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Indonesia's Sovereign Green Sukuk: Issuance, Allocation, and Reported Environmental Outcomes (2018–2023)

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Indonesia's Sovereign Green Sukuk program, established in 2018 as the world's first sovereign green sukuk issuance, has become an important instrument for financing environmentally sustainable development. However, the amount of funds raised, proceeds allocated, project outputs, reported environmental outcomes, and independently verified impacts represent distinct dimensions of evidence that require careful examination. This study provides a descriptive, document-based case study of Indonesia's Sovereign Green Sukuk, examining its issuance record, sectoral allocation, reported environmental outcomes, and the extent of independent verification. Data were collected from the Ministry of Finance's Green Sukuk Allocation and Impact Reports (2023 and 2024 editions), the Green Bond and Green Sukuk Framework, and relevant secondary sources through a documented collection protocol, structured data extraction, and cross-verification procedures. The analysis covers sovereign issuances from March 2018 to November 2023, comprising six global issuances totaling USD 6.0 billion and six retail ST-series issuances totaling IDR 30.68 trillion, while sectoral allocation data cover 2018–2022. Cumulative proceeds were reported at approximately USD 9.59 billion by the end of 2023. Sustainable transportation received the largest share of allocated proceeds (32.39%), followed by climate change resilience (28.09%) and sustainable water and wastewater management (25.00%). The 2023 report projected annual avoided emissions of 130,316.39 tonnes of CO_2-equivalent from rooftop solar photovoltaic installations and sea-navigation aids. However, these figures remain issuer-reported outcomes, as the reviewed documents did not establish independent verification of project outputs or reported emissions. The findings demonstrate the importance of distinguishing financial mobilization from allocation and environmental performance when assessing sovereign green sukuk. This study contributes an evidence-based account of Indonesia's experience and highlights the need for stronger impact verification and reporting transparency in Islamic sustainable finance. Its descriptive design does not establish causal effects on GDP growth or private capital mobilization.

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1. INTRODUCTION

Sustainable economic growth in emerging economies increasingly depends on the transition toward low-carbon energy systems and climate-resilient infrastructure. However, substantial financing gaps continue to constrain the implementation of climate-related development agendas, particularly in developing countries. Indonesia faces this challenge while seeking to maintain economic growth and fulfill its international climate commitments under the Paris Agreement. Through its Enhanced Nationally Determined Contribution (NDC), submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in September 2022, Indonesia increased its greenhouse gas emission reduction targets for 2030 from 29% to 31.89% unconditionally and from 41% to 43.20% with international support (Ministry of Finance Republic of Indonesia, 2023). Achieving these targets requires substantial and sustained financing, particularly for infrastructure development, renewable energy, climate resilience, and environmental protection.

In response to these financing requirements, Indonesia's Ministry of Finance introduced the country's sovereign Green Sukuk in March 2018, establishing Indonesia as the first sovereign issuer of green sukuk (UNDP, n.d.). The instrument represents an intersection between Islamic finance and sustainable development by combining Shariah-compliant financing principles with environmental eligibility criteria. Islamic finance emphasizes the avoidance of prohibited activities, the prohibition of riba and excessive gharar, and the promotion of economic activities associated with real assets and productive purposes. Its underlying ethical orientation also emphasizes the prevention of harm (*darar*) and the promotion of public interest (*maslahah*). Within this context, Green Sukuk provides a financing mechanism through which capital mobilized from investors can be directed toward eligible environmentally sustainable projects.

The development of sovereign Green Sukuk also reflects the broader expansion of Indonesia's Islamic financial sector. The Financial Services Authority (OJK) reported that Indonesia's Islamic financial assets, excluding Islamic stocks, reached IDR 2,375.84 trillion at the end of 2022, representing an annual increase of approximately 15% and placing Indonesia seventh globally in terms of Islamic financial assets (Tempo.co, 2023). Green Sukuk therefore forms part of a wider national effort to integrate Islamic financial instruments into sustainable economic development rather than representing an isolated financing initiative.

At the international level, the sukuk market has experienced considerable growth. The Islamic Corporation for the Development of the Private Sector (ICD) and London Stock Exchange Group (LSEG) reported that total outstanding sukuk

increased from USD 260.03 billion in 2012 to USD 788.39 billion in 2022, with 4,806 sukuk outstanding in 2022 (ICD & LSEG, 2023). Although green and sustainability-linked sukuk remain a relatively small segment of the broader sukuk market, their development indicates increasing interest in integrating Islamic capital markets with environmental objectives. Boston Consulting Group (BCG) reported that green and sustainability-linked sukuk issuance increased by 14% in 2024, reaching approximately USD 15.2 billion, or around 6% of total sukuk issuance (BCG, n.d.). Similarly, the High-Level Working Group on Green and Sustainability Sukuk identified Indonesia and the Gulf Cooperation Council (GCC) as leading jurisdictions, collectively accounting for 53% of total issuance, although the reporting source does not specify the period or denominator underlying this proportion (LSEG, 2022).

The institutional design of green bonds and green sukuk generally follows internationally recognized principles, particularly the International Capital Market Association's (ICMA) Green Bond Principles. These voluntary guidelines establish four central components: the use of proceeds, project evaluation and selection, management of proceeds, and reporting (ICMA, 2017). Indonesia's Green Bond and Green Sukuk Framework adopts a comparable structure by establishing eligible project categories, requiring the Ministry of Finance to maintain records of projects financed through each issuance, and providing for annual allocation and impact reporting. The framework also refers to independent third-party assurance concerning the annual report and compliance with the framework. Nevertheless, the existence of such provisions does not automatically establish that every reported project output or environmental outcome has been independently verified (Ministry of Finance Republic of Indonesia, n.d.).

The relationship between Islamic finance and environmental sustainability provides an additional conceptual foundation for understanding Green Sukuk. Sukuk are Islamic investment certificates structured around ownership interests in assets, usufructs, or project-related cash flows, depending on the contractual arrangement. When combined with environmental eligibility criteria, these instruments can provide a mechanism for directing investment toward projects with intended environmental benefits. The 2018 Indonesian Green Bond and Green Sukuk Framework received a second-party opinion from CICERO on 23 January 2018 and was assigned a Medium Green rating. However, CICERO explicitly clarified that its assessment concerned the framework and did not constitute validation of the climate effects of individual projects or responsibility for their implementation and investment outcomes (CICERO, 2018). This distinction is important because the environmental credibility of

a financing framework and the actual performance of funded projects represent different dimensions of assessment.

Despite the growing significance of Green Sukuk, evaluating the performance of a sovereign program requires more than examining the volume of capital raised. Funds mobilized from investors are not necessarily equivalent to funds allocated to eligible projects. Similarly, allocation does not establish that projects have been completed, while completed project outputs do not automatically demonstrate measurable environmental improvements. Furthermore, environmental outcomes reported by the issuer should not be treated as independently verified impacts unless appropriate external verification evidence is available. These distinctions are particularly important when evaluating Indonesia's Sovereign Green Sukuk because the available reports employ different reporting periods, indicators, and classifications, while several environmental outcome figures originate from issuer-generated reporting.

Previous studies have examined Green Sukuk from various conceptual, institutional, and empirical perspectives. Alam et al. (2016) provided an early conceptual discussion of Green Sukuk as an Islamic capital market innovation, including its potential to finance environmentally friendly projects such as solar parks, biogas facilities, and wind farms. Their analysis highlighted the compatibility between Islamic financial objectives and environmental protection. However, the study preceded Indonesia's sovereign Green Sukuk issuance in 2018 and therefore did not examine the subsequent development of the Indonesian program.

Ulfah et al. (2024) conducted a structured literature review of research on Green Sukuk and its implications for government policy. Their findings indicated that approximately half of the reviewed research was theoretical and qualitative, while fewer than 30% of the studies employed quantitative or empirical approaches. They also emphasized the potential contribution of Green Sukuk to the Sustainable Development Goals (SDGs) and encouraged governments to consider the instrument as part of their sustainable development financing strategies. Nevertheless, their study relied on existing academic literature rather than longitudinal program-level data on issuance, allocation, and reported environmental outcomes.

Several studies have specifically examined Indonesia's Green Sukuk experience. Arrazi (2025) analyzed the allocation of Indonesian Green Sukuk proceeds during 2018–2022 through a Maqasid al-Shariah perspective, using qualitative document analysis and a literature review of the Ministry of Finance's 2023 report. The study found that the allocation of proceeds generally corresponded with the five objectives of Maqasid al-Shariah, with sustainable transportation receiving the largest

allocation and natural resource management receiving the smallest. It also discussed limitations concerning emission reductions from railway projects, accounting transparency, public awareness, and local government support. Although this research provides an important perspective on the normative and ethical dimensions of Green Sukuk, it relies on the same issuer report and does not provide a consolidated assessment of the broader issuance record, subsequent reporting information, and the verification status of individual reported figures.

Rahman et al. (2022) examined policy implementation challenges associated with Green Sukuk in Malaysia, Indonesia, Saudi Arabia, and the United Arab Emirates. Their comparative case study identified differences in national implementation arrangements and highlighted the challenges of applying green financing policies across different institutional contexts. The study provides useful comparative insights into the policy environment of Green Sukuk but does not systematically consolidate Indonesia's issuance, sectoral allocation, and reported environmental outcomes over time.

Endri et al. (2022) investigated the potential development of corporate Green Sukuk in Indonesia using an analytic network process involving experts from academia, project development, and regulatory institutions. Their findings identified renewable energy as the most promising sector for corporate Green Sukuk and indicated that limited market understanding remained a major obstacle. The study also discussed the importance of government incentives and the suitability of *ijarah* contracts. However, its analysis focused on expert assessments of potential corporate issuance rather than observed allocation and environmental reporting from Indonesia's sovereign Green Sukuk program.

Similarly, Araminta et al. (2022) examined the relationship between Green Sukuk and Indonesia's 2030 SDG agenda through a systematic literature review. Their findings highlighted the potential of Green Sukuk to finance environmentally sustainable projects and generate employment opportunities, while identifying challenges related to technological costs, maintenance, public awareness, regulatory arrangements, and information transparency. Although this research provides a useful overview of the opportunities and constraints associated with Green Sukuk, it does not provide a consolidated empirical examination of the issuance and allocation records of the Indonesian sovereign program.

More recently, Faizi et al. (2024) explored Indonesia's Islamic green finance and climate financing landscape through an interpretive qualitative approach combining document analysis and interviews conducted between October 2022 and June 2023. Their findings emphasized the potential development of Islamic green finance through

capital markets, Islamic social finance, and green banking, identifying Green Sukuk as an important financing instrument. Nevertheless, the study primarily mapped the broader Islamic climate-finance ecosystem rather than systematically tracking the issuance, sectoral allocation, project outputs, and reported environmental outcomes of the sovereign Green Sukuk program.

Two additional contributions provide relevant contextual perspectives. Malahayati and Anggraeni (2023) discussed Indonesia's green economic recovery, while Balative et al. (2025) examined Indonesia's experience in developing Green Sukuk. These works are considered relevant to the broader policy and institutional context of the present study. However, only their bibliographic information, including titles, authors, and editors, was verified for this literature review; consequently, their substantive findings are not used to establish the research gap.

Taken together, the reviewed literature reveals several areas that remain relevant for further investigation. First, previous studies have predominantly approached Green Sukuk through conceptual analysis, systematic literature reviews, expert assessments, comparative policy analysis, and qualitative interviews. Although these approaches provide important theoretical and institutional insights, they offer limited consolidated evidence of how Indonesia's sovereign Green Sukuk has developed across issuance, allocation, project outputs, and reported environmental outcomes. Second, previous studies have identified information transparency, limited market understanding, and implementation challenges as important constraints, suggesting the need for more systematic examination of the quality and traceability of reported program information. Third, although Arrazi (2025) examined the Ministry of Finance's 2023 allocation and impact report, the present study extends the documentary examination by incorporating the 2024 report edition, the broader issuance record, and an explicit classification of evidence according to its verification status.

The central contribution of this study is therefore not to establish the causal economic or environmental effects of Green Sukuk, but to develop a consolidated and source-attributed empirical record of Indonesia's sovereign program. It applies a documented collection protocol, a structured data-extraction table, and explicit cross-verification procedures to distinguish between different categories of reported evidence. This approach responds to the need for greater transparency in assessing sustainable financing instruments and provides a basis for evaluating what can and cannot be established from publicly available documentary evidence.

To organize the analysis, the study adopts a results-chain framework consisting of five interconnected stages: issuance, allocation, project outputs, environmental

impact, and market development. Each stage represents a distinct dimension of evidence, and the existence of information at one stage does not automatically establish the achievement of the subsequent stage.

The first stage, issuance, refers to capital mobilized from investors through sovereign Green Sukuk offerings. Relevant indicators include issuance volume, tenor, yield, and investor composition. The second stage, allocation, concerns the distribution of proceeds among eligible sectors and projects. This stage examines the extent to which mobilized funds have been assigned to activities identified within the Green Bond and Green Sukuk Framework. The third stage, project outputs, refers to physical or institutional deliverables associated with financed projects, such as water infrastructure facilities, irrigation networks, and solar photovoltaic installations. The fourth stage, environmental impact, concerns reported environmental outcomes, including estimated annual reductions in greenhouse gas emissions and improvements in climate resilience. Finally, market development considers the broader development of the financing instrument through investor participation, retail market involvement, and the potential replication of Green Sukuk arrangements.

Independent verification is treated as a separate evidence-status dimension that may apply to each of the first four stages. Accordingly, the presence of a second-party opinion on the financing framework, an assurance statement concerning fund allocation, or a verification procedure relating to individual project outcomes must be distinguished rather than treated as equivalent forms of external validation. This distinction provides the analytical basis for assessing the reliability and limitations of the information reported by the issuer.

Based on the analytical framework, this study addresses the following research questions: RQ1**.** How did Indonesia's Sovereign Green Sukuk issuance develop in terms of volume, structure, and investor composition during the 2018-2023 period? RQ2**.** How were the proceeds allocated across eligible sectors, and what project outputs and environmental outcomes were reported by the government? RQ3**.** To what extent are the reported figures supported by documentary evidence and independent verification across the different stages of the financing process, from issuance and allocation to project outputs and environmental outcomes?

To answer these questions, the study pursues three corresponding objectives: (1) to consolidate issuance, allocation, and reported environmental outcome data from primary government documents and cross-checked secondary sources; (2) to classify reported figures according to their evidence status and the availability of independent verification; and (3) to identify the data requirements for future quantitative evaluations of the program.

The scope of the analysis distinguishes between the reporting periods available for different dimensions of the program. The issuance record covers March 2018 to November 2023, comprising six sovereign global issuances totaling USD 6.0 billion and six retail ST-series issuances totaling IDR 30.68 trillion. Sectoral allocation data cover 2018–2022, while the Ministry of Finance's 2023 and 2024 report editions provide the principal documentary sources for examining reported allocations and outcomes. Developments occurring after November 2023 are not included in the study's issuance window.

The study is deliberately descriptive and does not estimate causal relationships between Green Sukuk issuance and macroeconomic indicators such as GDP growth, renewable energy capacity, avoided emissions, or private capital mobilization. Such evaluations would require consistent quarterly time-series data and additional information on project implementation and investment flows that were not available in the public sources reviewed for this study. Instead, the findings provide a transparent account of the available evidence, identify the boundaries of what can be established from issuer reporting, and offer a foundation for subsequent empirical research on Islamic sustainable finance and sovereign green financing.

2. RESEARCH METHODOLOGY

2.1 Research Design

This study employs a descriptive, document-based, single-case longitudinal design to examine Indonesia's Sovereign Green Sukuk program during the 2018–2023 period. Indonesia was selected as an information-rich case because it pioneered sovereign green sukuk issuance in 2018 and has established a government reporting framework covering issuance, proceeds allocation, and environmental outcomes. The single-case approach enables an in-depth examination of the program's development through documentary evidence rather than statistical generalization across multiple countries.

The study adopts a descriptive analytical approach supported by quantitative indicators extracted from official reports and cross-checked secondary sources. It does not employ inferential statistical techniques or attempt to establish causal relationships between Green Sukuk issuance and macroeconomic or environmental outcomes. A macro-econometric approach, such as Vector Autoregression (VAR), was not undertaken because consistent quarterly data linking sukuk issuance with GDP growth, renewable energy capacity, avoided emissions, and private capital mobilization were not available from the public sources reviewed. Accordingly, the

analysis is restricted to documented evidence, with the data requirements for future quantitative research discussed in the limitations section.

2.2 Document Collection Protocol

Document collection followed a structured six-step protocol to ensure transparency and reproducibility. First, the study identified the primary documentary sources required by Indonesia's Green Bond and Green Sukuk Framework, particularly the government's annual Green Sukuk Allocation and Impact Reports. Second, the relevant documents were retrieved from the Directorate General of Budget Financing and Risk Management (DJPPR), Ministry of Finance of the Republic of Indonesia, together with the Green Bond and Green Sukuk Framework and the second-party opinion issued by CICERO. Third, each document was recorded according to its publisher, publication edition, reporting period, and intended analytical use.

Fourth, relevant information was extracted using a structured data-extraction table containing predefined variables and operational definitions. Fifth, extracted figures were compared with available secondary sources to identify inconsistencies, differences in reporting periods, and variations in numerical presentation. Sixth, each figure was assigned to one of five evidence categories, with its verification status assessed separately according to the availability and scope of external review or assurance.

The documentary analysis prioritized official government publications as the principal source of program information. Secondary sources were used for contextual information and documentary cross-checking rather than as substitutes for primary government records. Documents that did not provide directly relevant information for the research questions were not used as the basis for quantitative findings.

2.3 Data Sources

The study relies on primary government documents and selected secondary sources. Primary sources consist mainly of the Ministry of Finance's Green Sukuk Allocation and Impact Reports (2023 and 2024 editions) and the Republic of Indonesia Green Bond and Green Sukuk Framework. CICERO's second-party opinion issued in January 2018 was examined to establish the scope and nature of the external assessment of the framework.

Secondary sources include publications from multilateral institutions, financial market organizations, media outlets, and market information providers. These sources were used to contextualize the development of Indonesia's Green Sukuk program and cross-check selected issuance and allocation figures.

Table 1. Data Sources, Reporting Periods, and Analytical Uses

Source	Type	Data window	Used for
Ministry of Finance, Green Sukuk Allocation and Impact Report 2023	Primary (issuer)	2018-2022	Sectoral allocation, project outputs, avoided emissions, cumulative proceeds to end-2022, verification notes
Ministry of Finance, Green Sukuk Allocation and Impact Report 2024	Primary (issuer)	2018-2023	Global and retail issuance data, cumulative proceeds to end-2023, SDGs Framework
Republic of Indonesia Green Bond and Green Sukuk Framework	Primary (issuer)	Framework document	Eligibility, record-keeping, reporting and assurance requirements
CICERO second opinion (2018)	Independent review	Framework (Jan 2018)	Framework shading and scope of review
UNDP Climate Promise page; SBFN case study	Secondary (multilateral, network)	Various	Inaugural issuance and investor distribution, Climate Budget Tagging
Databoks (Katadata); Bareksa; Tempo.co; LSEG; ICD-LSEG; BCG; Sukuk.com; Jakarta Post; Salaam Gateway; Euromoney; Bank Indonesia	Secondary (media, market)	Various	Cross-checks of issuance data, allocation shares and ST009; market context
Macrotrends GDP growth series	Secondary	2020-2023	Macroeconomic context only, not estimation

2.4 Data Extraction and Indicator Definitions

Data extraction was conducted using a structured table to maintain consistency across documents and reporting periods. The extracted variables covered issuance

characteristics, proceeds allocation, project outputs, reported environmental outcomes, and the availability of external verification.

Each variable was recorded with its corresponding unit, reporting period, primary source, and available cross-check source. Monetary figures were retained in the currencies and conversion values reported by the issuer. No independent currency conversion was performed unless explicitly documented by the original source. Project outputs were distinguished from projected targets, while environmental indicators were recorded as issuer-reported figures without independently recalculating the underlying methodology.

Table 2. Data Extraction Variables and Operational Definitions

Variable	Definition and unit	Primary source	Cross-check source
Issuance date and series	Month and year; global or ST-series or project-based	MoF 2024 report	Independent press and market reports (see note to Table 6)
Volume	Amount as reported; USD for global, IDR for domestic; USD equivalents as stated by the issuer, with no independent conversion	MoF 2023 and 2024 reports	Secondary sources
Tenor and yield or coupon	Years; percent per annum	MoF 2024 report	Secondary sources
Investor composition	Percent of the inaugural issuance by investor type or region	UNDP Climate Promise page	SBFN case study
Cumulative proceeds	USD as stated by the issuer at end-2022 and end-2023, with components; no independent conversion	MoF 2023 and 2024 reports	Databoks (2024), citing the 2023 report

Variable	Definition and unit	Primary source	Cross-check source
Sectoral allocation share	Percent of cumulative proceeds assigned to each eligible sector within the stated window	MoF 2023 report	Databoks (n.d.)
Project outputs	Physical deliverables recorded as reported and flagged where projected	MoF 2023 report	None identified
Resilience target	Projected service-capacity discharge target for raw water structures, in cubic meters per second; a target, not a measured outcome	MoF 2023 report	None identified
Avoided emissions	Tonnes of CO2-equivalent per year as reported; the issuer's method is not re-derived	MoF 2023 report	SBFN (n.d.), qualitative only
Verification status	Whether an independent review or assurance exists, at framework, issuance or outcome level	MoF 2023 and 2024 reports; CICERO (2018)	None identified for outcomes

2.5 Cross-Verification Procedures

Five documentary cross-verification rules were applied to improve the consistency and reliability of the extracted information. First, figures identified in secondary sources were traced back to the relevant primary government report wherever possible. Second, when discrepancies occurred between primary and secondary sources, the primary government figure was retained as the principal reported value, while the discrepancy was documented. Third, figures originating from different reporting periods or classification systems were not merged into a single continuous dataset unless their comparability could be established.

Fourth, where internal inconsistencies appeared within a report, the inconsistency was explicitly recorded, and the affected figure was not used as a basis for further inference. Fifth, all environmental outcome figures were attributed to the

specific issuer report and reporting period from which they originated. Such figures were not presented as independently established environmental impacts unless the reviewed documentation provided evidence of external verification covering the relevant outcomes.

Importantly, documentary cross-checking and independent verification were treated as different procedures. Agreement between a government report and a secondary publication was considered supporting documentary evidence, not independent assurance of the underlying project performance or environmental impact.

2.6 Reporting Periods and Evidence Classification

The analysis distinguishes between reporting periods because the Ministry of Finance's report editions do not cover identical time windows or provide the same categories of information. The report labelled 2023 primarily presents allocation and impact information covering 2018–2022, whereas the 2024 edition provides additional issuance and cumulative proceeds information through 2023.

Accordingly, the issuance analysis covers March 2018 to November 2023, while sectoral allocation and reported environmental outcomes are examined for 2018-2022, based on the available information in the 2023 allocation and impact report. The 2024 report is used to supplement the issuance record and cumulative proceeds information through the end of 2023. Issuances and developments after November 2023 are excluded from the analytical window.

To distinguish the different types of information reported by the issuer, the study applies a five-category evidence classification:

1. Funds raised: Capital mobilized through global and retail Green Sukuk issuances, including issuance volume and investor-related information.
2. Funds allocated: Proceeds assigned to eligible sectors and projects under the Green Bond and Green Sukuk Framework.
3. Project outputs: Physical or institutional deliverables reported in connection with financed projects, with projected targets distinguished from completed outputs.
4. Reported environmental impact: Environmental outcomes, such as estimated annual avoided greenhouse gas emissions, disclosed in the issuer's allocation and impact reports.
5. Independently verified impact: Environmental outcomes supported by identifiable external verification or assurance whose scope explicitly covers the relevant project outputs or environmental results.

These categories represent distinct types of evidence rather than equivalent measures of program success. The availability of evidence at one category does not automatically establish achievement at the subsequent category. Furthermore, the existence of a second-party opinion on the financing framework or external assurance on a particular issuance does not automatically demonstrate independent verification of project-level environmental outcomes.

The classification is therefore applied alongside a separate assessment of verification status, identifying the source, reporting period, and scope of any external review or assurance. This approach enables the study to distinguish between information documented by the issuer, information supported by documentary cross-checks, and outcomes for which independent verification can or cannot be established from the reviewed sources.

3. RESULTS and DISCUTION

3.1.Legal and Shariah governance foundations

Indonesia's sovereign sukuk market, of which Green Sukuk is a specialized subset, rests on Law No. 19 of 2008 concerning State Sharia Securities (Surat Berharga Syariah Negara, SBSN), promulgated on 7 May 2008. The Law allows the government to establish a dedicated issuing company (Perusahaan Penerbit SBSN) and to use State Property (Barang Milik Negara) as the underlying asset (Aset SBSN), through sale or leasing of usufruct rights without transfer of legal ownership (Law No. 19 of 2008, Articles 10, 11 and 13). Shariah guidance comes from two fatwas of the National Sharia Council of the Indonesian Ulema Council (DSN-MUI), both dated 26 June 2008: Fatwa No. 69/DSN-MUI/VI/2008 on State Sharia Securities and Fatwa No. 70/DSN-MUI/VI/2008 on Methods of Issuing State Sharia Securities. The requirement for an identifiable underlying asset is what operationalizes the gharar and riba prohibitions discussed in Section 2.2. Two global green issuances are documented as wakala (agency) structures: the fifth, priced on 24 May 2022 (Bank Indonesia, 2022), and the sixth, issued in November 2023 through Perusahaan Penerbit SBSN Indonesia III (Euromoney, 2024). The contract structure of the other global issuances was not verified in this study and is not described.

The retail series ST008 illustrates how Shariah and green requirements are layered: DSN-MUI issued a Sharia Opinion for the series (No. B-789/DSN-MUI/X/2021, dated 18 October 2021), referring to Fatwa Nos. 69 and 70/2008 together with Fatwa No. 10/2000 (wakalah), No. 95/2014 (SBSN wakalah) and No. 112/2017 (ijarah) (Bareksa, 2021), while the green-eligibility criteria rest on the Framework, which has

an independent second-party opinion at framework level (CICERO, 2018). Section 4.6 sets out what each of these reviews does and does not cover.

3.2. **Funds raised: issuance history and scale (Level 1)**

Indonesia issued its inaugural Sovereign Green Sukuk in March 2018, raising USD 1.25 billion over five years. The investor distribution reported was 32% Islamic investors, 25% Asia, 18% United States, 15% European Union and 10% Indonesia (UNDP, n.d.); SBFN (n.d.) reports the first four shares. Table 6 gives the six sovereign global issuances to November 2023 as listed in the Ministry's 2024 report.

Table 3. Sovereign global Green Sukuk issuances, 2018-2023

Issuance	Date	Volume	Tenor	Yield
1st (inaugural)	March 2018	USD 1.25 billion	5 years	3.75%
2nd	February 2019	USD 750 million	5.5 years	3.90%
3rd	June 2020	USD 750 million	5 years	2.30%
4th	June 2021	USD 750 million	30 years	3.55%
5th	May 2022	USD 1.5 billion	10 years	4.70%
6th	November 2023	USD 1.0 billion	10 years	5.60%
Total	2018-2023	USD 6.0 billion		

Source: Ministry of Finance Republic of Indonesia (2024). The total is the sum of the six rows and matches the USD 6 billion global total reported by the Ministry. Each row was also cross-checked against an independent report: Sukuk.com (2018) for the inaugural issuance, priced on 24 February 2018; Jakarta Post (2019) for February 2019; Jakarta Post (2020) for the June 2020 five-year tranche; Salaam Gateway (2021) for the 30-year tranche of June 2021; Bank Indonesia (2022) for May 2022; and Euromoney (2024) for the November 2023 green tranche. The Jakarta Post article on June 2020 does not itself label the tranche green; the Ministry does.

Cumulative proceeds were USD 6.9 billion at the end of 2022 and approximately USD 9.59 billion at the end of 2023 (Table 7). The 2023 report breaks the 2022 total into USD 5 billion of global issuance, IDR 21.86 trillion (USD 1.495 billion) of retail and IDR

6.73 trillion (USD 450 million) of project-based issuance (Ministry of Finance Republic of Indonesia, 2023); Databoks (2024), citing the same report, gives the same split with retail at USD 1.5 billion. The 2024 report gives USD 6 billion global and about USD 3.59 billion domestic for 2018-2023 (Ministry of Finance Republic of Indonesia, 2024).

Table 4. Cumulative proceeds as reported by the Ministry of Finance

As of	Components	Total	Source
End-2022	Global USD 5.0 bn; retail IDR 21.86 tn (about USD 1.495 bn); project-based IDR 6.73 tn (about USD 450 mn)	USD 6.9 bn	MoF 2023 report; Databoks (2024)
End-2023	Global USD 6.0 bn; domestic about USD 3.59 bn (retail IDR 30.68 tn, about USD 2.09 bn; wholesale PBSG 001 IDR 22.22 tn, about USD 1.50 bn)	USD 9.59 bn	MoF 2024 report

Note: USD equivalents are as stated by the issuer and were not independently converted.

Beyond the global program, Indonesia issues Retail Green Sukuk (ST-series) for domestic individual investors. The Ministry's 2024 report lists ST006 in November 2019 as the first, and Table 8 summarizes the six series to 2023.

Table 5. Retail (ST-series) Green Sukuk issuances, 2019-2023

Series	Offering began	Tenor	Amount raised	Coupon (floating with floor)
ST006	November 2019	2 years	IDR 1.46 trillion	6.75%
ST007	November 2020	2 years	IDR 5.42 trillion	5.50%
ST008	November 2021	2 years	IDR 5.00 trillion	4.80%
ST009	November 2022	2 years	IDR 10.00 trillion	6.15%

Series	Offering began	Tenor	Amount raised	Coupon (floating with floor)
ST010T4	May 2023	4 years	IDR 3.3 trillion	6.40%
ST011T4	November 2023	4 years	IDR 5.5 trillion	6.50%
Total			IDR 30.68 trillion	

Source: Ministry of Finance Republic of Indonesia (2024). The total matches the cumulative retail figure reported by the Ministry. Coupons are the floating-with-floor rates reported in the 2024 report; its executive summary presents the ST010T4 and ST011T4 coupons as fixed-rate figures, an inconsistency within the report that is noted here and not resolved. Months refer to the start of the offering; settlement came later, for example in December 2023 for ST011T4. The sum of ST006 to ST009 is IDR 21.88 trillion, while the 2023 report gives IDR 21.86 trillion for retail at end-2022 (Table 7); the difference is small and is not reconciled here, and the reported figure is used in Table 7.

ST009 was fully subscribed at IDR 10 trillion with 35,397 investors, of whom 13,412 (37.89%) were first-time investors (Bareksa, 2022), which illustrates the instrument's role in financial inclusion alongside its environmental purpose. In addition, a project-based green sukuk (PBSG 001) was issued in September 2022 at IDR 6.73 trillion with a fixed 6.625% return; the 2023 report gives a seven-year tenor and a 6.63% rate, and the 2024 report gives the same seven years and 6.625% for the September 2022 issuance. A further IDR 15.49 trillion was issued under PBSG 001 during 2023 with a six-year tenor and the same 6.625% fixed rate (Ministry of Finance Republic of Indonesia, 2024); the report also mentions a six-year tenor for PBSG 001 elsewhere without distinguishing the issuance, so the tenor of the 2022 issuance is treated as reported in its milestone table and the inconsistency is noted under rule R4. Level 1 evidence shows capital mobilized only; it does not show how the capital was used.

Framework developments. The 2024 report states that the 2017 framework, which had nine eligible sectors, was reviewed in 2021 into the SDGs Government Securities Framework, covering green, blue, social and sustainability instruments across 15 eligible sectors, and that issuances from 2022 onward follow it (Ministry of Finance Republic of Indonesia, 2024).

3.3.**Funds allocated: sectoral allocation of proceeds (Level 2)**

According to the Ministry's 2023 report, cumulative proceeds for 2018-2022 were allocated across eight eligible sectors (Table 9). Sustainable transportation received the largest share (32.39%), followed by climate change resilience (28.09%) and sustainable water and wastewater management (25.00%). Renewable energy and energy efficiency received much smaller allocations of 4.92% and 4.80% (Ministry of Finance Republic of Indonesia, 2023; Databoks, n.d.).

Table 6. Cumulative sectoral allocation of Green Sukuk proceeds, 2018-2022

Sector	**Cumulative share, 2018-2022**
Sustainable transportation	32.39%
Climate change resilience	28.09%
Sustainable water and wastewater management	25.00%
Renewable energy	4.92%
Energy efficiency	4.80%
Waste-to-energy and waste management	4.58%
Green buildings	0.22%
Sustainable natural resource management	0.01%

Note: Shares as reported; they sum to 100.01% because of rounding in the source. Databoks labels the second sector "food and climate resilience", which differs from the report's "resilience to climate change".

3.4.**Project outputs (Level 3)**

The 2023 report records outputs of different kinds. For renewable energy and navigation safety, the outputs are rooftop solar photovoltaic installations and aids to sea navigation devices. For water infrastructure, the report projects the construction or rehabilitation of 685 raw water units and a 50-kilometer groundwater irrigation network, with a service-capacity discharge target of 4.10 cubic meters per second (Ministry of Finance Republic of Indonesia, 2023). These water figures are projections rather than confirmed deliverables, and the report's refinancing tables cite 585 raw water units for the same 4.10 target, an inconsistency noted under rule R4. No independent source for these outputs was identified.

3.5.**Reported environmental impact (Level 4)**

The 2023 report lists, under its projected environmental and social impacts, a contribution of the funded projects to an annual greenhouse gas reduction of 130,316.39 tonnes of CO2-equivalent from the installation of rooftop solar photovoltaic systems and aids to sea navigation devices (Ministry of Finance Republic of Indonesia, 2023). SBFN states that green sukuk proceeds have financed projects contributing to tens of millions of tons of CO2 reductions, without giving an exact cumulative figure, period or method (SBFN, n.d.). The two statements differ in scale and scope and cannot be reconciled from the documents reviewed, so the SBFN statement is treated as a general secondary description, not as corroboration of the Ministry's figure. The 2024 report extends emissions reporting to additional sectors, with some of its own text and tables internally inconsistent; these figures are not aggregated here.

The 2023 report also acknowledges that railway infrastructure development has yet to contribute significantly to emissions reduction, attributed to a declining trend in public transportation use during COVID-19 restrictions and changed travel patterns, and states that the projected emission reduction for the Makassar-Parepare line is still being calculated by the Ministry of Transport (Ministry of Finance Republic of Indonesia, 2023; Databoks, n.d.). Sustainable transportation received the largest allocation (32.39%) while this reduction was not yet realized, which illustrates that capital deployed to a green-eligible sector does not automatically yield a proportional environmental outcome. Arrazi (2025), analyzing the same 2023 report, reports the same annual figure of about 130,316 tonnes and the same railway shortfall; because it draws on the identical source, this repeats the issuer's claim rather than independently verifying it. This paper does not compare the 130,316.39-tonne figure with Indonesia's national emissions, because the documents reviewed do not provide a comparable national total, and it therefore draws no conclusion about its relative size.

3.6.**Independent verification status (Level 5)**

Several review mechanisms appear in the documents reviewed, each with a different scope. (a) CICERO's January 2018 second-party opinion rated the framework Medium Green and covers the framework, not realized outcomes (CICERO, 2018); the SDGs Framework was assessed by CICERO and IISD, with a Medium Green shading and a Good governance rating (Ministry of Finance Republic of Indonesia, 2023, 2024). (b) The Framework calls for independent third-party assurance on annual reports and on each issuance's compliance, without naming the assurer or the scope (Ministry of Finance Republic of Indonesia, n.d.). (c) For the 2022 global green sukuk, the 2023 report notes limited assurance from the audit firm KAP PSS-EY on the amount committed to green projects; this note was not found in the report's tables for the other

issuances, and it concerns amounts, not outcomes. (d) The 2024 report states that projected greenhouse gas reductions are validated by the Ministry of Environment and Forestry and registered in the National Registry System on Climate Change Control, which is government validation rather than independent assurance. (e) DSN-MUI review addresses Shariah compliance, not environmental performance, and Climate Budget Tagging is an internal tracking mechanism through which tagged expenditures form the pool of eligible projects (SBFN, n.d.). (f) A Ministry presentation of February 2019 states that the report was audited by KPMG International in January 2019 (Rulliadi, 2019); the slide does not give the scope or findings of the audit, and the audit report itself was not reviewed here. No independent assurance of project outputs or avoided emissions was identified in the portions of the reports reviewed. Reported outcomes therefore remain at Level 4.

3.7. Summary of evidence levels

Table 7. Evidence levels and status of the main findings

Level	What it measures	Indicators in this study	Source status	Interpretation
1. Funds raised	Capital mobilized	USD 9.59 bn cumulative to end-2023; six global issuances (USD 6.0 bn); six retail series (IDR 30.68 tn)	Documented in issuer reports	Market access shown; use of funds not shown
2. Funds allocated	Proceeds assigned to eligible sectors	Sectoral shares, 2018-2022	Issuer-reported	Direction of capital, not results
3. Project outputs	Deliverables	685 raw water units and 50 km irrigation network (projected); rooftop solar; navigation aids	Issuer-reported; some projected; one internal inconsistency	Partial evidence of delivery

Level	What it measures	Indicators in this study	Source status	Interpretation
4. Reported environmental impact	Emissions and resilience effects	130,316.39 tCO2e per year; 4.10 m3/s target	Issuer-reported	Government claim; method not re-derived
5. Independently verified impact	Third-party assurance of outcomes	Framework-level opinion; limited assurance on one issuance's committed amount; KPMG audit of an early report stated by the Ministry (scope and findings not stated); none for outcomes	Framework, amounts and process only	Outcome claims remain unverified

Note: The five levels are distinct kinds of evidence and are not equivalent indicators of success.

3.8.**Investor base diversification and private capital mobilization**

A recurring rationale for sovereign green sukuk is that a credible sovereign issuance can catalyze wider market participation by standardizing eligibility criteria, disclosure and verification practices. The 2018 inaugural issuance drew Islamic, Asian, United States and European investors (UNDP, n.d.; SBFN, n.d.), and ST009 drew 13,412 first-time investors (Bareksa, 2022). These facts show who participated; they do not show whether the investor base was broadened relative to what would have occurred without the instrument, and no counterfactual is available.

This paper does not estimate a multiplier or elasticity of private capital mobilized per unit of sovereign issuance, because none of the sources reviewed tracks private co-investment attributable to Green Sukuk-funded projects. Any numerical crowding-in coefficient reported elsewhere should be treated with caution unless it is traceable to a specific, cited primary dataset. The SBFN case study is titled around mobilizing private capital, but the page reviewed gives no quantified private-capital figure.

3.9. Macroeconomic context

Indonesia's real GDP growth was 5.31% in 2022 and 5.05% in 2023, following a contraction of -2.07% in 2020 and a rebound of 3.70% in 2021 (Macrotrends, n.d.). These figures are context only. Given confounding factors including the COVID-19 pandemic, global commodity cycles and domestic fiscal policy, this paper attributes no part of GDP performance to Green Sukuk and cautions against doing so without a properly specified multivariate model and longer, higher-frequency series. The share of Green Sukuk in Indonesia's total government securities issuance was not computed in this study; it would be a useful reference point for future work using debt-office data.

3.10. Regional context and scope

The program is described by the UNDP as the first sovereign green sukuk (UNDP, n.d.), and the Ministry's 2024 report lists ST006 as the first retail green sukuk in the series. Rahman et al. (2022) report that Malaysia, described there as the pioneer, issued ten green sukuk in 2020. A fuller numerical comparison with Malaysia, Saudi Arabia and the United Arab Emirates is outside the scope of this paper, because the sources needed to support it were not verified in this study. Future comparative work, ideally using the LSEG and ICD datasets cited in Section 2.1, would show whether the patterns observed in Indonesia generalize.

3.11. Toward corporate and sub-national diffusion

Endri et al. (2022) reported that no corporate green sukuk had been issued in Indonesia at the time of their study, that experts saw renewable energy as the most promising sector, and that limited market understanding was the main obstacle. This contrasts with the sovereign allocation record in Table 9, where renewable energy received 4.92% of proceeds, although the two are different questions (expert views on corporate potential versus the sovereign's own project pool). The documents reviewed for this paper do not allow a conclusion on whether corporate or sub-national green sukuk issuance has since developed; no first corporate green sukuk issuance is asserted here.

3.12. Theoretical and practical contribution

First, relative to the conceptual, expert-elicitation, literature-review and interview-based studies in Table 1, the paper assembles a consolidated, source-attributed record of the program's issuance, allocation and reported outcomes, cross-checked under explicit rules. Second, by separating what is documented (issuance, allocation shares) from what is only reported (outputs, avoided emissions) and from what would need new data (causal GDP effects, private-capital crowding-in), it offers

a template for distinguishing evidence-based claims about Green Sukuk from promotional ones.

Practically, the evidence is consistent with the program acting mainly as a market-development and investor-diversification instrument, and as a signal of sovereign climate commitment, rather than as the primary vehicle for financing the full energy transition. The data do not demonstrate this causally; it is an interpretation consistent with the scale of issuance and the modest direct allocation to renewable energy.

3.13. Policy implications

Four implications follow, each tied to a finding above. First, the reported emissions and output figures are issuer-reported, and the Framework itself calls for independent third-party assurance on annual reports; publishing the assurer, scope and findings for outputs and avoided emissions would move key figures from Level 4 toward Level 5. Second, report labels differ from the data windows they cover; a stable taxonomy, explicit reporting windows, and a clear flag for projected versus realized outputs would make replication feasible. Report-internal inconsistencies, such as the 685 versus 585 raw water units and the six- versus seven-year tenor of PBSG 001, should be reconciled.

Third, given the reported gap between capital allocated to sustainable transportation and realized emissions reductions, future reporting could disaggregate ridership and modal-shift indicators alongside disbursement figures, separating implementation delays from demand-side shortfalls. Fourth, the literature reviewed notes high costs, limited public education and weak regulation as constraints (Araminta et al., 2022) and limited market understanding as the main obstacle to corporate issuance (Endri et al., 2022); technical assistance, standardized documentation and government incentives could address these, and Endri et al. (2022) identify government incentives as the most effective encouragement. Secondary-market disclosure for green-labelled state securities is another reporting gap, since the sources reviewed give no secondary-market data.

3.14. Limitations and directions for future research

This study is descriptive by design and does not establish causal relationships between Green Sukuk issuance and GDP growth, private investment or emissions outcomes. It relies substantially on figures reported by the issuer, cross-checked where possible but not re-verified against project-level records or audited emissions data. The window ends in 2023 for issuance and 2022 for allocation. Sectoral allocation is taken from the 2023 report only; investor counts other than for ST009 are not reported in the sources used and are omitted. Malahayati and Anggraeni (2023) and Balative et al.

(2025) are cited as related work; only their titles, authors and publication details were verified, and they are not analyzed in Table 1; the page range of the Malahayati and Anggraeni chapter could not be verified and is omitted.

A rigorous quantitative test, for example through a Vector Autoregression or panel model, would require primary quarterly, or at minimum annual, series over a longer window for four elements: allocation disbursed per quarter, as distinct from issuance date; installed renewable energy capacity attributable to Green Sukuk-funded projects, ideally from PLN or the Ministry of Energy and Mineral Resources; verified avoided-emissions figures at consistent intervals, reconciled with Indonesia's national GHG inventory; and a tracked measure of private co-investment linked to funded projects, which none of the sources reviewed publishes. Future researchers should first establish, through correspondence with DJPPR, BPS (Statistics Indonesia) and PLN, whether such series can be obtained or constructed.

4. CONCLUSION

Answers to the research questions, On RQ1, the program grew from a single USD 1.25 billion issuance in March 2018 to cumulative proceeds of approximately USD 9.59 billion by end-2023, comprising six global issuances totaling USD 6.0 billion and domestic issuance of about USD 3.59 billion, including six retail series totaling IDR 30.68 trillion, with a diversified investor base at inception and strong retail demand in 2022. On RQ2, allocation for 2018-2022 was concentrated in sustainable transportation (32.39%), climate change resilience (28.09%) and sustainable water and wastewater management (25.00%), and the government reports 130,316.39 tonnes of CO2-equivalent avoided annually from rooftop solar and navigation aids, with railway emissions benefits not yet realized. On RQ3, funds raised are documented, allocation, outputs and environmental impact are issuer-reported, and independent review or assurance was found for the framework, for the amount committed under one issuance and, according to a Ministry presentation, for an early report (scope and findings not stated), but not for project outputs or emissions.

Main findings supported by the data. The data support three findings: the scale and structure of issuance, the sectoral direction of allocated capital, and the existence of review mechanisms of different scope at framework level. They do not support claims about causal effects on GDP, private-capital crowding-in, or independently verified emissions reductions.

Scientific contribution and practical implications. The paper contributes a consolidated, source-attributed record, a replicable protocol and a five-level evidence classification, and illustrates why headline figures should be traced to primary reports.

Practically, the evidence is consistent with a market-development role, and the implications are independent assurance of outcomes, stable reporting taxonomies, a clear separation of projected and realized outputs, and reconciliation of report-internal inconsistencies.

Limitations and research priorities. The study is descriptive, relies on issuer-reported outcomes, and covers issuance to 2023 and allocation to 2022. Priorities are to obtain disaggregated series on disbursement, attributable renewable capacity, verified avoided emissions and private co-investment from DJPPR, BPS and PLN; to estimate dynamic relationships once such data exist; and to extend the framework comparatively to other jurisdictions.

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