

Green Finance in Indonesia: Implementation and Challenges

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Abstract

The transition toward a low-carbon economy has increased the need for financing mechanisms that incorporate environmental considerations. In Indonesia, the implementation of green finance has continued to develop through strengthened policy frameworks, green financing instruments, and market-based mechanisms, although various challenges remain. This study aims to examine the implementation of green finance in Indonesia by reviewing policy developments, the application of green finance instruments, and the challenges associated with their implementation. This study employs a qualitative descriptive approach using a narrative literature review. Data sources include scholarly articles, regulations, official reports from government agencies and financial institutions, and institutional publications relevant to green finance in Indonesia. The findings indicate that the implementation of green finance is supported by the Sustainable Finance Roadmap, Financial Services Authority regulations, and the Indonesian Taxonomy for Sustainable Finance. Its implementation is reflected in instruments and mechanisms such as green bonds, green sukuk, green banking, and the carbon exchange. Each faces specific challenges, including the limited availability of eligible green projects, transparency and impact-reporting requirements, the technical capacity of financial institutions, the quality of environmental, social, and governance (ESG) data, and limited market liquidity and participation. In addition, uneven stakeholder literacy and the risk of greenwashing emerge as cross-cutting challenges.

INTRODUCTION

Along with increasing development intensity, economic activity has become closely linked to climate conditions and environmental quality. Economic development contributes to climate change and environmental degradation through industrialization, increased agricultural activity, and the exploitation of natural resources (Wang et al., 2021). This relationship is reflected in rising carbon emissions, which further emphasizes the need to address sustainability challenges.

As a developing country with a large population and undergoing significant economic transformation, Indonesia experienced a 63.11% increase in carbon emissions during the 1990–2010 period and ranked seventh among the world's highest carbon-emitting countries during 2019–2021 (Budianto, 2022; Crippa et al., 2022). Indonesia's commitment under the Paris Agreement, including its target of achieving carbon neutrality by 2060, is reflected in its Nationally Determined Contribution (NDC) (Budianto, 2022). Therefore, an approach is needed that can balance the demands of economic development with a strong commitment to environmental sustainability.

The economy currently faces environmental challenges that require concrete action to protect natural resources, mitigate climate change, and reduce pollution (Auliya & Nurhadi,

2023). These conditions have encouraged the adoption of development approaches that balance economic growth with environmental sustainability. Through efficient resource use, reductions in carbon emissions, and the development of environmentally friendly technologies, the green economy can contribute to creating a more sustainable economic system (Syahyana & Putriana, 2025).

The transition toward a green economy requires the financial sector to play an active role in allocating financing, investment, and financial instruments to activities that support environmental sustainability. This view is supported by Chen et al. (2022), who stated that financial institutions can play an important role in supporting green recovery, particularly in emerging markets. This role is reflected in the implementation of green finance, which can contribute to reducing carbon emissions (Pratama & Firmansyah, 2024).

The implementation of green finance has become increasingly important as financing needs continue to grow in support of the transition toward a low-carbon economy (Belgacem et al., 2023; Daniya & Tang, 2024; Hu et al., 2023; Sun et al., 2023; Wu et al., 2024). The Financial Services Authority (OJK) has issued the Sustainable Finance Roadmap, OJK Regulation Number 51/POJK.03/2017 concerning the Implementation of Sustainable Finance for Financial Services Institutions, Issuers, and Public Companies, as well as the Indonesian Green Taxonomy, which serves as a guideline for the development of sustainable economic activities as part of Indonesia's commitment to advancing green finance. In addition, the government has issued various green financial instruments, including green sukuk, making Indonesia the first country in the world to issue sovereign green sukuk (Vizcaino, 2018).

At the implementation level, the banking sector, capital markets, financing institutions, and business actors have begun to integrate sustainability principles through green financing, environmental, social, and governance (ESG)-based investments, and the preparation of sustainability reports in accordance with OJK policies. This development demonstrates a shift in business activities from a primary focus on financial performance toward a broader consideration of environmental and social impacts.

A number of previous studies have examined green finance from various perspectives, including the concept and development of green finance (Wati & Fasa, 2024), green sukuk as a sustainable financing instrument (Arrazi, 2025; Endri et al., 2022; Hania et al., 2022), the relationship between green finance and ESG (R. Sharma et al., 2025), and its contribution to sustainable development (Arrazi, 2025; Park & Kim, 2020). However, most studies have discussed green finance in general terms or focused on specific instruments. Research that specifically maps the implementation of green finance in Indonesia by integrating policy frameworks, financing instruments, and implementation challenges remains relatively limited. A comprehensive understanding of these three dimensions is important for assessing the current development of green finance and its potential future trajectory.

This limitation creates a significant gap in the literature because there is still insufficient systematic synthesis connecting Indonesia's regulatory framework, the implementation of green financial instruments, and cross-cutting challenges. Such an integrated understanding is important not only for assessing the development of green finance but also for identifying areas in which policies and practices need to be strengthened. The research gap therefore lies in the limited availability of comprehensive studies that simultaneously examine policy development, instrument implementation, and implementation challenges within the Indonesian context. The

urgency of this research is reinforced by Indonesia's ambitious climate commitments, the rapid development of green finance instruments, and the increasing need to scale up sustainable financing to achieve national development objectives and international climate targets. The novelty of this study lies in its comprehensive mapping of green finance implementation in Indonesia by examining the interconnections among policy development, financial instrument implementation, and cross-cutting challenges, thereby providing a more holistic perspective than previous studies that have tended to focus on isolated aspects of green finance.

Based on this background, this study aims to examine the implementation of green finance in Indonesia through a literature review focusing on policies that support the development of green finance, various financing instruments that have been implemented, and the challenges encountered in their implementation. The findings are expected to contribute to the literature on green finance in Indonesia and to provide a reference for government institutions, financial institutions, business actors, and academics in strengthening a sustainable financial system.

METHOD

This study employed a qualitative descriptive approach using a narrative literature review. Relevant literature was identified, organized, and synthesized to provide a comprehensive overview of the implementation of green finance in Indonesia (Snyder, 2019; Sukhera, 2022). The data sources included scientific articles, regulations, official reports from government agencies and financial institutions, and institutional publications related to green finance in Indonesia. Literature searches were conducted through Google Scholar, ScienceDirect, Garuda/Sinta, and the official websites of the Financial Services Authority (OJK), the Ministry of Finance, Bank Indonesia, the Indonesia Stock Exchange, and other relevant institutions.

The data were analyzed through reduction, thematic grouping, presentation, and synthesis. The selected literature was classified according to key themes and compared to identify similarities, differences, and recurring patterns across sources. The synthesized findings were then organized into three main areas: policy development, the implementation of green finance instruments, and implementation challenges. This analytical approach was consistent with textual narrative synthesis, which organizes literature into thematic categories to facilitate a systematic comparison of findings (Barnett-Page & Thomas, 2009).

RESULTS AND DISCUSSION

Development of Green Finance Policy in Indonesia

The regulations used as the basis for the implementation of green finance in Indonesia include the following:

1. OJK Sustainable Finance Roadmap

As an institution that has the authority to make policies and supervise the financial services sector, the OJK has initiated the Sustainable Finance Roadmap Phase I (2015–2019) and Phase II (2021–2025). The Sustainable Finance Roadmap Phase I focuses on increasing understanding, capacity building, and laying the foundation for regulation for the financial services industry. Meanwhile, the Sustainable Finance Roadmap Phase II focuses on creating a comprehensive sustainable financial ecosystem by involving all relevant parties and

encouraging the development of cooperation with other parties. The Sustainable Finance Roadmap Phase II is the foundation and reference in developing innovative financing initiatives for the financial services sector and related Ministries/Institutions.

2. OJK Regulation Number 51/POJK.03/2017 concerning the Implementation of Sustainable Finance for Financial Services Institutions, Issuers, and Public Companies (POJK Sustainable Finance)

This regulation contains the obligations of financial services institutions, issuers, and public companies to implement sustainable finance in their business activities, by preparing and implementing a Sustainable Finance Action Plan, reporting in the Sustainable Report, and publishing it.

3. OJK Regulation Number 18 of 2023 concerning the Issuance and Requirements for Debt and Sukuk Securities Based on Sustainability

This regulation was issued to replace POJK Number 60/POJK.04/2017 concerning the Issuance and Requirements of Environmentally Sound Debt Securities (Green Bonds) by expanding the scope, so that it is not only limited to green bonds, but also includes environmentally friendly sukuk (green sukuk), Debt securities and/or socially oriented sukuk (sukuk), Sustainability EBUS (sustainability bonds/sukuk), Waqf Sukuk, and Sustainability-linked EBUS.

4. Taxonomy for Indonesia's Sustainable Finance (TKBI)

OJK published TKBI, which is a transformation of Indonesia's Green Taxonomy Edition 1.0. The TKBI is an official guideline document for classifying economic activities based on their contribution to the environment and society, which is compiled to support the achievement of Indonesia's SDGs as well as the net zero emission target by 2060, through increased capital allocation and sustainable financing. On February 5, 2026, the OJK published TKBI version 3 as a follow-up to Indonesia's Taxonomy for Sustainable Finance (TKBI) version 2 and ASEAN Taxonomy for Sustainable Finance (ATSF) version 4. In this taxonomy, economic activity is classified into:

1) Green

Business activities that clearly have a positive impact on the environment, protect biodiversity, and are aligned with climate targets.

2) Transition

Business activities that are not currently completely clean, but are making significant improvements towards environmentally friendly operations (for example, factories that carry out massive energy efficiency to reduce emissions).

3) Does Not Meet the Classification

Economic activities that damage the environment, do not make transition efforts, or violate aspects of social protection and human rights.

Implementation and Challenges of Green Financial Instruments in Indonesia

Based on the regulations that have been described, the implementation of green financial instruments in Indonesia can be explained as follows:

1. Green Bonds

Green bonds are an environmentally friendly alternative to sustainable financing in the capital market. OJK Regulation Number 60/POJK.04/2017 concerning the Issuance and Requirements of Environmentally Sound Debt Securities (Green Bond) states that green bonds

are debt securities whose issuance funds are used to finance or refinance some or all of their environmentally sound business activities. The issuance of green bonds can only be done to finance business activities or other activities that aim to protect, improve, or improve the quality or function of the environment. These activities can be in the form of renewable energy, energy efficiency, pollution prevention and control, biological natural resource management and sustainable land use, conservation of terrestrial and water biodiversity, environmentally friendly transportation, sustainable water and waste management, climate change adaptation, products that can reduce resource use and produce less pollution, environmentally sound buildings that meet recognized standards or certifications nationally, regionally, or internationally, as well as other environmentally friendly activities. Green bond regulations were then expanded through POJK Number 18 of 2023 concerning the Issuance and Requirements of Debt Securities and Sustainability-Based Sukuk.

In Indonesia, the first green bond issuance was carried out in 2018 by PT Sarana Multi Infrastruktur through the Sustainable Green Bond Phase I worth Rp500 billion. The funds were used to refinance the Jabodebek LRT project and two mini-hydro power plants, which have reportedly avoided emissions of 149,344 tons of CO₂ and produced 131,803 MWh of clean energy. (At-Tibasiy et al., 2019; Salsadilla et al., 2023; Altamziz & Rahadiyan, 2026). The development of environmentally sound debt instruments in Indonesia continues through the issuance of sustainability bonds by BRI in 2019 and Bank Mandiri in 2021. The instrument not only finances projects that provide environmental benefits, but also social projects.

Indonesia already has policies and regulations regarding the issuance of green bonds, but its implementation is not optimal compared to other countries (Cendekiawan & Firmansyah, 2024). The Asian Development Bank (ADB) reported in the Green Bond Market Survey for Indonesia in 2022, the green bond market in Indonesia has great potential, but it still needs to be strengthened in terms of regulation, project quality, investor demand, and market understanding of green bonds. In line with this, Indonesia's Thematic Bond: Market Investor Survey 2024 states that although the sustainable finance situation in Indonesia has evolved, there are still obstacles related to the understanding, challenges, and opportunities of thematic bond investment in Indonesia. Some investors still value bonds in terms of returns and financial risk, while environmental aspects have not always been the main considerations. In addition, not all companies understand the benefits of green bonds as an alternative source of financing.

2. Green Sukuk

POJK Number 18 of 2023 concerning the Issuance and Requirements of Debt Securities and Sustainability-Based Sukuk states that sukuk is a sharia security in the form of a certificate or proof of ownership of equal value and represents an inseparable or undivided share (syuyu'/undivided share), of the underlying asset. In terms of issuance, most of the products issued by the government are green sukuk (Prisandy & Widyaningrum, 2022). Basically, green sukuk is similar to green bonds, in that sukuk and bonds have the same trading process and pattern; For example, the issuance of both instruments needs to specify the coupon, maturity, and issuance price. However, there is a slight difference between sukuk and bonds. Sukuk is an equity-based or asset-based instrument, while bonds are structured based on debt (Arifah, 2025). Sukuk holders allow holders to receive a share of the profits generated by the asset, while bondholders act as lenders, allowing for periodic interest payments from bond issuers.

The issuance of the first sovereign green sukuk in 2018 by the Government of Indonesia was used as a financing innovation to support climate change mitigation and adaptation. Green sukuk is considered relevant in achieving government goals because the use of issuance funds is specifically allocated to the development sector by considering environmentally friendly aspects (Pujiantoro et al., 2021). The allocation of Indonesia's green sukuk has an impact on various sectors, such as renewable energy, climate resilience, sustainable transportation, natural resource management, green buildings, waste to energy, waste management, and water and wastewater management (Arrazi, 2025; Hilwa et al., 2026).

Despite being a pioneer of green sukuk, the implementation of green sukuk in Indonesia still faces the challenge of limited corporate green sukuk issuers. Endri et al. (2022) in their study found that green sukuk is still more dominant issued by the government than the corporate sector (Endri et al., 2022). According to the Green Sukuk Allocation and Impact Report 2025, in fiscal year 2024, Indonesia managed to raise USD 600 million through Global Sovereign Green Sukuk which is fully allocated to finance eligible projects. In addition, green financing is also carried out through domestic Retail Green Sukuk and Project-Based Sukuk Green. Meanwhile, the issuance of corporate green sukuk was first carried out by Bank Syariah Indonesia in May 2024 (Adzimatunur et al., 2024).

Another challenge in the implementation of green sukuk in Indonesia is the availability of projects that meet the criteria as eligible green projects. Sriwijaya (2025) stated that the limited availability of renewable energy projects is one of the factors that hinder the contribution of green sukuk to the energy transition in Indonesia. This shows that not all projects can be financed directly through green sukuk, as they must meet certain environmental criteria and have identifiable and measurable benefits. The limited number of projects that are ready and meet these requirements can ultimately limit the scope of green sukuk issuance and the distribution of funds related to it.

In addition, green sukuk requires transparency and impact reporting. Raeni et al. (2022) stated that green financing instruments require strong tracking and accountability so that the use of funds can be linked to tangible environmental outcomes. The Sustainable Banking and Finance Network (2026) also shows that tracking the use and impact of green finance in Indonesia becomes complex when projects are spread across sectors and institutions, while data gaps can reduce the transparency and credibility of instruments. Therefore, standardization of reporting, allocation recording, verification, and impact measurement are important aspects in maintaining investor confidence in green sukuk. The Ministry of Finance periodically publishes the Green Sukuk Allocation and Impact Report as a form of accountability for the use of funds. However, in practice, the quality of reporting and impact measurement remains an important aspect that must be continuously strengthened to maintain investor confidence

3. Green Banking

Banking occupies a special position because of its ability to influence the growth and economic development of countries in environmental issues (M. Sharma & Choubey, 2022). Green banking can be understood as a form of implementing green finance in the banking sector that aims to create a balance between economic performance, environmental protection, and social responsibility (Khairunnessa et al., 2021; Rahman et al., 2023; Firmansyah & Kartiko, 2024; Gulzar et al., 2024; Mir et al., 2025). This can be done through environmentally

friendly banking operational activities, integration of environmental aspects in the financing and investment process, and the distribution of funds to green projects (Jain & Sharma, 2023).

The presence of green banking regulations in Indonesia has prompted a positive response from the board of directors which has a large size in disclosing green banking (Firmansyah & Kartiko, 2024). One of the priorities for the implementation of sustainable finance is the development of Sustainable Finance products and/or services, including increasing the portfolio of financing, investment or placement in financial instruments or projects that are in line with the implementation of Sustainable Finance. In the Technical Guidelines for Banks related to the Implementation of the Sustainable Finance POJK, it is stated that the sustainable finance financing portfolio is closely correlated with the seventeen SDGs.

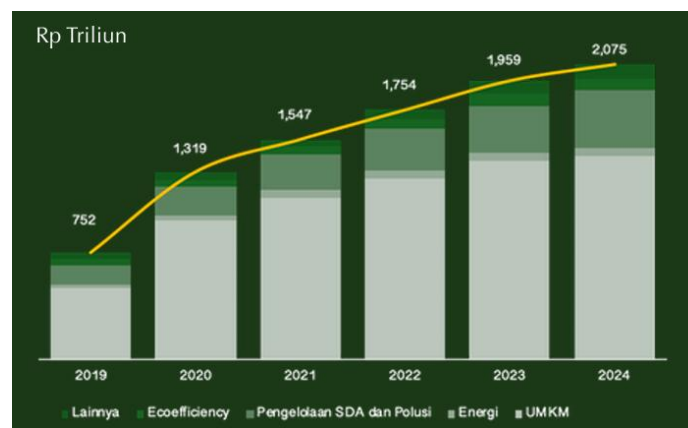


Figure 1. Sustainable Development of the Banking Portfolio
Source: Banking Sustainable Maturity Assessment Report 2025

Based on Figure 1, until 2024, the total sustainable finance portfolio in Indonesia was recorded at IDR 2,075 trillion, or equivalent to 26.12% of the total national commercial bank credit and financing portfolio of IDR 7,942 trillion, with a growth of 5.89% on an annual basis (Financial Services Authority, 2025). This portfolio increase shows that the implementation of sustainable finance in Indonesia has a significant portion and still has the potential to continue to be developed.

Mayasari (2024) stated that in the first quarter of 2024, BCA recorded sustainable financing of IDR 197.4 trillion and BNI posted green loans of IDR 67.4 trillion, while Bank Mandiri recorded IDR 130 trillion for its green credit portfolio. In the Bank Mandiri Sustainable Finance Framework, Bank Mandiri classifies green financing in the renewable energy sector, energy efficiency, pollution prevention, clean transportation, water and waste management, climate change adaptation, circular economy, and green buildings. Bank Mandiri also reported that the financing portfolio of the New and Renewable Energy (NRE) sector until the end of 2024 reached IDR 11.8 trillion (Bank Mandiri, 2025).

Studies on green banking in Indonesia show that this practice is generally analyzed through financing, green banking products, and sustainability reporting. Dewi et al. (2024) examined the role of banking in green banking in terms of financing, a variety of green banking products, and reporting. Research by Widiyanti et al. (2024) on Indonesian Islamic banks uses the Green Banking Disclosure Index to assess green banking initiatives through Islamic bank

sustainability reports. Although various studies show that green banking practices in Indonesia have evolved, their implementation still faces a number of challenges.

OJK through the Banking Sustainability Maturity Assessment Report 2025 shows the need to strengthen governance, strategy, risk management, sustainable financing, disclosure, and internal capacity of the banking industry. In addition, the taxonomic issue is also a challenge. Reuters reported that Indonesia's Taxonomy for Sustainable Finance had drawn criticism for including certain coal-fired power plants in the transition category, raising a debate about the boundary between transition finance and green financing (Christina et al., 2024)

The implementation of green banking also requires technical capacity to identify, measure, and integrate environmental, social, and climate risks into the credit analysis and risk management processes. In the Green Banking Survey Climate Policy Initiative (2022), 69% of respondents stated that there is still a need for greater capacity for climate-related impact assessment and financial risk reporting. The development of green financial products and services is often constrained by knowledge gaps and capacity limitations in the development of green finance.

Meanwhile, the availability of detailed ESG data and sustainability indicators is still an obstacle in the financing analysis process. The Climate Policy Initiative (2022) reported that 23% of sample banks had disclosed climate-related information that referred to the recommendations of the Climate-related Financial Disclosure Task Force (TCFD). Banks have incorporated sustainability and climate change into their products and services, but do not have adequate monitoring and reporting methods. Bank disclosures are still general, while the development of climate risk metrics, targets, and emissions calculations in the financing portfolio is inadequate. The disclosure of sustainable financial information in the Indonesian banking industry has not been consistent and shows considerable variation between banks, especially before the implementation of POJK No.51/POJK.03/2017 (Rahayu & Djuminah, 2022). Widiyanti et al. (2024) suggest the need for stakeholder involvement to formulate nationally standardized reporting metrics and ensure banking compliance with these standards.

Furthermore, green projects generally require large initial investments (Wahyuni & Ahdim, 2025). Large upfront costs and long returns can increase a bank's exposure to project risk, cash flow risk, and return uncertainty, necessitating a more in-depth feasibility assessment and risk management process.

4. Bursa Carbon

Carbon exchanges are markets that accommodate the trading of carbon units or greenhouse gas emission reduction certificates through a systematic mechanism and supervised by authorities (Salsadilla et al., 2023; Raodah & Amalia, 2026). In this mechanism, companies that successfully reduce emissions can sell carbon units to other companies that require emission compensation, so that emission reductions have economic value.

The implementation of Carbon Economic Value in Indonesia is regulated in Presidential Regulation Number 110 of 2025 concerning the Implementation of Carbon Economic Value Instruments and National Greenhouse Gas Emission Control, which replaces Presidential Regulation Number 98 of 2021 concerning the Implementation of Carbon Economic Value for the Achievement of Nationally Determined Contribution Targets and Greenhouse Gas Emission Control in National Development. OJK Regulation Number 10 concerning

Amendments to Financial Services Authority Regulation Number 14 of 2023 concerning Carbon Trading through the Carbon Exchange is an operational rule of the policy contained in the Presidential Regulation on the Implementation of Carbon Economic Value. This regulation regulates the requirements and procedures for licensing carbon trading through carbon exchanges, which include: carbon exchange operators, participants, transaction mechanisms, recording carbon units, transaction settlement, and carbon exchange supervision. Units of carbon traded must be recorded in advance in the National Registry System for Climate Change Control (SRN-PPI).

The carbon exchange in Indonesia is held through IDXCarbon (PT Bursa Efek Indonesia) which was launched on September 26, 2023. This provides an opportunity that carbon trading can be done just like any other stock or securities trade. The Indonesian carbon exchange recorded a number of Greenhouse Gas Emission Reduction Certificates (SPE-GHG) that have been traded (Mukti et al., 2025). According to the World Bank, carbon transactions generate more than USD100 billion in revenue by 2024. However, Indonesia has only contributed a total transaction of only IDR78 billion (USD4.9 million) since IDX Carbon came into operation. This is reinforced by the report of the Institute for Energy Economics and Financial Analysis (IEEFA) in 2025 that IDXCarbon has not reached expectations because the trading volume and participation of market participants are still far below a similar scheme globally (Yustika, 2025). This shows that the existence of an exchange infrastructure does not necessarily create an active market.

In addition, carbon trading in Indonesia is still more oriented towards the energy and industrial sectors (Irwanto et al., 2026). Reuters noted that Indonesia will start opening the trade of carbon credit certificates to foreigners in 2025, but the certificates offered still come from the carbon reduction of the energy sector (Suroyo, 2025). Meanwhile, the government has also begun to prepare carbon offset trading from the forestry sector to expand carbon units.

The next challenge is that there is no specific legal basis for monitoring emissions trading through off-exchange direct trading (Raodah & Amalia, 2026). Ariyanti et al. (2024) stated that regulations have not clarified who can be involved in carbon trading other than the organizers. In addition, one of the obstacles to carbon trading is low investor environmental awareness and the complex structure of Indonesia's capital market (Olii, 2024). Not all businesses understand the knowledge of carbon units and the mechanisms of carbon trading.

In addition to challenges specific to each instrument, the implementation of green finance in Indonesia also faces cross-instrumental challenges. Literacy and stakeholder understanding of the characteristics, benefits, risks, and mechanisms of green financing instruments are still uneven. In the green bond market, Sangiorgi & Schopohl (2023) show that limited market development and low awareness are the main reasons issuers have not entered the green bond market early. This is in line with Prisandy & Widyaningrum (2022) who identified a lack of awareness and knowledge about green bonds among prospective issuers and investors. A similar problem occurs with green sukuk. Hania et al. (2022) place the lack of understanding of market participants as one of the main problems in the issuance of corporate green sukuk, while Pujiantoro et al. (2021) and Arrazi (2025) show that limited understanding of green projects and sukuk structures is still an obstacle to the adoption of green sukuk. In the banking sector, Kurniadi et al. (2024) identified gaps in banks' understanding of financial concepts and risks as well as public difficulties in understanding innovative financial products. This shows

that literacy is not only needed by customers, but also by financial institutions as product providers. R. Sharma et al. (2025) also show that green banking awareness plays a role in influencing green fintech adoption, ESG investment, perception of profitability, and sustainable banking practices. Meanwhile, the implementation of Indonesia's carbon exchange, which is still in its early stages, also requires strengthening understanding and collaboration between the government, the banking industry, business actors, and the community (Yuspin et al., 2024). The publication of the booklet Understanding Carbon Trading for the Financial Services Sector by the OJK confirms the importance of education on carbon trading mechanisms. Overall, these findings show that green finance literacy is a cross-instrumental challenge that can affect issuer interest, investor decisions, financial institution readiness, and market participant participation.

Another challenge in the implementation of green financing instruments is the risk of greenwashing. This risk may occur because green labels do not always guarantee a real environmental impact. Shi et al. (2023) analyzed whether publishing actually results in environmental improvements or simply builds a green image. POJK 60/2017 has also not provided maximum protection because it has not detailed green criteria and has not verified the ability of environmental experts and the quality of reporting information (Baity, 2024). Similar risks are also found in green sukuk. Ulfah & Al-Kahfi (2026) state that the risk of greenwashing and the need for stricter impact reporting standards are structural barriers to green sukuk. In the banking sector, the risk of greenwashing can arise when the sustainability narrative is not fully consistent with the financing composition. Wibowo & Al-Fadhat (2026) found that there is a discrepancy between the use of the term transition activity that does not have clear parameters. This is in line with Galletta et al. (2024) who place greenwashing as a problem in the banking industry, because it affects consumer confidence and the credibility of banks' sustainability commitments. In the carbon exchange, Wuryantoro & Sumaragatha (2026) also identified weaknesses in the determination of projects with carbon economic value that can open up the risk of greenwashing.

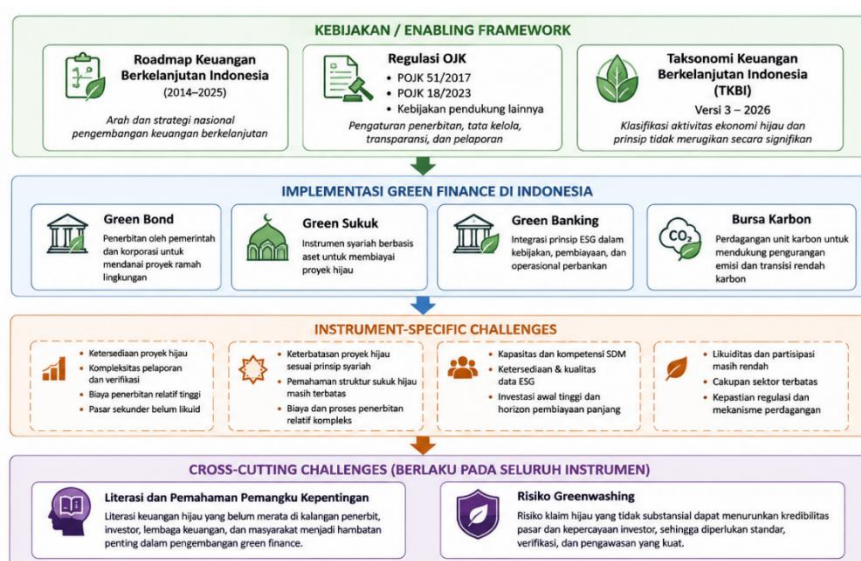


Figure 2. Implementation Framework and Challenges of Green Finance in Indonesia

Source: Data processed (2026)

Figure 2 shows the linkage between the policy framework, the development of the instrument, and the challenges of its implementation. The sustainable finance roadmap, OJK regulations, and TKBI form a supporting framework for the implementation of green finance through green bonds, green sukuk, green banking, and carbon exchanges. Each form of implementation faces its own challenges that are influenced by its characteristics and mechanisms. However, the cross-instrument synthesis shows two problems that continue to arise, namely the uneven literacy of stakeholders and the risk of greenwashing. These findings show that strengthening green finance depends not only on the development of individual instruments, but also on increasing the capacity and credibility of the green finance ecosystem as a whole.

CONCLUSION

The implementation of green finance in Indonesia has progressed through the support of sustainable finance policies, regulations, and taxonomies that provide a framework for the development of various green financial instruments. In practice, green finance has been implemented through green bonds, green sukuk, green banking, and carbon markets, each of which has distinct characteristics and levels of development. Green bonds and green sukuk have been used to finance environmentally sustainable projects, while green banking has expanded through the growth of sustainable finance portfolios and the integration of environmental considerations into banking activities. Meanwhile, carbon markets have begun to establish market-based mechanisms that assign economic value to emissions reductions.

However, the implementation of green finance still faces a number of challenges. These challenges vary across instruments and include the readiness of eligible green projects, transparency and impact reporting, the technical capacity of financial institutions, the quality of environmental, social, and governance (ESG) data, and the liquidity and participation of carbon markets. Beyond these instrument-specific challenges, the literature synthesis identifies two cross-cutting issues: uneven stakeholder literacy and the risk of greenwashing. Therefore, strengthening green finance in Indonesia requires not only the broader adoption of green financial instruments but also improvements in institutional capacity, transparency, standardization, verification, and the overall integrity of the green finance ecosystem to more effectively support the transition toward a low-carbon economy and sustainable development.

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