UDC 336.71
JEL: G15; G21; G23; Q01; O13
DOI: 10.33111/iep.eng.2026.44.02

Development of the Green Bond Market Amid the Transformation of the Global Financial Ecosystem

Yuliia Strilchuk[1],
Vladyslav Lavreniuk[2],
Mariia Sandul[3],
Andrii Bielinskyi[4]

ABSTRACT. This article examines the development of the sustainable bond market against the backdrop of the transformation of the global financial ecosystem and the growing need for long-term instruments capable of combining capital mobilisation with the achievement of environmental, social and governance (ESG) objectives. It is argued that sustainable bonds are gradually gaining significance not only as a debt instrument but also as an institutional mechanism for channelling financial flows towards projects with a measurable social impact. The structural framework of the work consists of a system of specific tasks, specifically: elucidating the nature and classification of sustainable bonds; identifying key trends in the development of the sustainable bond market; benchmarking best practices for issuing such instruments at a regional level against the backdrop of transformational changes in the global financial system; and, on this basis, developing proposals for the development of the sustainable bond market in Ukraine. Methods of systematic generalisation, comparative analysis, structural decomposition and critical evaluation of practices for issuing green, social, sustainable development and sustainability-linked bonds were employed. It has been established that the global sustainable bond market is characterised by dynamic but uneven development, a high concen-

[1] **Yuliia Strilchuk** — Candidate of Economic Sciences, Associate Professor, Associate Professor at the Department of Banking and Insurance, Kyiv National Economic University named after Vadym Hetman (Kyiv, Ukraine). Research interests: financing sustainable development, sustainable finance, green banking, bank lending, digitalisation. Email: julia.strilchuk@kneu.edu.ua. ORCID: https://orcid.org/0000-0001-8368-322X

[2] **Vladyslav Lavreniuk** — Candidate of Economic Sciences, Associate Professor, Associate Professor at the Department of Banking and Insurance, Kyiv National Economic University named after Vadym Hetman (Kyiv, Ukraine). Research interests: systemically important banks, financial stability, risk management, economic security of financial and credit institutions. Email: v.lavreniuk@kneu.edu.ua. ORCID: https://orcid.org/0000-0002-1069-0928

[3] **Mariia Sandul** — Candidate of Economic Sciences, Associate Professor, Associate Professor at the Department of International Trade and Marketing, Kyiv National Economic University named after Vadym Hetman (Kyiv, Ukraine). Research interests: international economics, sustainable development, international logistics, international trade, supply chains, sustainable finance, international competitiveness. Email: m.sandul@kneu.edu.ua. ORCID: https://orcid.org/0000-0001-6985-5179

[4] **Andrii Bielinskyi** — PhD student at the Department of Artificial Intelligence, Modelling and Statistics, Kyiv National Economic University named after Vadym Hetman (Kyiv, Ukraine). Research interests: modelling of complex systems, AI, machine learning, system forecasting, financial ecosystem. Email: bielinskyi.andrii99@gmail.com. ORCID: https://orcid.org/0000-0002-2821-2895

IEP, No. 44 (2026) pp. 23–39.
Received on: March 09, 2026 / Accepted for publication: April 20, 2026 / Published: May 29, 2026

ISSN (English edition) 1811-9832/2026/No. 1 (44)
ISSN (online) 1812-0660/2026/No. 1 (44)

tration of issuances in Europe, and the leading role of financial institutions, the energy sector and international financial organisations. It has been demonstrated that instruments with earmarked funds remain the most robust, as they ensure a more transparent link between the capital raised and specific projects. At the same time, risks have been identified regarding declarative sustainability labelling, weak linkage of financial terms to outcomes, and insufficient transparency in reporting. It has been determined that, for Ukraine, sustainable bonds could become an important instrument for financing economic recovery, modernising energy and social infrastructure, and supporting local communities, provided that a national taxonomy for sustainable finance is established, a system of independent verification is introduced, and there is adequate disclosure of information and risk-based supervision.
KEYWORDS: global financial ecosystem, banks, sustainable development, sustainable finance, sustainable banking, sustainable bonds, green bonds, sustainable development bonds, social bonds, sustainability, ESG.

Introduction

In the current context of the transformation of the global financial ecosystem, instruments capable of combining the mobilisation of long-term capital with the achievement of environmental, social and governance (ESG) objectives are becoming increasingly important. The intensification of climate risks, growing needs for financing the energy transition, infrastructure modernisation, social sustainability and post-war reconstruction are driving the search for financial mechanisms that not only secure the mobilisation of resources but also establish a transparent link between funding sources, the use of funds and measurable sustainable development outcomes. In this context, sustainable bonds issued to raise funds for projects that promote sustainable development take on particular significance; these include green bonds, social bonds, sustainable development bonds, and bonds linked to sustainable development indicators. The growing role of these instruments in international practice indicates a gradual shift from the traditional understanding of debt financing as a neutral mechanism for raising capital to viewing it as an institutional tool for channelling financial flows towards the achievement of socially significant goals. The significant diversity of these instruments expands the opportunities for issuers and investors, but at the same time complicates the issues of their regulation, verification, performance assessment, and the prevention of risks associated with the formal labelling of financial products as ‘green’ or ‘sustainable’. For Ukraine, the issue of bond market development is of particular importance, as the country requires substantial financial resources to restore critical infrastructure, modernise the energy sector, improve energy efficiency, support communities, develop affordable housing, revive business and adapt the economy to European standards of sustainable financing.

The development of the sustainable bond market in the current context of the financial ecosystem’s transformation is attracting considerable attention from academics and practitioners, which has led to a wide range of studies focusing on its institutional, regulatory and market aspects. Among these instruments, the greatest attention is currently being paid to the study of green bonds, which account for the lion’s share

of the entire sustainable bond segment[5], [6]. In particular, the works of foreign scholars extensively examine the institutional and regulatory aspects of the introduction of sustainable bonds[7], [8], as well as the key factors influencing the volume of green bond issuance[9]. Despite the relative novelty of such financial instruments, many studies analyse their impact on achieving the Sustainable Development Goals[10], [11], [12], [13], [14], [15]. Some studies also highlight the positive correlation between the most innovative instruments and their positive impact on sustainable development[16]. In studies of the market aspects of sustainable bonds, much attention has been paid to examining various aspects of green bond pricing[17], [18]. Finally, from a regional perspective, the issue of sustainable bonds and their impact on financial markets and sustainable development is most actively researched in the context of the EU[19], [20], China[21], [22], [23], the Asia-Pacific region[24], and Central Africa[25], [26].

---

[5] Luxembourg Green Exchange (n.d.). Dashboard. https://lgxhub-premium.luxse.com/

[6] Sandul, M., Strilchuk, Y., Primierova, O. (2025). The Impact of Financial Mechanisms for Sustainable Development on the Evolution of Global Value Chains. *International Economic Policy*, 1(42), 26–56. https://doi.org/10.33111/iep.eng.2025.42.02.

[7] Benlemlih, M., El Ouadghiri, I., Jaballah, J., & Peillex, J. (2026). On the legal foundations of green bonds. *Journal of Environmental Management*, 398, 128556. https://doi.org/10.1016/j.jenvman.2026.128556

[8] Chen, Y., & Zhao, Z. J. (2021). The rise of green bonds for sustainable finance: Global standards and issues with the expanding Chinese market. *Current Opinion in Environmental Sustainability*, 52, 54–57. https://doi.org/10.1016/j.cosust.2021.06.013

[9] Cicchiello, A. F., Cotugno, M., Monferrà, S., & Perdichizzi, S. (2022). What factors influence the issuance of green bonds? Evidence from the European bond market. *Finance Research Letters*, 50, 103190. https://doi.org/10.1016/j.frl.2022.103190

[10] Kaushik P, Garg V, Singh S, Kumar A (2025). Green bonds for sustainable energy transition: unlocking resource efficiency in Asia–Pacific. *Technological Sustainability*, Vol. 4 No. 3 pp. 311–327, doi: https://doi.org/10.1108/TECHS-03-2025-0048

[11] Lin, W., & Wang, J. (2025). Sustainable finance and carbon neutrality: The role of green bonds, ESG investments, and carbon pricing. *Journal of Environmental Management*, 395, 127731. https://doi.org/10.1016/j.jenvman.2025.127731

[12] Shah, S. S., Nakouwo, S. N., Sobirjonovna, G. M., & Khan, A. (2025). Exploring the sustainability impact of green bonds on ecological and resource capacities. *Renewable Energy*, 243, 122590. https://doi.org/10.1016/j.renene.2025.122590

[13] Teti, E., Baraglia, I., Dallocchio, M., & Mariani, G. (2022). The green bonds: Empirical evidence and implications for sustainability. *Journal of Cleaner Production*, 366, 132784. https://doi.org/10.1016/j.jclepro.2022.132784

[14] Ullah, F., Lu, Q., Jie, C., & Ullah, M. (2025). Role of green bonds in energy transition and environmental sustainability. *Energy*, 342, 139635. https://doi.org/10.1016/j.energy.2025.139635

[15] Wang, Y., Wang, R., & Mason, T. A. (2025). Exploring the impact of green bonds on sustainable development and financial markets: an ARDL-based causality approach. Finance Research Letters, 85, 107943. https://doi.org/10.1016/j.frl.2025.107943

[16] Hoque, M. E., Khalfaoui, R., Leccadito, A., & Mejri, S. (2025). Green and innovative assets in times of uncertainty: A portfolio perspective for environmental financial management. *Journal of Environmental Management,* 395, 127746. https://doi.org/10.1016/j.jenvman.2025.127746

[17] Nevatia, V. (2026). Sovereign green bonds: Risk-mitigating sustainability instruments in emerging markets. *Energy Economics*, 155, 109173. https://doi.org/10.1016/j.eneco.2026.109173

[18] Wu, Y. (2022). Are green bonds priced lower than their conventional peers? *Emerging Markets Review,* 52, 100909. https://doi.org/10.1016/j.ememar.2022.100909

[19] Christodoulou, P., Psillaki, M., Sklias, G., & Chatzichristofis, S. (2023). A blockchain-based framework for effective monitoring of EU Green Bonds. *Finance Research Letters*, 58, 104397. https://doi.org/10.1016/j.frl.2023.104397

[20] Smeets Křístková, Z., Cui, H., Rokicki, B., M'Barek, R., Van Meijl, H., & Boysen-Urban, K. (2025). European green bonds, carbon tax and crowding-out: The economic, social and environmental impacts of the EU's green investments under different financing scenarios. *Renewable and Sustainable Energy Reviews,* 211, 115330. https://doi.org/10.1016/j.rser.2025.115330

There are certain gaps in domestic economic science regarding research into financial instruments for sustainable development, as well as the theoretical foundations for the development of this area of scientific research. In particular, Shkvaruk D. and Donchak L.[27] emphasise the need to develop a clear conceptual framework and theoretical justification for the concept of 'green finance' in Ukrainian-language academic discourse. In addition, Varchenko O. et al.[28] explore the theoretical and institutional foundations of sustainable finance and its role in the context of Ukraine's post-war recovery. At the same time, considerable attention is paid to various aspects of sustainable finance; in particular, Stoliarchuk Y. et al.[29] focus on the study of green investment, emphasising the need to create a favourable environment for the implementation of green investment projects in Ukraine, especially in the context of intensifying competition for global environmental leadership.

Thus, an analysis of current research indicates that a significant proportion of academic works focus primarily on the environmental dimension of green bonds, their role in financing climate projects, and their impact on the cost of capital and the investment attractiveness of issuers. At the same time, less attention has been paid to issues such as the systematic comparison of different types of bonds, their effectiveness in transforming countries' financial ecosystems, the specific features of the participation of banks and other financial institutions as issuers and intermediaries, as well as the possibilities for adapting international experience to countries with capital markets that are at the stage of institutional development. Insufficient attention is also paid to the negative experience of using such instruments, in particular the risks of 'greenwashing' (sustainability-washing), the weak link between targets and actual

---

[21] Chen, Y., & Zhao, Z. J. (2021). The rise of green bonds for sustainable finance: Global standards and issues with the expanding Chinese market. *Current Opinion in Environmental Sustainability*, 52, 54–57. https://doi.org/10.1016/j.cosust.2021.06.013

[22] Lin, W., & Wang, J. (2025). Sustainable finance and carbon neutrality: The role of green bonds, ESG investments, and carbon pricing. *Journal of Environmental Management*, 395, 127731. https://doi.org/10.1016/j.jenvman.2025.127731

[23] Wu, Y. (2022). Are green bonds priced lower than their conventional peers? *Emerging Markets Review*, 52, 100909. https://doi.org/10.1016/j.ememar.2022.100909

[24] Kaushik P, Garg V, Singh S, Kumar A (2025). Green bonds for sustainable energy transition: unlocking resource efficiency in Asia–Pacific. *Technological Sustainability*, Vol. 4 No. 3 pp. 311–327, doi: https://doi.org/10.1108/TECHS-03-2025-0048

[25] Bhutta, U. S., Tariq, A., Farrukh, M., Raza, A., & Iqbal, M. K. (2022). Green bonds for sustainable development: Review of literature on development and impact of green bonds. *Technological Forecasting and Social Change*, 175, 121378. https://doi.org/10.1016/j.techfore.2021.121378

[26] Manasseh, C. O., Logan, C. S., Okanya, O. C., Ede, K. K., Onuselogu, O. C., Igwemeka, E. C., & Okonkwo, O. N. (2026). Exploring the interconnections between climate-green bond financing, sustainable environment and financial markets in Sub-Saharan Africa. *Sustainable Futures*, 11, 101661. https://doi.org/10.1016/j.sftr.2026.101661

[27] Shkvaruk, D., & Donchak, L. (2024). Green finance: theoretical aspects and operational features in Ukraine. Herald of Khmelnytskyi National University. *Economic Sciences*, 326(1), 123–127. https://doi.org/10.31891/2307-5740-2024-326-21

[28] Varchenko, O., Varchenko, O., Drahan, O., Tkachenko, K., Rybak, N., & Zubchenko, V. (2024). 'Green finance' in the post-war reconstruction of Ukraine: organisational and financial aspects. *Financial and Credit Activity Problems of Theory and Practice,* 3(56), 75–85. https://doi.org/10.55643/fcaptp.3.56.2024.4403

[29] Stoliarchuk, Y., Ilnytskyy, D., Rudkovskyy, S. (2023). Green investments as a mechanism of global sustainable development. *Herald of Khmelnytskyi National University. Economic sciences*. 2023. Volume 316, No. 2. pp. 241–246. https://doi.org/10.31891/2307-5740-2023-316-2-39

impact, insufficient transparency in reporting, and the limited additionality of the funding raised.

This issue is particularly relevant in the context of Ukraine. In particular, the conceptual and categorical framework in the field of sustainable bonds requires further development in domestic academic literature. Furthermore, the potential of sustainable bonds should be viewed not only through the prism of capital raising, but also through their ability to foster a new quality of interaction between the state, banks, international financial organisations, local communities, the corporate sector and investors. In this context, such bonds can serve not merely as a debt instrument, but as an element of the institutional architecture for recovery, combining financial resources, targeted projects, standardised reporting and measurable sustainable development outcomes.

The aim of this article is to justify the strategic directions for the development of the sustainable bond market in Ukraine by explaining their nature, identifying key trends in the development of the sustainable bond market, and benchmarking best practices for issuing such instruments at a regional level against the backdrop of the transformation of the global financial system.

Types of sustainable bonds in the modern global financial ecosystem

In the current climate, transformation processes based on sustainable development are taking place across various sectors of the economy. There is no doubt about the need to finance projects related to the green transition, as well as initiatives aimed at accelerating the achievement of sustainable development goals. In order to accumulate the necessary resources, there is a need to develop and implement innovative financial instruments, among which bonds play an important role, in particular green, social and sustainable development bonds, as well as bonds linked to sustainable development.

According to the definition of the International Capital Market Association, green, social and sustainable development bonds can be distinguished as any type of debt instrument where the proceeds from their issuance are used exclusively to finance relevant environmental and social projects or a combination thereof[30]:

- Green bonds are any debt instruments the proceeds of which are used exclusively to finance or refinance projects with clearly defined environmental benefits and which comply with the Core Components of the Green Bond Principles (GBP)[31]. According to these principles[32], eligible ‘green’ project categories include: renewable energy, energy efficiency, pollution prevention and control, environmentally sustain-

[30] ICMA (2022), Guidance Handbook, https://www.icmagroup.org/assets/GreenSocialSustainabilityDb/The-GBP-Guidance-Handbook-January-2022.pdf.

[31] Ibid.

[32] ICMA (2025). The Green Bond Principles. https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/green-bond-principles-gbp/

able management of natural resources and land use, conservation of terrestrial and aquatic biodiversity, clean transport, sustainable water and wastewater management, climate change adaptation, the circular economy and/or eco-efficient projects, as well as 'green' buildings. In this classification, 'blue bonds' and 'climate bonds', which focus respectively on environmental issues related to the seas and climate change, fall under the category of 'green bonds'[33].

- Social bonds — bonds issued to finance projects directly aimed at addressing or mitigating a specific social problem or achieving positive social outcomes, particularly for specific target groups, and which comply with the Core Components of the Social Bond Principles (SBP)[34]. The SBP[35] stipulates that social projects include providing or facilitating access to basic infrastructure, essential services, affordable housing, job creation, food security, socio-economic development and empowerment.
- Sustainability bonds are any debt instruments the proceeds of which are used exclusively to finance or refinance a combination of 'green' and social projects and which comply with the Core Components of GBP and SBP[36].

In addition to the above, sustainability-linked bonds are also distinguished — these are any debt instruments whose financial and/or structural characteristics (e.g., coupon, maturity, payment amount) may vary depending on whether the issuer meets pre-defined strategic ESG indicators within the set timeframes, and which comply with the Core Elements of the Sustainability-Linked Bond Principles (SLBP)[37].

According to the OECD, all these types of bonds are grouped under the umbrella term 'sustainable bonds.' Sustainable bonds can be classified into two main categories[38]:

1. *Use-of-proceeds bonds* are bonds where the proceeds from their issuance must be used, in whole or in part, to finance or refinance new or existing eligible 'green', social or sustainable projects. These include green, social and sustainable development bonds. In the case of such bonds issued by financial institutions, the proceeds are usually directed towards financing or refinancing loans for the implementation of the relevant projects.

2. *Sustainability-linked* bonds *(SLBs).* Proceeds from such bonds do not necessarily have to be invested in projects with an expected positive environmental or social impact.

It is possible to combine the 'earmarking' approach with the sustainable-linked bond approach if the issuer decides to direct the proceeds from such bonds towards specific projects that are eligible as 'green' or social, aligning their bonds simultaneously with all the key components of GBP/SBP/SLBP.

---

[33] ICMA (2025). The Green Bond Principles. https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/green-bond-principles-gbp/

[34] ICMA (2022). Guidance Handbook, https://www.icmagroup.org/assets/GreenSocialSustainabilityDb/The-GBP-Guidance-Handbook-January-2022.pdf.

[35] ICMA (2025). The Social Bond Principles. https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/social-bond-principles-sbp/

[36] ICMA (2022). Guidance Handbook, https://www.icmagroup.org/assets/GreenSocialSustainabilityDb/The-GBP-Guidance-Handbook-January-2022.pdf.

[37] Ibid.

[38] ICMA (2022), Guidance Handbook, https://www.icmagroup.org/assets/GreenSocialSustainabilityDb/The-GBP-Guidance-Handbook-January-2022.pdf.

Features and transformative trends in the development of the global sustainable bond market over the last decade

It is worth noting that sustainable bonds are regulated instruments and are subject to the same capital market and financial regulation rules as other listed fixed-income debt securities. Over the past decade, the use of sustainable bonds has grown significantly worldwide (Fig. 1).

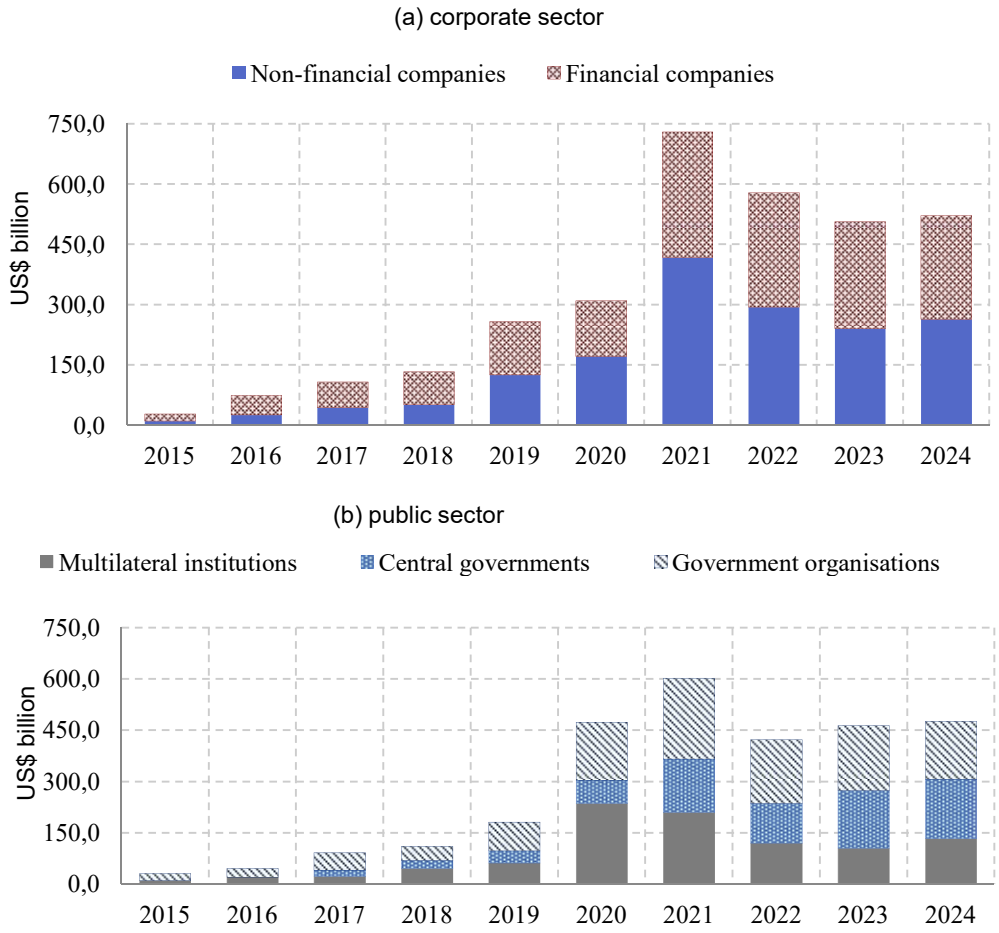

Fig. 1. Structure and dynamics of sustainable bond issuance in the corporate (a) and public (b) sectors, 2015–2024

Source: compiled by the authors based on[39].

[39] Organisation for Economic Co-operation and Development (2025). Sustainable bonds. Trends and Policy Recommendations. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en.html

The data in Fig. 1 show an upward trend in the volume of sustainable bond issuance by issuer, reflecting the transformational phases of rapid growth, market adaptation and the subsequent consolidation of sustainable instruments. Over the past five years, sustainable bonds have become an important source of financing in capital markets for both the corporate sector and the public sector, which includes central governments, government organisations (national government organisations, local authorities, national development banks), as well as multilateral institutions, which include organisations established by three or more jurisdictions (e.g. the International Finance Corporation), as well as the European Union. In 2024, companies issued a total of US$522 billion in sustainable bonds, of which US$473 billion were bonds issued by the public sector. The total volume of corporate sustainable bond issuance between 2020 and 2024 was four times higher than during the 2015–2019 period. At the same time, the volume of issuance by the public sector over the last five years has increased fivefold compared to 2015–2019.

In 2021, the corporate sector carried out a record issuance of US$728 billion, of which 58 per cent was accounted for by non-financial companies. The volume of fixed-income bonds issued by the public sector reached record levels in 2020 and 2021 — US$462 billion and US$508 billion respectively. In the following two years, corporate issuance declined slightly. This rapid surge occurred against the backdrop of the COVID-19 pandemic, when the implementation of monetary stimulus programmes by leading central banks and large-scale fiscal measures helped to reduce the cost of capital to record lows[40]. In 2023, the volume of corporate fixed-income bond issuance fell by 30 per cent compared with 2021, with the public sector experiencing a similar decline. In 2024, bond issuance rose again—by 3 per cent compared with the previous year.

However, the end of quantitative easing and the sharp rise in key interest rates by the US Federal Reserve and the ECB during 2022–2023 led to a significant market correction. According to analytical reports, in 2023, corporate issuance of fixed-income instruments fell by 30 per cent relative to the historical highs of 2021, whilst the public sector showed a similar decline[41]. Signs of market stabilisation only emerged in 2024, when the level of corporate borrowing rose by 3 per cent year-on-year, reaching US$522 billion[42]. This development trajectory clearly confirms that the environmental and social debt segment is not immune to macro-financial instability and is directly dependent on global resource costs.

Research into the public sector reveals marked structural heterogeneity among different categories of entities. In 2024, the total volume of debt on fixed-rate bonds was distributed as follows: US$891 billion was held by public sector organisations,

[40] Organisation for Economic Co-operation and Development. (2026). Corporate debt market outlook in a transforming world: Global debt report 2026. https://www.oecd.org/en/publications/global-debt-report-2026_e9d80efd-en/full-report/corporate-debt-market-outlook-in-a-transforming-world_cf86a220.html

[41] Organisation for Economic Co-operation and Development (2025). Sustainable bonds. Trends and Policy Recommendations. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en.html

[42] Organisation for Economic Co-operation and Development. Trends in the sustainable bond markets: Sustainable bonds. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en/full-report/component-5.html

US$718 billion by multilateral institutions, and US$612 billion by central governments. International financial organisations (in particular the World Bank Group and the EBRD) remain the key market drivers, accounting for 34 per cent of all issuances within the official sector[43]. The specific nature of their activities, focused on impact investing, leads to the organic integration of sustainable instruments into the funding structure. Local authorities are also showing significant momentum, channelling sustainable borrowing to cover around 9 per cent of their financial needs. EU member states are particularly active in this segment, integrating green finance into the implementation of strategic climate programmes[44].

The identified trend regarding the institutional affiliation of issuers deserves special attention, as it challenges established notions of the public sector's exclusive role in ESG financing. Analytical data for 2023–2024 indicate that the lead in the use of sustainable development instruments has passed to private (unlisted) entities[45].

In particular, within the structure of corporate non-financial debt, unlisted companies accounted for 58 per cent of total issuance, whilst large public corporations represented in the MSCI indices accounted for only 27 per cent, and small public businesses for 15 per cent of the volume. A similar situation is observed in the financial sector, where the share of private institutions in fixed-income bond issues reached 55 per cent, significantly outpacing the 35 per cent figure for large public institutions[46].

This transformation is driven by the rapid expansion of the global private debt market, whose asset volume had grown to US$1.8 trillion by mid-2025[47]. Furthermore, unlisted structures, which often act as specialised operators of large-scale energy and infrastructure initiatives, are choosing green bonds as an effective route to capital, bypassing cumbersome listing procedures. This allows for the optimisation of regulatory costs and focuses disclosure exclusively on verifying the performance of environmental projects. Figure 2 details the geographical and sectoral landscape of the market, highlighting a high level of asymmetry.

The data in fig. 2 indicates that the European region retains its status as the undisputed leader in the global sustainable debt segment. A retrospective analysis for 2015–2024 shows that European issuers accounted for 50 per cent of global sustainable bond issuance, demonstrating dominance in both the corporate segment and the public sector[48].

---

[43] Organisation for Economic Co-operation and Development. Trends in the sustainable bond markets: Sustainable bonds. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en/full-report/component-5.html

[44] Organisation for Economic Co-operation and Development (2025). Sustainable bonds. Trends and Policy Recommendations. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en.html

[45] Ibid.

[46] Organisation for Economic Co-operation and Development. Trends in the sustainable bond markets: Sustainable bonds. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en/full-report/component-5.html

[47] Organisation for Economic Co-operation and Development. (2026). Corporate debt market outlook in a transforming world: Global debt report 2026. https://www.oecd.org/en/publications/global-debt-report-2026_e9d80efd-en/full-report/corporate-debt-market-outlook-in-a-transforming-world_cf86a220.html

[48] Organisation for Economic Co-operation and Development. Trends in the sustainable bond markets: Sustainable bonds. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en/full-report/component-5.html

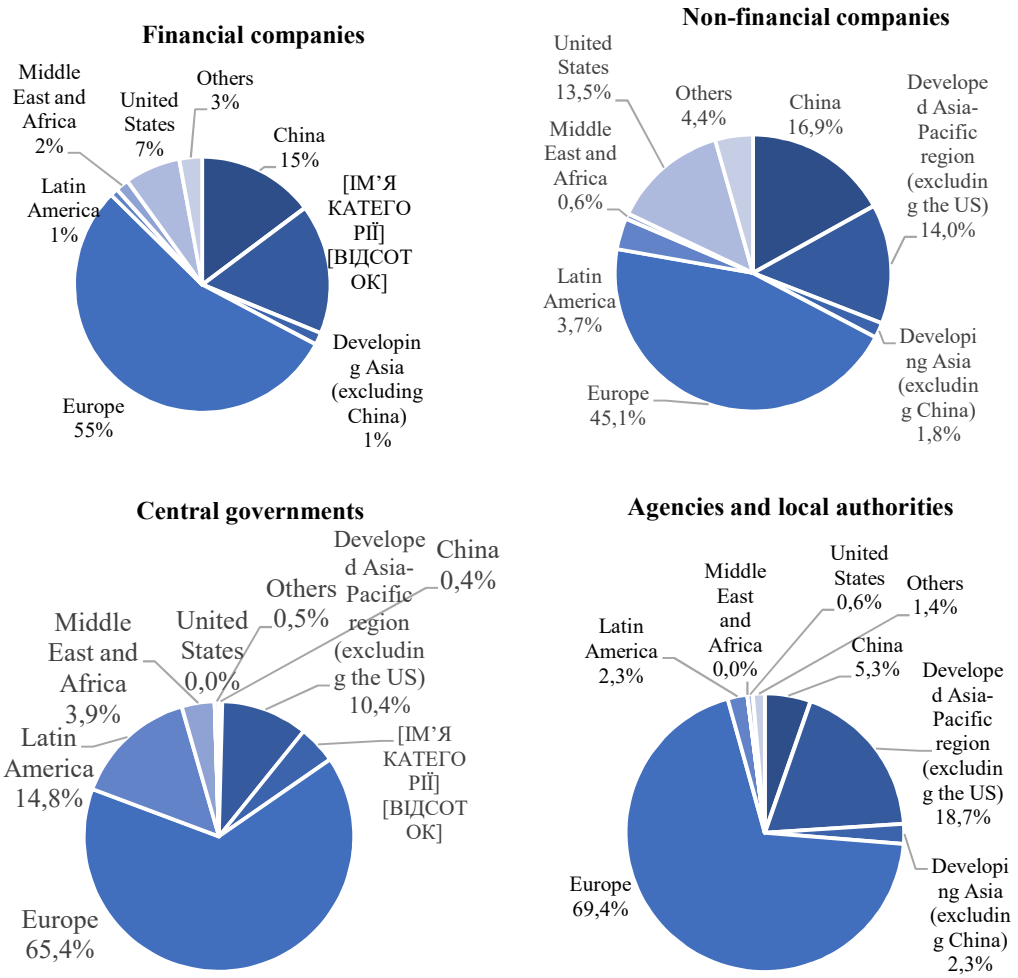

Fig. 2. Geographical breakdown of global sustainable bond issuance volumes in 2015–2024.

Source: compiled using data from[49].

A structural breakdown of the sovereign segment confirms the exceptional role of European governments, which account for 65 per cent of total issuance, whilst the figure for Latin American countries stands at just 15 per cent. This institutional concentration is driven by the development of a robust regulatory framework, in particu-

[49] Organisation for Economic Co-operation and Development (2025). Sustainable bonds. Trends and Policy Recommendations. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en.html

lar through the implementation of the European Taxonomy, the SFDR Regulation and the development of EuGB standards, which systematically encourage the reallocation of financial flows towards environmentally significant assets[50]. In contrast, the Chinese market in 2024 showed a downward trend in GSSS-instrument issuances due to local entities reorienting towards traditional debt markets in an effort to minimise funding costs against the backdrop of an economic slowdown[51].

OECD analytical data enables an assessment of the extent to which sustainable instruments have been integrated into the overall borrowing structure by sector[52]. The study shows that green bonds have evolved from highly specialised mechanisms into dominant financial strategies for two key sectors:

1. Financial institutions: the share of environmentally oriented instruments in the overall borrowing structure of this sector has shown significant volatility, rising from 18 per cent in 2020 to a record 41 per cent in 2022, with a subsequent stabilisation at 31 per cent as of 2024[53]. Within the framework of the financial ecosystem, banking institutions act as key intermediaries, raising capital through the issuance of green bonds on global markets to subsequently channel liquidity in the form of targeted lending to small business projects and retail consumers as part of the development of sustainable banking.

2. Energy supply and utilities infrastructure (utilities): as a driving force behind the low-carbon transition, this sector recorded a share of sustainable debt at 28 per cent in 2024, whereas in 2021 this figure reached its peak of 37 per cent[54].

At the same time, other segments of the economy show a significantly lower level of integration of such instruments. An analysis of the sectoral structure for 2024 shows that the consumer goods sector accounts for 9 per cent, industrial production for 8 per cent, and the technology and energy sectors (oil and gas segment) for 5 per cent each. The most significant decline was recorded in the healthcare sector, where the figure fell to a low of 1 per cent, whereas at the peak of the 2021 pandemic it remained at 11 per cent[55]. This distribution confirms the selectivity of investors, who are focusing resources on capital-intensive sectors with a critical need for ESG modernisation, such as finance and energy, whilst viewing sustainable transformation in other sectors as a lower priority.

Figure 3 shows the market structure by type of financial instrument, illustrating the shift in priorities among key players and the evolution of institutional preferences.

---

[50] National Bank of Ukraine. (2025). Sustainable finance development policy. https://bank.gov.ua/admin_uploads/article/Policy_rozvytok-stalogo-finansuvannja_2025_en.pdf?v=4

[51] Amundi Research Centre. (2024). Emerging market green bonds — Report 2024. https://research-center.amundi.com/article/emerging-market-green-bonds-report-2024

[52] Organisation for Economic Co-operation and Development (2025). Sustainable bonds. Trends and Policy Recommendations. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en.html

[53] Organisation for Economic Co-operation and Development (2025). Sustainable bonds. Trends and Policy Recommendations. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en.html

[54] Ibid.

[55] Organisation for Economic Co-operation and Development. Trends in the sustainable bond markets: Sustainable bonds. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en/full-report/component-5.html

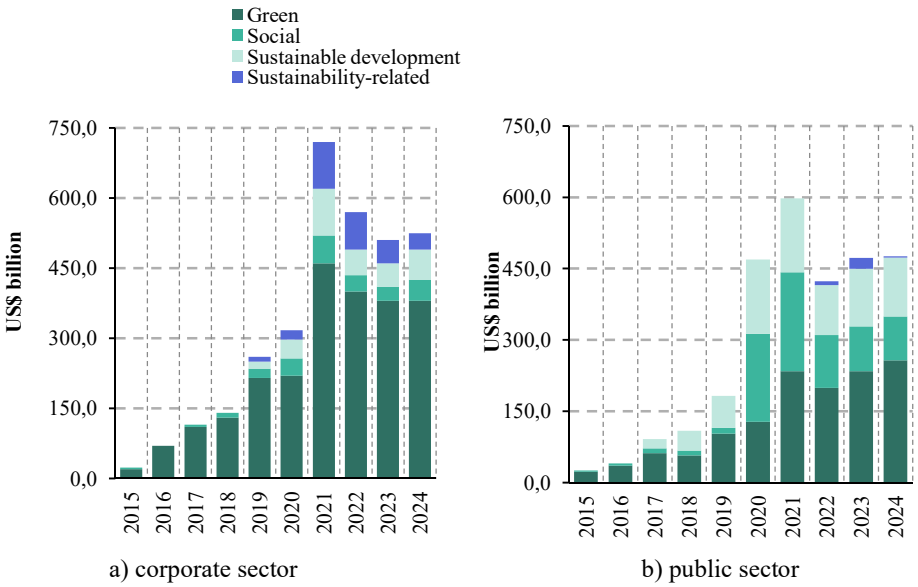

Fig. 3. Structural breakdown of the global sustainable bond market by financial instrument, 2015–2024

Source: compiled using data from[56]

The data in Fig. 3 show that green bonds hold undisputed leadership in the global segment, accounting for the lion's share of total issuance in 2024: corporate issuance reached US$382 billion, whilst the public sector accounted for US$257 billion[57]. A retrospective analysis shows that by 2020, this instrument accounted for around 92 per cent of the total volume of sustainable corporate borrowing; however, the subsequent emergence of alternative mechanisms has contributed to a gradual diversification of the market structure. For sovereign and multilateral issuers, social bonds (22 per cent) and sustainable development bonds (26 per cent) remain critically important, due to their focus on impact investing, particularly in the areas of poverty alleviation, housing infrastructure development and labour market support[58].

The dynamics of the SLB segment serve as the most representative indicator of market self-regulation in response to identified institutional shortcomings. Having emerged in 2019, these instruments demonstrated rapid expansion thanks to operational flexibility and the absence of strict earmarking of resources. Peak activity was recorded in 2021, when the volume of issuance reached a historic high of US$115 bil-

[56] Organisation for Economic Co-operation and Development (2025). Sustainable bonds. Trends and Policy Recommendations. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en.html
[57] Ibid.
[58] Organisation for Economic Co-operation and Development (2025). Sustainable bonds. Trends and Policy Recommendations. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en.html

lion. However, by 2023, figures had fallen by a third, and by the end of 2024, borrowing volumes had stabilised at US$35 billion, representing around 7 per cent of total corporate issuance. Within the public sector, this mechanism has not proven viable, accounting for a marginal share of 1 per cent of total issues[59].

According to OECD analytical reports, the fundamental factor behind this market correction is a lack of effective structuring of instruments, manifested through a combination of inadequate call options with insufficiently stringent financial consequences for issuers. A retrospective study covering 2015–2024 indicates that a critical mass of corporate SLBs (around 79 per cent) contained embedded call options granting the right to early redemption of debt obligations. In the public sector, the share of such instruments reached 47 per cent, whereas in the segment of traditional GSS bonds, the corresponding figure did not exceed a marginal level of 4 per cent[60].

This structural feature opened the door to manipulative financial arbitrage strategies. In cases where issuers predicted that the declared environmental targets (in particular, a 20 per cent reduction in CO_2 emissions) could not be met and sought to avoid the penalty-based increase in debt servicing costs, they utilised the mechanism of early redemption via call options prior to the verification of KPI performance. As a result, the financial incentive system lost its effectiveness, transforming the bonds into a tool for formal 'greenwashing'[61]. In response to the identified institutional asymmetry, large investors shifted their focus to classic Use-of-Proceeds bonds, which ensure a transparent link between the raised funds and specific environmental assets.

Strategic directions for the development of the sustainable bond market in Ukraine

Drawing on global experience, it is worth noting that for Ukraine, sustainable bonds could become a source of long-term capital and, in a broader sense, an element of the institutional architecture for recovery, capable of pooling the resources of the state, international financial organisations, banks, local authorities, businesses and investors. Issues focused on the restoration of critical infrastructure, energy efficiency, renewable energy, affordable housing, and support for communities and entrepreneurship hold the greatest potential. A prerequisite for their effective use is the formal adoption of international practices and the creation of a system of criteria, reporting, verification and supervision adapted to the conditions of a wartime and post-war economy.

Comprehensive benchmarking of global trends allows us to formulate the following strategic directions for the development of the sustainable bond market in Ukraine:

---

[59] Organisation for Economic Co-operation and Development. Trends in the sustainable bond markets: Sustainable bonds. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en/full-report/component-5.html

[60] Ibid.

[61] Amundi Research Centre. (2024). Emerging market green bonds — Report 2024. https://research-center.amundi.com/article/emerging-market-green-bonds-report-2024

1. European alignment. Analysis shows that Europe accounts for over 50 per cent of global issuance and demand for sustainable bonds[62]. Given Ukraine's course towards European integration, the NSSMC, the Ministry of Environment and the Government face the need to adopt a National Taxonomy for Sustainable Finance in line with the EU Taxonomy, as attempts to forge a unique Ukrainian path or relax the criteria will hinder Ukrainian companies' access to European ESG funds.

2. A shift away from SLBs in favour of Use-of-Proceeds. The global crisis of confidence in sustainability-linked bonds (SLBs), reflected in a decline in issuance, and investor concerns about greenwashing due to early redemption options, send a clear signal. Therefore, in the early stages of recovery, it is advisable for Ukrainian issuers to focus entirely on issuing traditional Green and Social Bonds (use-of-proceeds), as only the strict, transparent allocation of funds to specific, physical reconstruction projects (power grids, schools, hospitals, etc.) will secure investor confidence.

3. The use of green bonds as a key source of access to international capital. The OECD notes that the green premium has narrowed to a statistical margin of error (1.2 basis points) in a high-interest-rate environment[63]. Therefore, green bonds in Ukraine should be viewed not as a tool for obtaining artificially cheap loans, but exclusively as a mechanism for accessing a new, vast pool of international capital that lacks mandates to invest in conventional debt in risky markets.

4. Establishment of a verification ecosystem. The NSSMC's decisions must be transformed from advisory to mandatory. To reduce issuers' transaction costs, the state should facilitate the creation of a national register of independent verifiers and auditors capable of providing internationally recognised second-party opinions. Additionally, it would be advisable for donors (for example, through the *Ukraine Facility*) to establish a special fund to cover the costs incurred by Ukrainian municipalities and medium-sized businesses in undergoing ESG compliance and verification procedures.

5. Development of sustainable banking. Analysis of global trends has shown that banks play an important role in the development of the sustainable bond market, and the financial sector in particular is a key issuer of various types of sustainable bonds. Given the realities in Ukraine, there is a need to accumulate significant resources for economic recovery, and a need to develop new areas and instruments of financing. The development of sustainable banking, and in particular work with sustainable bonds, should be considered a priority area for the transformation of banking activities and the financial system as a whole.

6. The introduction of blended finance instruments. Currently, given the high risks involved, there is a need to create mechanisms for de-risking Ukrainian corporate sustainable bonds in order to attract international investors. To this end, it would be advisable to introduce blended finance, specifically by reformatting the support provided by international financial organisations (the World Bank, EBRD, EIB) from

[62] Organisation for Economic Co-operation and Development. Trends in the sustainable bond markets: Sustainable bonds. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en/full-report/component-5.html

[63] Organisation for Economic Co-operation and Development (2025). Sustainable bonds. Trends and Policy Recommendations. https://www.oecd.org/en/publications/sustainable-bonds_26726c68-en.html

exclusively direct project lending to the provision of partial credit guarantees for issues of Ukrainian corporate and municipal sustainable bonds.

For Ukraine, green bonds could become a source of long-term capital and, in a broader sense, an element of the institutional architecture for recovery—capable of pooling the resources of the state, international financial organisations, banks, local authorities, businesses and investors. Issues focused on the restoration of critical infrastructure, energy efficiency, renewable energy, affordable housing, and support for communities and entrepreneurship hold the greatest potential. A prerequisite for their effective use is the formal adoption of international practices and the creation of a system of criteria, reporting, auditing and oversight adapted to the conditions of a wartime and post-war economy.

Conclusions

The sustainable bond market has moved beyond the narrow segment of environmentally oriented debt financing and is evolving into an institutional mechanism for channelling capital in line with sustainable development priorities. Its evolution reflects a shift in the logic of the financial ecosystem, where the targeted use of funds, the measurability of results, transparency of reporting, verification and issuer accountability are becoming key determinants. The global market for sustainable bonds is developing unevenly and remains sensitive to macro-financial conditions, the cost of capital, regulatory certainty and investor confidence. Europe's dominance in this segment is explained by the size of its capital market and the presence of a developed regulatory framework, a taxonomy of sustainable activities, disclosure standards and external assessment mechanisms. At the same time, the decline in the issuance of certain types of bonds, particularly instruments linked to sustainability indicators, highlights the limitations of models that lack a strong link between borrowing conditions and actual outcomes.

Fundamentally, the development of the sustainable bond market should be based on the need for financial resources; however, in the absence of a high-quality taxonomy, reliable impact assessment, issuer accountability and investor protection, sustainable bonds may lose credibility and become a means of declarative labelling. Further research in this area should focus on methodologies for assessing the performance of the sustainable bond market in Ukraine, a risk-based supervision model for their issuance, the role of banks as intermediaries in sustainable financing, and mechanisms for attracting international capital to recovery projects.

In this regard, the prospects for further research in this area are linked to the development of comprehensive approaches to the development of the sustainable bond market in Ukraine, in particular through the adaptation of international standards and practices to national conditions, the assessment of the effectiveness of their application in the context of post-war reconstruction, and the creation of institutional prerequisites for scaling up the relevant financial instruments.

*This article was translated from its original in Ukrainian.

References

1. Amundi Research Centre. *Emerging Market Green Bonds — Report 2024*. 2024. https://research-center.amundi.com/article/emerging-market-green-bonds-report-2024

2. Benlemlih, M., I. El Ouadghiri, J. Jaballah, and J. Peillex. «On the Legal Foundations of Green Bonds.» *Journal of Environmental Management* 398 (2026): 128556. https://doi.org/10.1016/j.jenvman.2026.128556

3. Bhutta, Umair S., Adeel Tariq, Muhammad Farrukh, Ali Raza, and Muhammad K. Iqbal. «Green Bonds for Sustainable Development: Review of Literature on Development and Impact of Green Bonds.» *Technological Forecasting and Social Change 175*, (2022): 121378. https://doi.org/10.1016/j.techfore.2021.121378.

4. Chen, Yujin, and Zhirong J. Zhao. «The Rise of Green Bonds for Sustainable Finance: Global Standards and Issues with the Expanding Chinese Market.» *Current Opinion in Environmental Sustainability 52*, (2021): 54–57. https://doi.org/10.1016/j.cosust.2021.06.013.

5. Christodoulou, P., M. Psillaki, G. Sklias, and S.A. Chatzichristofis. «A Blockchain-based Framework for Effective Monitoring of EU Green Bonds.» *Finance Research Letters 58*, (2023): 104397. https://doi.org/10.1016/j.frl.2023.104397.

6. Cicchiello, Antonella F., Matteo Cotugno, Stefano Monferrà, and Salvatore Perdichizzi. «Which Are the Factors Influencing Green Bonds Issuance? Evidence from the European Bonds Market.» **Finance Research Letters* 50*, (2022): 103190. https://doi.org/10.1016/j.frl.2022.103190

7. Hoque, Mohammad E., Rabeh Khalfaoui, Arturo Leccadito, and Sami Mejri. «Green and Innovative Assets in Times of Uncertainty: A Portfolio Perspective for Environmental Financial Management.» *Journal of Environmental Management 395*, (2025): 127746. https://doi.org/10.1016/j.jenvman.2025.127746

8. ICMA. *Guidance Handbook*. 2022. https://www.icmagroup.org/assets/ GreenSocialSustainabilityDb/The-GBP-Guidance-Handbook-January-2022.pdf.

9. ICMA. *The Green Bond Principles.* 2025. https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/green-bond-principles-gbp/

10. ICMA. *The Social Bond Principles.* 2025. https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/social-bond-principles-sbp/

11. Jankovic, Irena, Vladimir Vasic, and Vlado Kovacevic. «Does Transparency Matter? Evidence from Panel Analysis of the EU Government Green Bonds.» *Energy Economics 114*, (2022): 106325. https://doi.org/10.1016/j.eneco.2022.106325.

12. Kaushik, P., V. Garg, S. Singh, and A. Kumar. «Green Bonds for Sustainable Energy Transition: Unlocking Resource Efficiency in Asia–Pacific.» *Technological Sustainability* 4, no. 3 (2025): 311–327. https://doi.org/10.1108/TECHS-03-2025-0048

13. Lin, Wang, and Jing Wang. «Sustainable Finance and Carbon Neutrality: The Role of Green Bonds, ESG Investments, and Carbon Pricing.» *Journal of Environmental Management 395*, (2025): 127731. https://doi.org/10.1016/j.jenvman.2025.127731.

14. Luxembourg Green Exchange. *Dashboard*. https://lgxhub-premium.luxse.com/

15. Manasseh, Charles O., Chine S. Logan, Ogochukwu C. Okanya, Kenechukwu K. Ede, Odidi C. Onuselogu, Ebele C. Igwemeka, and Osmond N. Okonkwo. «Exploring the Interconnections between Climate-green Bond Financing, Sustainable Environment and Financial Markets in Sub-Saharan Africa.» *Sustainable Futures 11*, (2026): 101661. https://doi.org/10.1016/j.sftr.2026.101661.

16. National Bank of Ukraine. *Sustainable finance development policy*. 2025. https://bank.gov.ua/admin_uploads/article/Policy_rozvytok-stalogo-finansuvannja_2025_en.pdf?v=4

17. Nevatia, Vedanshi. «Sovereign Green Bonds: Risk-mitigating Sustainability Instruments in Emerging Markets.» *Energy Economics 155*, (2026): 109173. https://doi.org/10.1016/j.eneco.2026.109173.

18. OECD. *Global Debt Report 2024: Bond Markets in a High-Debt Environment*. Paris: OECD Publishing, 2024. https://doi.org/10.1787/91844ea2-en

19. OECD. *Global Debt Report 2026: Sustaining Debt Market Resilience Under Growing Pressure*, OECD Publishing, Paris, 2026. https://doi.org/10.1787/e9d80efd-en.

20. OECD. *Sustainable Bonds: Trends and Policy Recommendations*, OECD Publishing, Paris, 2025. https://doi.org/10.1787/26726c68-en.

21. OECD. *Sustainable Bonds: Trends and Policy Recommendations*. OECD Publishing, Paris, 2025. https://doi.org/10.1787/26726c68-en.

22. Sandul, M., Strilchuk, Y., Primierova, O. «The Impact of Financial Mechanisms for Sustainable Development on the Evolution of Global Value Chains.» *International Economic Policy, 1(42),* (2025): 26–56. https://doi.org/10.33111/iep.eng.2025.42.02.

23. Shah, Syed S., Solomon N. Nakouwo, Gulnora M. Sobirjonovna, and Anwar Khan. «Exploring the Sustainability Impact of Green Bonds on Ecological and Resource Capacities.» *Renewable Energy 243*, (2025): 122590. https://doi.org/10.1016/j.renene.2025.122590

24. Shkvaruk, D., & Donchak, L. «Green finance: theoretical aspects and operational features in Ukraine.» *Herald of Khmelnytskyi National University. Economic Sciences*, *326*(1), (2024): 123–127. https://doi.org/10.31891/2307-5740-2024-326-21

25. Smeets Křístková, Z., H.D. Cui, B. Rokicki, R. M'Barek, H. Van Meijl, and K. Boysen-Urban. «European Green Bonds, Carbon Tax and Crowding-out: The Economic, Social and Environmental Impacts of the EU's Green Investments under Different Financing Scenarios.» *Renewable and Sustainable Energy Reviews 211*, (2025): 115330. https://doi.org/10.1016/j.rser.2025.115330.

26. Stoliarchuk, Y., Ilnytskyy, D., Rudkovskyy, S. «Green investments as a mechanism of global sustainable development.» *Herald of Khmelnytskyi National University. Economic sciences*, vol. 316, No. 2, (2023): 241–246. https://doi.org/10.31891/2307-5740-2023-316-2-39

27. Teti, Emanuele, Icaro Baraglia, Maurizio Dallocchio, and Giovanna Mariani. «The Green Bonds: Empirical Evidence and Implications for Sustainability.» *Journal of Cleaner Production* 366, (2022): 132784. https://doi.org/10.1016/j.jclepro.2022.132784.

28. Ullah, Farid, Qianjin Lu, Chen Jie, and Mirzat Ullah. «Role of Green Bonds in Energy Transition and Environmental Sustainability.» *Energy 342*, (2025): 139635. https://doi.org/10.1016/j.energy.2025.139635.

29. Varchenko, O., Varchenko, O., Drahan, O., Tkachenko, K., Rybak, N., & Zubchenko, V. «Green finance» in the post-war reconstruction of Ukraine: organisational and financial aspects.» *Financial and Credit Activity Problems of Theory and Practice*, *3*(56), (2024): 75–85. https://doi.org/10.55643/fcaptp.3.56.2024.4403

30. Wang, Yi, Rui Wang, and Tajul A. Mason. «Exploring the Impact of Green Bonds on Sustainable Development and Financial Markets: An ARDL-based -Causality Approach.» *Finance Research Letters 85*, (2025): 107943. https://doi.org/10.1016/j.frl.2025.107943.

31. Wu, Yue. «Are Green Bonds Priced Lower than Their Conventional Peers?» *Emerging Markets Review 52*, (2022): 100909. https://doi.org/10.1016/j.ememar.2022.100909.