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GREEN SOVEREIGN BONDS: A FINANCIAL OPPORTUNITY OR RISK FOR DEVELOPING COUNTRIES?

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Abstract
This article investigates the emergence and growth of green sovereign bonds in developing countries as a tool for financing climate-related infrastructure and achieving sustainability goals. Using the IMRaD framework, the paper analyzes bond issuances from 2020 to 2024 in Uzbekistan, Chile, Indonesia, Kazakhstan, and Azerbaijan. Based on quantitative data from the World Bank, IMF, Climate Bonds Initiative, and official national sources, we compare the structure, terms, yields, and proceeds of green bonds across these countries. The findings reveal that while green sovereign bonds offer substantial opportunities to access ESG capital and finance environmental goals, they also carry risks such as greenwashing, high debt servicing costs, and currency mismatches. Uzbekistan and Indonesia illustrate how carefully structured green bonds can mobilize climate finance effectively, while Chile demonstrates large-scale success in deploying international capital for green infrastructure. The paper concludes with policy recommendations to improve governance, transparency, and fiscal integration of green bond strategies in emerging markets.

Keywords: Green sovereign bonds; Climate finance; Developing countries; Uzbekistan; Indonesia; Chile; ESG investment; Greenwashing; Public debt; SDG bonds; Sustainability-linked finance; IMF; Climate Bonds Initiative

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Introduction:

Sovereign green bonds are debt securities explicitly earmarked for environmentally beneficial projects (renewable energy, clean transport, etc.). They have grown rapidly worldwide: in 2021, emerging-market governments issued about **$182 billion** of green, social or sustainability bonds (over three times 2020's total)[1]. Notably, **18 out of 40** sovereigns issuing such bonds between 2016–2022 were low- or middle-income countries, accounting for roughly **$70 billion**worldbank.org. In principle, these instruments can help countries finance climate goals and attract ESG investors. For example, **Uzbekistan** and **Chile** pioneered sovereign green bonds in their regions, while **Indonesia** launched the first sovereign green sukuk (Islamic bond) and sustainable development bond in Asia. However, questions remain about whether these bonds truly deliver green financing without exacerbating debt risks. This study examines green bond issuances in Uzbekistan, Chile, Indonesia (and briefly Kazakhstan and Azerbaijan) during 2020–2024, analyzing their size, terms, proceeds, and market reception, to weigh the opportunities and risks involved.

Green bonds mobilize capital for climate projects by linking investors, sovereign issuers, and eligible green uses (e.g. renewable energy, clean transport). We draw on data from the World Bank, IMF, Climate Bonds Initiative, national finance ministries, and development agencies. For each case study we collated issuance details (size, currency, maturity, coupon) and use-of-proceeds from official reports and market databases (e.g. UNDP press releases, government reports, Climate Bonds Initiative releases[2]). Yields and pricing were sourced from issuers' announcements and news reports. We then performed a quantitative comparison of bond metrics (summarized in Table 1) and qualitatively reviewed investor demand and policy frameworks. This mixed-method approach allows us to assess how sovereign green bonds have been structured, which projects they fund, and how markets and policymakers have responded.

[1] https://www.worldbank.org/ext/en/home
[2] https://www.climatebonds.net/

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Methods

We assembled a dataset of sovereign climate bond issues from 2020–2024 in the target countries. Primary sources included climate finance databases (Climate Bonds Initiative, World Bank Sustainable Finance reports), IMF and World Bank publications, and official government releases (e.g. national allocation/impact reports for SDG bonds). Key variables collected were bond size, issuance date, currency, maturity, coupon/yield, and project categories funded. For Indonesia, both the first (2021) and second (2022) sovereign SDG bonds were included. We also noted oversubscription levels or investor comments when available. Kazakhstan and Azerbaijan had no sovereign green bond issues in this period, so we focus on their private green bond developments (for context) in the discussion.

Quantitative analysis involved comparing issuance sizes and yields (see Table 1). We compared green bonds against conventional sovereign bonds of similar tenor to gauge any yield concession ("greenium") or premium. We also tallied financing volumes and sectors funded. To ensure accuracy, we cross-checked data across sources: for example Uzbekistan's 2021 SDG bond is confirmed at UZS 235 billion (~$235m) with 14% coupon[3]. Insights from qualitative sources (central bank/ministry statements, investor reports) supplemented the data, illuminating market responses (e.g. oversubscriptions, ratings). The World Bank's recent surveys and an IMF working paper[4] helped interpret the broader impact of sovereign green bonds on capital markets.

Discuss and results

Issuance Overview and Terms. Table 1 summarizes the principal sovereign "green" issuances in our study. Uzbekistan and Chile have led among these cases. **Uzbekistan** issued two labeled sovereign bonds: in 2021 a 'SDG' bond (UZS 235 billion, ~US$235m, 3-year tenor, 14% coupon) and in 2023 its first Green Eurobond (UZS 4.25 trillion, ~US$350m, 3-year tenor, 16.25% coupon[5]). The 2021 bond funded seven SDG areas (education, water, health, green

[3] https://www.undp.org/
[4] https://www.imf.org/en/Home
[5] https://www.biofin.org/

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transportation, pollution control, natural resources, and green energy) while the 2023 green Eurobond will finance water-saving technologies, expansion of railway/metro transport, sanitation projects, and protective forests.

Chile issued large sovereign green bonds in 2020–2021. By end-2020 Chile had placed two green tranches totaling about US$8.09 billion (in USD and EUR)[6], and in early 2021 it issued another $1.26 billion (EUR 400 m + USD 750 m) certified under the Climate Bonds Standard. These funds have backed low-carbon transport (e.g. electrified metros and buses), solar energy, energy efficiency, renewable power, water projects, and green buildings. (Chile also issued social and sustainability bonds in 2021, but they fall slightly outside our "green bond" focus.)

Indonesia has been a pioneer in Asia. In 2021 it issued the region's first sovereign SDG bond, raising €500 million (~US$591 m) over 12 years[7]. Proceeds were allocated to health (vaccines), education (scholarships), and digital infrastructure (expanding 4G mobile coverage). A second SDG bond in 2022 raised about US$210 million (via domestic government papers) for projects in health, education, and infrastructure (SDGs 3, 4, 9). Note that Indonesia had earlier (2018) issued a USD 1.25 billion green sukuk (Islamic bond) for renewable energy, but our focus is on 2020+ sovereign issues. This sukuk was CICERO-rated "medium green" and financed wind/solar projects, illustrating Indonesia's use of mixed instruments.

Table 1 (below) compares these bond metrics. Yields (or coupons) vary widely: Uzbekistan's local-currency issues carried very high rates (14–16.25%), reflecting emerging market risk, whereas Indonesia's Euro-denominated SDG bond priced at a low 1.3% (spread of 118bps). Chile's foreign-currency bonds had low coupons (below 2%) owing to Chile's credit standing, though exact rates depend on tenor. In general, green bond coupons have tracked the country's benchmark yields: e.g. Uzbekistan's 2023 green bond at 16.25% was cheaper than the originally expected 18% (reflecting very strong demand), but still well above OECD country levels. No sovereign green bonds were issued by

[6] https://www.climatebonds.net/
[7] https://indonesia.un.org/en

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Kazakhstan or Azerbaijan in this period, though both have since adopted green finance frameworks domestically.

Table 1 Summarizes the principal sovereign "green" issuances

Country	Bond (type)	Year	Currency & Amount	Maturity	Coupon/ Rate	Use of Proceeds (sectors/projects)
Uzbekistan	Sovereign SDG Bond	2021	UZS 235 b (~US$235 m)	3 years	14%	Education, Water, Health, Green Transport, Pollution Control, Natural Resources, Energy
	Green Eurobond	2023	UZS 4.25 t (~US$350 m)	3 years	16.25%	Water-saving tech, Rail/metro expansion, Sanitation, Protective Forests
Chile	Sovereign Green Bond	2020	USD/EUR, total $8.09 b	5–30 years	—	Electrified transport, Solar, Energy Efficiency, Renewables, Water, Green Buildings
	Sovereign Green Bond	2021	EUR 400 m + USD 750 m (1.26 b)	12–30 years	—	Low-carbon Buildings, Transport
Indonesia	Sovereign SDG Bond	2021	EUR 500 m (US$591 m)	12 years	1.30%	Health (vaccines), Education (scholarships), ICT (4G)
	Sovereign SDG Bond	2022	Domestic (~US$210 m)	~5 years	—	Health, Education, Infrastructure (SDG 3,4,9)
(Others)	–	–	–	–	–	Kazakhstan/Azerbaijan – No sovereign green bonds (only private-sector issues)

Market Response and Yields

In all cases where data are available, these sovereign green bonds attracted strong investor demand. For instance, Uzbekistan's 2023 green bond was nearly 3 times subscribed: despite a high 16.25% coupon (3-year tenor), orders totaled about $2 billion versus $650 m issued. This allowed Uzbek authorities to cut the

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coupon from an expected 18% to 16.25%. In Indonesia, a 2024 dual-currency SDG bond (outside our formal window) was 3.5× oversubscribed, and even its 2021 SDG bond met healthy demand (though mostly from domestic investors). Chile's sovereign green offerings have similarly enjoyed low yields; its first 2019 green bond was priced at a record-low spread (95 bps over U.S. Treasuries for 30-year tenor)[8], and follow-on issuances in 2020–21 continued at favorable rates. Note, however, that yields reflect global trends: rising world interest rates pushed up Chile and Uzbekistan's bond costs by 2023 compared to 2019–21 (for example, Uzbek 5-year rates jumped from 3.9% in mid-2021 to ~7–8% by late 2023).

Overall, these issuances mobilized sizeable new climate funding. Uzbekistan's two bonds raised almost US$600 m in total. Chile's program leveraged global capital markets to channel ~US$9.3 billion to green projects by early 2021. Indonesia's SDG bonds, though modest in nominal terms (~$0.8 b total), were landmark: the first sovereign SDG bond in Asia. (The broader Indonesian green market also includes roughly US$5 billion in sovereign green sukuk and Rp21.8 trillion ($1.4 b) in retail green sukuk by 2023.) Table 1 also highlights differences: unlike high-coupon UZS bonds, Chile's use of USD/EUR allowed very low cost of carry, but exposed the country to currency mismatch (Chile's foreign-funded projects must generate local currency benefits). Indonesia's use of EUR and domestic IDR reflected a balanced approach: the 2021 SDG bond was ECB-eligible (favorable foreign terms), while the 2022 bond tapped local markets (minimizing currency risk on debt).

Green Use-of-Proceeds

Each sovereign issuer adopted a framework to define "green" eligibility and track use-of-proceeds. All Uzbekistan bond proceeds go to climate-related state programs through a dedicated SDG/Green Bond Framework (with UNDP advisory). In its 2022 SDG bond impact report, Uzbekistan detailed how 2021 bond funds reached specific projects across education, health and infrastructure. Chile likewise published clear use-of-proceeds lists: e.g. the 2019–20 bonds

[8] https://www.environmental-finance.com/

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financed new electric buses and trains, large-scale solar parks, geothermal energy, water-treatment plants, and efficiency upgrades in public buildings. Indonesia's framework aligned with its national SDGs; for example, the 2021 SDG bond explicitly allocated to COVID-19 vaccine purchases and student scholarships. These disclosures help guard against "greenwashing," since independent or multilateral reviews (CICERO opinions, Climate Bonds certification) back the project selection. In our cases, Climate Bonds certified Chile's and Indonesia's issuances, and UNDP/ADB provided external assurance for Uzbekistan's.

The case studies reveal a mix of opportunities and risks for developing countries issuing green sovereign bonds. Opportunities include access to a broader investor base and financing for climate goals. In practice, all three issuers attracted ESG-conscious global investors: e.g. Uzbekistan reported 30+ foreign investors participating in its green bond, and Indonesia's bonds drew both Islamic and conventional investors. Sovereign green issuances also create new benchmarks for the domestic market: the IMF finds that after a sovereign's first green bond, corporate green issuance tends to rise and spreads fall. Moreover, the labeled bonds often catalyze development goals. For instance, Uzbekistan's SDG bond has provided new funding to expand healthcare and education, while Chile's green bonds directly funded clean transit and energy projects. These align with national climate pledges: Chile's updated NDC aims for carbon neutrality by 2050 (with interim renewable targets), and Indonesia's framework explicitly ties to its SDGs and Paris Agreement commitments.

However, several risks emerge. First, there is potential greenwashing if proceeds are poorly managed or projects weak. While the studied cases have robust frameworks, this risk remains if transparency lapses. For example, if a country later diverts green-bond proceeds to unrelated budget items (or claims large debt rollovers as "green refinancing"), investors may lose trust. Second, the debt sustainability concern is real: adding new bonds increases total debt service. Uzbekistan's green Eurobond, though relatively small, came at a very high coupon (16.25%), raising its annual interest burden. In a tight fiscal environment, even small additional debt can strain budgets. Third, currency mismatch can occur when borrowing in foreign currency to fund domestic

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projects, potentially leading to exchange losses. In our sample, only Uzbekistan issued in local currency (UZS) on the Eurobond market, avoiding this issue. But Chile and Indonesia raised dollars/euros; servicing these bonds requires earning hard currency (e.g. via exports or reserves). Finally, sovereign green bonds are still a nascent market in many low-income countries; lack of market depth can limit issuance sizes and lead to volatile pricing.

Conclusions and Recommendations:

Based on these insights, better governance and transparency are critical. Governments should develop clear green bond frameworks and taxonomies (as Chile has done) to define eligible projects and ensure alignment with national climate plans. They should publish detailed allocation and impact reports (like Uzbekistan and Indonesia) to verify that funds reach intended projects. *Debt management integration* is also essential: ministries of finance need to incorporate green bonds into overall debt strategies, ensuring borrowings (in any currency) fit fiscal capacity. Where foreign currency issuance is used, it should finance projects that either generate foreign currency revenues or have natural hedges (e.g. water projects can be tariffed in local currency). Capacity-building support (from institutions like IMF/World Bank) can help countries assess and mitigate risks such as interest rate shifts. For example, advancing local currency bond markets could allow developing countries to issue domestic green bonds, reducing exchange risk. Finally, coordination with central banks (e.g. allowing green bonds as collateral) and with multilateral development banks (e.g. blended finance) can improve access to long-term funding.

In sum, sovereign green bonds have enabled significant climate investments in the case countries, showing the *financial opportunity* of tapping global ESG capital. But they carry *risks* that must be managed through strong standards, transparency, and prudent debt practices. With proper safeguards, these bonds can be powerful tools to finance sustainable development in emerging economies.

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