results obtained lies in the possibility of using them in the development of measures to improve the national system of sustainable financing. In particular, the results of the study substantiate the need to expand the participation of second-tier banks in financing environmental projects, develop interest rate subsidy mechanisms, introduce common ESG reporting standards and further integrate the national taxonomy of "green" projects into the lending activities of financial organizations.

Despite the results, the study has certain limitations. Firstly, some of the information on individual programs is evaluative due to the lack of a unified disclosure system for "green" loans. Secondly, the limited time series does not

allow us to fully assess the long-term patterns of market development. Thirdly, the work focuses mainly on institutional and financial aspects, whereas the assessment of the actual environmental impact of implemented projects requires a separate study.

Thus, the results of the conducted research generally confirm the provisions of modern scientific literature on the increasing role of "green" lending in ensuring sustainable economic development. At the same time, the identified features of the Kazakh market indicate the need for further improvement of the institutional environment and increased participation of second-tier banks in financing environmentally oriented projects.

Conclusion. The conducted research made it possible to carry out a comprehensive analysis of the "green" lending programs of second-tier banks and development institutions of the Republic of Kazakhstan, identify the features of their functioning, identify the main trends in market development and assess the prospects for further expansion of sustainable financing mechanisms.

The results of the study showed that the market of "green" financing in Kazakhstan for the period 2015-2024 has passed the stage of active institutional formation. If there were practically no specialized "green" financial instruments before 2020, then in subsequent years the necessary organizational and regulatory prerequisites were created for the formation of a national system of sustainable financing. The development of the market was accompanied by the introduction of a national taxonomy of "green" projects, the appearance of the first "green" bonds and loans, as well as the gradual integration of ESG approaches into the activities of financial organizations.

It has been established that development institutions that provide financing for large infrastructure and energy projects play a key role in the development of the market at the present stage. At the same time, second-tier banks are gradually expanding their participation in the implementation of environmentally oriented initiatives, which indicates the gradual transition of "green" financing from a predominantly quasi-governmental segment to the commercial banking sector.

The comparative analysis showed that the programs of development institutions and second-tier banks have different directions and perform complementary functions. Development institutions are focused primarily on long-term capital-intensive projects, while second-tier banks have a higher potential for financing small and medium-sized businesses, energy efficiency projects and modernization of production processes. This allows us to consider these groups of financial institutions as elements of a unified system of sustainable financing.

The results of the quantitative analysis confirmed the existence of a close relationship between the development of "green" financing and the general macroeconomic conditions. The revealed positive relationship between the volume of "green" financial instruments and the pace of economic growth indicates that the expansion of the sustainable financing market is taking place in the context of increased investment activity and the development of the banking sector.

The study identified the main factors limiting the further development of "green" lending in the Republic of Kazakhstan. These include insufficient standardization of "green" financial products, limited long-term financial resources, high cost of borrowed capital, insufficient level of ESG reporting of enterprises, lack of uniform disclosure mechanisms and insufficient awareness of business entities about existing support tools.

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ISSN 2518–1467 (Online),

ISSN 1991–3494 (Print)

<http://www.bulletin-science.kz/index.php/en>

Managing Editor: A.Shormakova

Editors: D.S. Alenov, M.Konyrbekov

Computer layout: G.D. Zhadyranova

Signed for print: June 30, 2026

Format: 70×90 1/16. 48.0 printed sheets. Order No. 3