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Financing India's Green Transition: The Emergence of Sovereign Green Bonds as a Strategic Lever in India's Sustainable Finance Agenda for Viksit Bharat@2047

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Abstract

The most populated country as well one of the largest and fastest developing major economies in the world, India has also the dubious distinction of alarming carbon footprints. However, India is all set to play the role of a responsible climate leader pledged to the Paris Agreement and, as evidences suggest, is trying to evolve as an Inclusive Green Economy (IGE) by balancing environmental sustainability and economic growth. In line with the UN Sustainable Development Goals 2030 and its national vision-plan *Viksit Bharat@2047*, India has undertaken ambitious climate targets, including achieving net-zero emissions by 2070, reducing greenhouse gas emissions intensity of its GDP by 45% (from 2005 levels) by 2030, and securing 50% of its electricity generation capacity from non-fossil fuel sources by 2030. To realize these climate and environment friendly goals, India needs an estimated \$2.5 trillion in climate finance by 2030. In this context, Sovereign Green Bonds (SRGBs) have emerged as a vital financial (read debt) instrument for mobilizing both domestic and international capital towards environmentally sustainable projects. India's ambitious climate targets necessitate significant capital mobilization, making SGrBs a crucial instrument in its sustainable finance agenda to fund green projects of renewable energy, clean transportation, climate change adaptation, sustainable water and waste management, pollution prevention and control, green infrastructure, etc. This paper argues that India's sovereign green bond program plays a pivotal role in advancing the country's sustainable finance agenda by mobilizing ESG-aligned capital; however, overcoming challenges related to market trust, governance, and transparency is essential. This paper employs a SWOT analysis to review India's SGrBs programme on green bonds and sustainable finance, contextualizing India's initiative within global trends and evaluating the SGrBs program's strengths, weaknesses, opportunities, and threats. Key market problems such as transparency issues, low 'greenium,' secondary market illiquidity, and the absence of a comprehensive, full-proof green taxonomy are identified. Through a detailed analysis of current policies and market dynamics, the study proposes strategic interventions aimed at enhancing investor confidence and optimizing capital mobilization to support India's climate and development objectives through SGrBs. Finally, strategies are proposed to enhance market trust and facilitate greater ESG-aligned capital mobilization, including strengthening reporting, optimizing greeniums, boosting secondary market liquidity, and developing a robust green taxonomy aimed at generating sustainable finance over time to realize the vision of *Viksit Bharat@2047*.

Keywords: Green bonds, Climate change, Climate finance, ESG, Greenium, Greenwashing, Inclusive Green Economy, Sovereign Green Bonds, Sustainable finance, Viksit Bharat@2047

1. Introduction

India stands at a critical crossroads in its development journey, pursuing an ambitious vision to become a self-reliant, just, inclusive, globally influential and developed economy by 2047—marking 100 years of independence. This national aspiration, articulated as *Viksit Bharat@2047*, serves as a comprehensive roadmap for inclusive growth and long-term progress. Even as economically the *Viksit Bharat@2047* vision aspires to elevate India's economy to at least US$30 trillion by 2047, the World Bank positively affirms, "India's aspiration to achieve high income status by 2047 will need to be realized through a climate-resilient growth process that delivers broad-based gains to the bottom half of the population" (The World Bank, 2024). The International Monetary Fund (IMF), through its Executive Director, exuded hope, "India can be a $55 trillion economy by 2047" (The Hindu, Aug. 8, 2024). The *Viksit Bharat@2047* ambition is inextricably linked with India's sustainable development agenda—balancing environmental sustainability and economic growth (Bhatnagar et al., 2025), and emerging as an Inclusive Green Economy (IGE) leveraging *sustainable finance* as a major instrument in the process. "India's Green Transition" refers to the shift in the country's development trajectory from a carbon-intensive economy toward low-carbon, climate-resilient, and inclusive model of development encompassing a strategic reorientation of India's policy, finance, infrastructure, and energy systems. By integrating climate action, green infrastructure investment, inclusive economic growth, and sustainable finance through green bonds in general and Sovereign Green Bonds (SGrBs) in particular, this paper argues, India can emerge as a green economy and realize its long-term development goals under *Viksit Bharat@2047*. In this context, this paper explores the key barriers to sustainable finance and investment agenda of India through SGrBs while outlining strategies for activating critical enablers.

India, a rapidly developing economy, has pledged significant contributions to global climate action. Among them are included achieving Net-Zero emissions by 2070, a 45% reduction in the emissions intensity of its GDP compared to 2005 levels by 2030, and to have 50% of its electricity generation capacity derived from non-fossil fuels by 2030 (Government of India, 2022). To meet these goals, the country requires substantial climate-aligned capital flows, with estimates placing the financing need at approximately USD 2.5 trillion by 2030 (Government of India-Ministry of Finance, 2025). The Government of India claims that "the Net Zero target by 2030 by Indian Railways alone will lead to a reduction of emissions by 60 million tonnes annually" (Government of India, 2022). Realizing these targets demands massive financial resources, with estimates suggesting over USD 470 billion annually will be required by 2070 (CEEW-CEF, 2021). In line with the United Nations Framework Convention on Climate Change (UNFCCC) and the International Capital Market Association (ICMA) Green Bond Principles (GBP), the Indian government launched its Sovereign Green Bonds (SGrBs) in FY 2022-23 as a key thematic debt instrument to generate sustainable finance by mobilizing both domestic and cross-border green capital for environmentally sustainable projects or green projects (World Bank, 2023).

Sovereign green bonds have gained traction globally as instruments for governments to finance climate-friendly infrastructure and meet sustainability goals (Flammer, 2021). India operationalized its Sovereign Green Bond Framework in 2022, aligning with the International Capital Market Association's (ICMA) Green Bond Principles (Government of India, 2022). Subsequent sovereign issuances have sought to finance eligible green projects—including utility-scale renewable energy, clean mobility systems, and ecosystem restoration. These interventions have supported measurable progress in India's low-carbon transition, with solar capacity reaching 107.9 GW by April 2025 and total non-fossil fuel capacity expanding to 213.7 GW by November 2024, accounting for 46.8% of the country's total installed electricity capacity (Press Information Bureau, 2024). On August 29, 2024, the Reserve Bank of India (RBI) launched new scheme to facilitate the trading and settlement of SGrBs within India's International Financial Services Centre (IFSC) to attract foreign investment and enhance non-resident participation in these environmentally focused instruments (IFSCA, 2024).

Sovereign Green Bonds are debt instruments in pursuit of sustainable finance for funding India's green projects. Consistent with India's sustainable finance agenda are the "Framework for Sovereign Green Bonds", released by the Ministry of Finance on November 9, 2022 and the *Draft Climate Finance Taxonomy*, introduced in the Union Budget for FY 2024–25 developed by the Department of Economic Affairs, Government of India, to outline the approach, objectives, principles, and methodology for classifying climate-aligned activities aligned with India's SDG commitments and the *Viksit Bharat 2047* vision. The Framework of "India's Climate Finance Taxonomy" (Press Information Bureau, 07 May 2025) strengthens India's climate action goals as per Paris Agreement and "India's Updated First Nationally Determined Contribution Under Paris Agreement" (Government of India, August 26, 2022).

According to the government reply to the Rajya Sabha untarred question no. 2000, the Government of India raised ₹57,697.398 crore between FY 2022-23 and FY 2024-25 Department of Economic Affairs, 18 March 2025). However, structural inefficiencies persist. Despite eight SGrB issuances aggregating approximately ₹53,000 crore, the observed greenium in Indian markets remains shallow (2–3 basis points), significantly below international benchmarks (7–8 basis points). As noted in the Economic Survey 2024-25, institutional investors and market intermediaries displayed limited appetite for concessional yield spreads on green-labelled sovereign debt (Ministry of Finance, 2025). Budgetary reallocations and revenue shortfalls—such as the downward revision of SGrB proceeds from ₹32,061 crore to ₹25,298 crore for FY 2024–25 and the reduction in grid-scale solar allocations from ₹10,000 crore to ₹1,300 crore—further reflect implementation bottlenecks and market underperformance. Approximately ₹3,600 crore of originally earmarked green capital was redirected to general revenue, weakening the additionality and earmarking credibility of the green fiscal envelope (Team Angel One, 2025).

This paper aims to thoroughly analyze India's nascent SGrB market. We will begin by reviewing the relevant literature on green bonds and sustainable finance, followed by a detailed account of all of India's SGrB issuances to date. A comprehensive SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis will then assess the market's current landscape. We will identify specific market problems and challenges hindering the full potential of SGrBs in India, such as transparency concerns and the 'greenium' puzzle. Finally, this paper will propose actionable strategies to enhance market trust, deepen the SGrB market, and facilitate greater mobilization of ESG (Environmental, Social, and Governance)-aligned capital for India's sustainable development agenda and the *Viksit Bharat@2047*.

2. Literature Review: Sovereign Green Bonds and Sustainable Finance

2.1 Defining Green Bonds

Green bonds are distinct from conventional bonds by their explicit commitment to finance or re-finance environmentally sound projects. According to the International Capital Market Association (ICMA), green bonds are debt instruments issued to finance or refinance eligible projects that yield clear environmental benefits. These fixed-income securities are utilized by corporations, governments, or institutions to support green initiatives and advance ecological sustainability (Agarwal, 2023; Goldman Sachs, 2023). The CMA Green Bond Principles, widely recognized as the market standard, outline four core components: (a) use of proceeds, (b) process for project evaluation and selection, (c) management of proceeds, and (d) reporting (ICMA, 2021). Adherence to these principles ensures transparency and credibility, preventing 'greenwashing' – the practice of misrepresenting environmental credentials. These bonds appeal to a growing investor base prioritizing ESG factors, allowing issuers to diversify their funding sources and enhance their reputation.

2.2 Evolution of Sovereign Green Bonds

While the World Bank is the first to have issued green bond in 2008, the first country to issue sovereign green bonds was Poland (2016), followed by prominent economies like France (2017) and the Netherlands (2019). SGrBs play a pivotal role beyond capital raising; they signal a government's unwavering commitment to environmental goals, set a benchmark for pricing green debt, and can catalyze the broader domestic green finance market by providing a sovereign yield curve for green assets. Their success often depends on robust underlying green frameworks, clear project pipelines, and credible reporting mechanisms.

2.3 Sustainable Finance Landscape in India

India's journey towards sustainable finance for balancing economic growth and environmental sustainability has "gained momentum" only in recent years (EY India, 2025). Regulatory bodies like RBI and the Securities and Exchange Board of India (SEBI) have introduced various measures to promote green finance, including guidelines for green bonds and sustainability reporting for corporates. The corporate green bond market in India has seen gradual growth, but the scale of investment required for India's climate targets far outstrips current private sector mobilization. The launch of SGrBs is therefore seen as a strategic move to accelerate this mobilization and integrate green finance into mainstream government borrowing.

2.4 Challenges in Green Bond Markets

Despite their growth, green bond markets face common challenges (Baker McKenzie, 2019, September 23). These include the 'greenium' – whether green bonds genuinely offer a lower yield than conventional bonds – and concerns about secondary market liquidity. Most importantly, the specter of greenwashing and the weak contractual enforceability of "green" commitments within green bond frameworks looms large, necessitating rigorous verification and transparent impact reporting to maintain investor trust. For emerging economies, additional challenges can include the lack of a standardized green taxonomy, limited institutional capacity for project identification and monitoring, and attracting a diverse international investor base.

2.5 Research Gap

While there's general literature on green bonds, a detailed, post-issuance analysis of India's specific SGrB experience is crucial. This paper aims to fill this gap by providing a focused SWOT analysis tailored to India's context, detailing each of its distinct SGrB issuances, and identifying India-specific market problems. By doing so, it proposes tailored strategies to enhance market trust and accelerate ESG-aligned capital mobilization, contributing practical insights to India's sustainable finance agenda.

Emerging economies, including India, face unique challenges in green bond market development such as limited investor awareness, regulatory gaps, and data transparency issues (Giglio, Kelly, & Stroebel, 2021). Several studies stress the importance of marketcraft — the strategic design and governance of green bond programs — to enhance credibility and attract institutional investors (Tang & Zhang, 2020). India's SGrB issuances have been analyzed in terms of their policy alignment with national climate targets and international standards. While government reports document progress in renewable energy capacity expansion, independent assessments note the limited greenium (yield discount) in Indian SGrBs compared to mature markets, indicating market trust issues (Walia, 2025). There is a clear research gap on the operational weaknesses and governance issues constraining India's SGrB market expansion (IMI, 2025), which this paper aims to address through a SWOT framework.

3. Overview of India's Sovereign Green Bonds

3.1 Policy Framework and Launch

India's foray into Sovereign Green Bonds is anchored by a comprehensive 'Framework for Sovereign Green Bonds", released by the Ministry of Finance on November 9, 2022

(Government of India, 2022). This framework is meticulously designed to align with the ICMA Green Bond Principles, ensuring international best practices in terms of use of proceeds, project selection, management of proceeds, and reporting. A crucial aspect of this framework is that the principal and interest payments on SGrBs are not contingent on the performance of the financed green projects, providing investors with security akin to conventional government securities. The framework reflects extensive collaboration among key government entities, including the Ministry of Finance, Ministry of Environment, Forests and Climate Change, PDMC, RBI, and NITI Aayog.

3. 2 Details of India's Sovereign Green Bond Issuances till Date

India initiated its SGrB program in Fiscal Year 2022-23 (FY23), successfully issuing a total of ₹16,000 crore (INR 160 billion) across two tranches of ₹8,000 crore in January and February 2023. Since then, the government has continued its issuance strategy, demonstrating a sustained commitment to green finance. As of April 2025, the government has conducted eight distinct green bond issuances declaration, raising a cumulative amount of nearly ₹57,697.398 crore (approx. ₹5,769.7 billion) between FY 2022-23 and FY 2024-25 (Department of Economic Affairs, 18 March 2025). The most recent announcements indicate plans to issue another ₹20,000 crore (INR 200 billion) in SGrBs during H2 FY25 as per the Issuance Calendar of Government Bonds (Ministry of Finance, 2025).

India's Sovereign Green Bonds have been used to finance a range of eligible projects, including renewable energy, afforestation, clean transportation, water management, solar power infrastructure, waste management, pollution control, grid-scale solar, energy efficiency, sustainable agriculture, forestry, renewable energy expansion, and climate resilience and water projects.

3. 2.1 Eligible Green Projects

The proceeds from India's SGrBs are exclusively allocated to public sector projects that demonstrably contribute to reducing the economy's carbon intensity. The broad categories of eligible projects include (Ministry of Finance, 202):

- *Renewable Energy:* Projects encompassing solar, wind, small hydro, and research & development for emerging renewable technologies like tidal energy.
- *Clean Transportation:* Initiatives such as energy-efficient electric locomotives and metro rail projects aimed at reducing emissions from the transport sector.
- *Sustainable Water and Waste Management:* Projects focusing on efficient water use, wastewater treatment, and effective waste disposal and recycling.
- *Energy Efficiency:* Including green building certifications and other measures to reduce energy consumption.
- *Climate Change Adaptation:* Projects designed to help communities and ecosystems adapt to the impacts of climate change.

- *Sustainable Management of Living Natural Resources and Land Use:* This includes critical initiatives like afforestation efforts under programs such as the National Mission for a Green India.
- *Terrestrial and Aquatic Biodiversity Conservation:* Projects aimed at protecting and restoring biodiversity across different ecosystems.

It's explicitly stated that SGrB funds are not to be utilized for fossil fuel-related expenditures (World Bank, 2023). The allocation report for FY 2022-23 indicated that approximately 78% of the proceeds were directed towards clean transportation, 21% towards renewable energy, and about 1% to sustainable management of living natural resources and land use (Ministry of Finance, 2025). For the upcoming FY 2024-25, revised budget allocations indicate a significant focus on green areas, with ₹12,600 crore for electric locomotives, ₹8,000 crore for metro projects, ₹4,607 crore for renewable energy including the Green Hydrogen Mission (https://mnre.gov.in/en/national-green-hydrogen-mission/), and ₹124 crore for afforestation (Team Angel One, 2025). This demonstrates the government's commitment to channelling funds into key green sectors.

4. SWOT Analysis of India's Sovereign Green Bond (SGrB) Program

In the following sub-sections, we analyze the Strengths, weaknesses, opportunities and threats associated with India's Sovereign Green Bond Program.

4.1 Strengths (Internal, Positive) of India's Sovereign Green Bonds (SGrBs) Program

Strengths are internal capabilities that enable a company to leverage opportunities and revisit threats. Here are the internal strengths consisting of factors within the government's control or inherent to the market structure that positively impact India's Sovereign Green Bonds (SGrB) Program:

- **Strong Government Commitment:** India's ambitious climate targets, including Net-Zero by 2070 and significant emissions intensity reduction goals, underpin the SGrB program. This strong political will and alignment with national climate policies provide a credible foundation for the market (Government of India, 2022). SGrBs are backed by a government guarantee for redemption, which establishes their credibility and renders them a trustworthy investment instrument for potential investors.

  The Draft Climate Finance Taxonomy, introduced in the Union Budget for FY 2024–25 by the Department of Economic Affairs, establishes clear criteria for identifying climate-aligned activities and directing capital towards low-carbon sectors. By offering a unified, science-based framework, it also seeks to mitigate the risk of greenwashing and ensure transparency for both public and private stakeholders. The Draft Framework of the Climate Finance Taxonomy has been developed to outline the approach, objectives, principles, and methodology for classifying climate-aligned activities aligned with India's commitments and the *Viksit Bharat 2047* vision.

- **Large Domestic Capital Market:** India possesses a vast and growing domestic capital market, offering a substantial base for investor participation in SGrBs. This reduces over-reliance on volatile international capital flows (Ministry of Finance, Government of India. (2023).
- **Diversification of Funding Sources:** SGrBs allow the government to tap into a new and expanding pool of capital, both domestically and internationally, specifically targeted at green infrastructure, diversifying its overall funding mix.
- **Signaling Effect:** Issuing SGrBs significantly enhances India's image as a responsible and sustainable economy on the global stage. This positive signaling can attract further green foreign direct investment (FDI) and foster international collaboration.
- **Standardized Framework:** India’s SGrB framework adheres to the globally recognized ICMA Green Bond Principles, providing a credible and transparent structure that instils confidence in international investors (Government of India, Ministry of Finance, 2022).
- **Massive Renewable Energy Potential:** India is endowed with abundant solar and wind resources, offering a consistent and robust pipeline of eligible green projects for SGrB financing (Shreeprabha, 2024).
- **Growing Demand for Environmental Goods and Services (EGS):** Environmental goods and services (EGS), i.e., “goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil as well as problems related to waste, noise and ecosystems” (Organisation for Economic Co-operation and Development, 1999). The consumer preference in India is heaving titled in favour of EGS (Devi, et al., 2025), which has created a favourable atmosphere for more and more green projects and in turn need for SGrBs.
- **Continuous Revision and Upgrading:** Indian government agencies like the RBI, the Securities and Exchange Board of India (SEBI) are constantly revising and upgrading the capital market. For example, SEBI effectuated a framework for the issuing and listing ESG (Environment, Social and Governance) debt securities that came into effect on 5 June 2025 for curbing responsible finance and “purpose-washing”. The SEBI’s ESG Debt Securities Framework, effective June 5, 2025, governs social bonds, sustainability bonds, and sustainability-linked bonds but excludes green bonds. In fact, this provision will strengthen India’s sustainable finance reputation and indirectly support the SGrB agenda.
- **Coordination and Flexibility in Approach:** The Government of India and the policy think-tank bodies including the apex government think-tank NITI Ayog and the regulatory bodies like RBI, SEBI, etc. not only have excellent coordination but also the needed expertise in flexible adopt-and-adapt approach to develop, monitor, track, evaluate the system by adopting both market-led bottom-up approach and a policy-led top-down approach and also adapting global best practices and measures to render the policy and execution on track.

4.2 Weaknesses (Internal, Negative) in India’s Sovereign Green Bond (SGrB) Program

Weaknesses are internal issues that make an organization or a programme vulnerable. India's Sovereign Green Bond (SGrB) Program, while a crucial step towards financing green initiatives, faces several internal weaknesses or factors that negatively impact the program. These include:

- **Muted Foreign Investor Demand:** Even though the Government of India eased regulations for foreign investors to optimize demand for Sovereign Green Bonds (SGrBs), the real outcome has fallen short of expectations. India's sovereign credit rating, while investment grade, is not exceptionally high, which can limit investor confidence, particularly among international investors who are sensitive to sovereign risk.
- **Credit Rating Sensitivity and Foreign Investor Appeal:** India's sovereign credit rating, while investment grade, is not exceptionally high, which can limit investor confidence, particularly among international investors who are sensitive to sovereign risk.
- **Limited Track Record:** As a relatively nascent market compared to developed economies, India's SGrB market lacks extensive historical data and a long track record, which some investors might view as a risk.
- **Low 'Greenium' Achievement:** 'Greenium' refers to the lower borrowing costs (yield) that green bonds typically command compared to conventional bonds due to their environmental benefits. Indian SGrBs have consistently achieved a very modest greenium (typically 2-3 basis points) compared to the global average of 7-8 basis points. This makes them less financially attractive to issuers and, in some cases, has led to muted demand and devolvement of bonds to primary dealers (Team Angel One, 2025). It is a great challenge that needs policy revision.
- **Secondary Market Liquidity:** The secondary market for Indian SGrBs often suffers from low liquidity. This is partly due to smaller issue sizes and a tendency for investors to hold bonds till maturity, making it challenging for investors to exit their positions easily (Team Angel One, 2025). The relatively small sizes of SGrB issues can limit their appeal to larger institutional investors.
- **Focus on ROI over Environmental Concerns:** A large segment of Indian investors still prioritize higher returns on investment over explicit environmental benefits, further dampening demand for green bonds.
- **Lack of Standardized Metrics:** While the framework outlines eligible projects, there's a perceived absence of clear, standardized metrics for measuring and comparing the environmental impact of various projects. This can lead to discretion and potential inconsistency in project selection, raising concerns about "greenwashing" (overstating environmental benefits).
- **Data Availability and Delayed/Insufficient Reporting:** Timely and comprehensive post-issuance reporting on fund allocation and environmental impact is crucial for investor confidence. Delays in publishing allocation and impact reports (e.g., the 2023-24 allocation report) reduce transparency and trust, making it difficult for investors to assess how funds are utilized. Challenges persist in consistent, granular, and timely reporting on the environmental impact of financed projects across various government

ministries. The absence of a comprehensive allocation report for all fiscal years can lead to investor scepticism.

- **Absence of a Comprehensive Green Taxonomy:** While a framework exists, India lacks a detailed, legally binding national green taxonomy. This can lead to ambiguity in defining "green" projects, potential for greenwashing, and reduced comparability with international standards.
- **Capacity Constraints:** There are existing limitations in institutional capacity within various government entities for rigorously identifying, evaluating, monitoring, and reporting on eligible green projects.
- **Over-reliance on Fossil Fuels:** Despite rapid progress in renewables, India's energy matrix remains heavily reliant on coal and other fossil fuels. This significant existing dependency makes the transition slow and resource-intensive, posing a long-term challenge to the 'green' narrative (Team Angel One, 2025).

It is noteworthy that in May 2024, RBI called off an SGrBs auction of ₹6,000 crores for falling short of expected greeniums even though there were expected number of bidders. Even the receivable amount was more than 2x oversubscribed than the notified amount, i.e. ₹12677 crores (Kajal, 2025). This sent a wrong message to the market, raising concerns that RBI prioritized its own financial benefits over fulfilling the very core purpose of the SGrBs framework that aimed at significant reduction of the carbon intensity in the economy. The notion that the government gave more priority to greenium over sustainability did not go well with environment-friendly people, let alone its critics.

4.3 Opportunities (External, Positive) for the Success of India's Sovereign Green Bond (SGrB) Program

Opportunities arise from external environment—factors outside the government's direct control but which can positively influence India's Sovereign Green Bond (SGrB) Program:

- **Growing Global ESG Investor Base:** There is a rapidly expanding global appetite for sustainable investments, particularly from institutional investors and dedicated ESG funds. India's SGrBs can tap into this significant pool of capital (Green, 2024). An IFC–Amundi Emerging Markets Green Bonds report confirms that "rising investor demand for sustainable products was the chief driver of the asset class's growth." It notes sovereign green bonds are accounting for over 5 % of emerging-market bonds and investor appetite remains strong (International Finance Corporation & Amundi, 2025).
- **Regulatory Support:** Regulators like RBI and SEBI are increasingly focused on strengthening the regulatory environment for green finance, which can boost market confidence and attract more investors.
- **Incentives and PLI Schemes:** Government initiatives like Production Linked Incentive (PLI) schemes for clean manufacturing and FAME subsidies for electric vehicles create a supportive ecosystem for green projects, making them more financially viable for SGrB funding.

- **Catalyst for Private Green Investment:** SGrBs can act as a crucial benchmark, establishing a sovereign green yield curve that encourages and facilitates private sector green bond issuances, thereby deepening the overall green debt market in India.
- **Retail Investor Participation:** The provision for retail investor participation in SGrB auctions (5% of the aggregate nominal amount) can broaden the investor base and foster a sense of public ownership in climate action.
- **Renewable Energy Costs:** The falling costs of renewable energy technologies (solar, wind) make green projects more financially attractive and viable, increasing the pool of projects that can be financed through SGrBs.
- **Innovation in Green Technologies:** Continuous innovation in areas like electric mobility, energy efficiency, and sustainable waste management creates new opportunities for impactful green investments.
- **Alignment with Global Standards:** India's SGrB framework generally aligns with the International Capital Markets Association's (ICMA) Green Bond Principles, which enhances credibility and appeals to international investors.
- **Learning from Global Best Practices:** India can learn from the experiences of other sovereign green bond issuers and adopt best practices in areas like impact reporting, transparency, and liquidity enhancement to improve its own program.
- **Attracting Foreign Institutional Investors (FIIs):** The increasing global focus on climate finance makes India an attractive destination for FIIs seeking to invest in emerging markets with strong sustainability commitments.
- **Development of a Broader Green Debt Market:** SGrBs can be a foundational element for the development of a comprehensive green debt market, including municipal green bonds and corporate green bonds, creating a robust ecosystem for sustainable finance.
- **International Collaboration:** International collaboration with multilateral development banks (MDBs) and international financial institutions can significantly enhance the credibility and appeal of India’s Green Bonds. Such partnerships help leverage higher credit ratings, attract greater volumes of foreign capital, and offer vital technical assistance—factors that collectively boost investor confidence and market uptake (International Finance Corporation & Amundi, 2025; Moody’s, 2023).
- **Innovation in Green Technologies:** SGrB proceeds can fund research and deployment of emerging green technologies and innovative solutions in renewable energy, energy storage, and sustainable infrastructure, fostering a green economy (Khan et al., 2025).
- **Exploration of Sustainability Bonds:** India could explore issuing “sustainability bonds,” which combine green and social projects. This broader scope has shown greater investor interest in emerging markets, potentially attracting a more diverse investor base (Angel One, 2025).
- **Scope for of Blue Bonds:** India can integrate blue bonds into its sustainable finance architecture. Blue bonds present significant opportunities to support clean water access, preserve marine ecosystems, and foster a sustainable blue economy. They are financial instruments specifically designed to mobilize capital for projects focused on water and wastewater management, ocean plastic reduction, marine habitat restoration,

sustainable maritime transport, environmentally responsible tourism, and offshore renewable energy development (International Finance Corporation, n.d.).

While India's SRGBs represent a significant step toward sustainable finance, bridging policy gaps and market failures is crucial for effective climate action. Strengthening institutional frameworks, enhancing market mechanisms, and fostering investor confidence are imperative to scale up green investments and achieve long-term sustainability goals. The establishment of a National Green Financing Institution as envisaged in the NITI Ayog Annual Report 2024-25 can help aggregate green finance from various sources and lower the cost of capital for sustainable projects (NITI Ayog, 2025).

4.4 Threats (External, Negative) to the Success of India's Sovereign Green Bond (SGrB) Program

Threats are external risks that can harm an organization's or a programme's performance. While India's Sovereign Green Bond (SGrB) program has significant internal opportunities, it also faces several external threats that could impede its success. These threats often stem from global economic, financial, and geopolitical dynamics. Here are key points:

- **Reduced Investor Appetite for Risk:** In times of global economic uncertainty or recession, investors typically become more risk-averse, preferring safer, more liquid assets over newer or niche instruments like green bonds. This can lead to lower demand for SGrBs and make it harder to achieve favourable borrowing costs.
- **Capital Flight from Emerging Markets:** A global slowdown can trigger capital flight from emerging markets like India, as foreign institutional investors (FIIs) repatriate funds to safer havens. This would directly impact the demand for Indian SGrBs, especially those aimed at international investors.
- **Tightening Global Liquidity:** A global economic contraction often leads to tighter global liquidity conditions, making it more challenging for all borrowers, including sovereign entities, to raise funds at attractive rates.
- **Increased Competition for Capital:** When central banks in major economies (e.g., US Federal Reserve, European Central Bank) raise interest rates, it increases the attractiveness of traditional, highly liquid government bonds in those economies. This makes SGrBs, even with their "greenium," less competitive, as investors seek higher risk-free returns elsewhere.
- **Competition from Other Green Finance Hubs:** More mature green finance markets in developed economies (e.g., EU, US) with larger issue sizes, greater liquidity, and strong regulatory frameworks can draw away international investors who prioritize market depth and ease of trading. Besides, other emerging economies are also entering the green bond market, creating competition for a finite pool of "green" capital.
- **Global Economic Volatility:** External economic shocks, rising global interest rates, and geopolitical uncertainties can impact investor confidence, lead to capital flight from emerging markets, and reduce appetite for fixed-income instruments.

- **Competition from Other Green Bond Issuers:** The global green bond market is increasingly competitive, with more countries and corporations issuing green bonds. This creates a challenging environment for India to attract green capital.
- **Nascent Domestic ESG Market**: The domestic institutional investor base for ESG instruments remains underdeveloped, reducing long-term market depth.
- **Perception of Greenwashing:** Any failure to demonstrate credible environmental impact, robust project tracking, or transparent reporting could severely damage market trust and the integrity of India's SGrB program.
- **Policy Inconsistency/Reversals:** Changes in government priorities, environmental policies, or regulatory frameworks could undermine investor confidence and the long-term viability of the SGrB market.
- **Muted Investor Demand and Devolvement:** Challenges in consistently achieving a significant greenium and attracting foreign portfolio investors have, at times, led to muted demand and the devolvement of bonds to primary dealers, impacting issuance plans (Team Angel One, 2025).
- **Persistent Funding Gap for Green Projects:** Despite the SGrB program, a significant funding gap remains for the large-scale green infrastructure projects required to meet India's climate targets.
- **Limited Transparency and Impact Reporting**: Concerns over post-issuance impact reporting, third-party verification, and alignment with global best practices may deter international investors.
- **Foreign Exchange Risk**: Currency volatility can be a deterrent to foreign investors unless appropriately hedged or backed by credit enhancements.

Additionally, the renewable energy sector's struggle to raise foreign capital is exacerbated by protectionist policies and high interest rates. Allegations of corporate misconduct have increased the risk perception of India's renewable energy sector, potentially deterring international investments. Addressing these challenges requires robust regulatory frameworks, tax incentives, de-risking mechanisms, and alignment with ESG standards.

5. India's Sovereign Green Bond program: Market Problems and Challenges

Despite the initial success of India's Sovereign Green Bond program, several market problems and challenges persist which need strategic attention to ensure its long-term effectiveness and enhance investor trust.

5.1 Transparency and Reporting Deficiencies

- **Problem:** While India has a framework, there's a **lack of consistent, granular, and timely impact reporting** on how SGrB proceeds are utilized and what actual environmental benefits are achieved. The absence of comprehensive allocation reports for all recent fiscal years is a notable gap.
- **Impact:** This reduces investor confidence, makes it difficult for investors to track and verify the "green" credentials of their investments, and exposes the market to

accusations of greenwashing. It also hinders the ability to showcase the tangible environmental benefits of these crucial investments.

5. 2 'Greenium' and Yield Expectations

- **Problem:** Indian SGrBs have consistently yielded a very **low 'greenium'**, typically around 2-3 basis points, which is significantly lower than the global average of 7-8 basis points. This implies the government doesn't significantly reduce its borrowing costs by issuing green bonds compared to conventional ones.
- **Impact:** The limited financial incentive for the issuer (government) and sometimes the muted demand from investors seeking higher yields or more pronounced greenium have, at times, led to the devolvement of bonds to primary dealers, potentially affecting future issuance plans.

5.3 Secondary Market Liquidity

- **Problem:** The secondary market for India's SGrBs often suffers from *low liquidity*. This is attributed to relatively smaller issue sizes compared to conventional government bonds and a tendency for a significant portion of investors to hold these bonds until maturity.
- **Impact:** Low liquidity makes it difficult for investors to exit their positions easily without impacting bond prices, potentially deterring some institutional investors who prioritize liquid assets and limiting the breadth of the investor base.

5.4 Need for a Detailed Green Taxonomy

- **Problem:** While India has a framework for SGrBs, it currently lacks a comprehensive, standardized, and legally binding national green taxonomy similar to those in the European Union or other developed economies. Although the draft taxonomy is there, the fool-proof taxonomy is still evolving.
- **Impact:** This creates ambiguity in the definition of "green" projects, leading to potential inconsistencies in project selection and increasing uncertainty for investors. It also hinders comparability and standardization across various green finance instruments within India.

5.5 Limited Investor Base Diversification

- **Problem:** Despite the global surge in ESG investing, there's an *over-reliance on domestic institutional investors* for India's SGrBs. While efforts have been made, attracting sufficient participation from foreign portfolio investors (FPIs) and non-resident Indians (NRIs) remains a challenge. There's also a need to cultivate a stronger ecosystem of dedicated social impact funds.
- **Impact:** This limits the market's depth and resilience to market shocks. A more diversified investor base would provide greater stability and demand for future issuances.

5.6 Project Pipeline and Capacity Building

- **Problem:** Ensuring a consistent and robust pipeline of *high-quality, genuinely green, and 'bankable' projects* across diverse sectors and ministries is crucial. Furthermore, there's a need for enhanced capacity within government agencies for the rigorous evaluation, monitoring, and reporting of these green projects.
- **Impact:** This can lead to risks of underutilization of funds, inefficient allocation of proceeds, and potential dilution of the 'green' credibility if projects are not meticulously managed.

6. Strategies for Enhancing Market Trust and ESG-Aligned Capital Mobilization

To fully leverage the potential of Sovereign Green Bonds and accelerate India's sustainable finance agenda, addressing the identified market problems is paramount. The following strategies are proposed to enhance market trust and facilitate greater ESG-aligned capital mobilization:

6.1 Strengthening Transparency and Impact Reporting

- **Develop a Centralized Digital Platform:** Establish a robust, publicly accessible digital platform for real-time tracking and reporting of SGrB proceeds utilization. This platform should detail funds allocated to specific projects, their progress, and key environmental impact indicators.
- **Adopt Granular Reporting Standards:** Implement standardized, granular reporting metrics for all eligible projects, aligning with international best practices (e.g., Task Force on Climate-related Financial Disclosures-TCFD, Sustainability Accounting Standards Board - SASB where applicable for public entities). Reports should be *independently verified* by credible third parties to enhance credibility.
- **Publish Timely Allocation Reports:** Ensure regular and comprehensive allocation reports for SGrB proceeds are published promptly for all issuances, not just the initial ones. This includes details of the funds channelled to various ministries and projects.

6. 2 Optimizing 'Greenium' and Attracting Diverse Investors

- **Explore Sustainability Bonds:** Consider issuing "sustainability bonds" that combine both green and social projects. Such combined-purpose bonds have shown higher investor interest in emerging markets and can attract a broader investor base.
- **Proactive Engagement with International ESG Funds:** The government should undertake targeted outreach and roadshows to engage with global ESG-focused funds, sovereign wealth funds, and pension funds. Highlight India's long-term growth story and its ambitious climate targets.
- **Leverage Multilateral Partnerships:** Collaborate strategically with multilateral development banks (MDBs) like the World Bank, Asian Development Bank (ADB), or IFC. MDB involvement, potentially through credit enhancements or guarantees, can

significantly reduce perceived risk, enhance credit ratings, and attract a wider international investor base.

- **Promote Retail Participation:** Introduce innovative mechanisms such as *green savings bonds* targeted at retail investors. This would not only broaden the investor base but also foster greater public awareness and participation in India's green transition.

6.3 Enhancing Secondary Market Liquidity

- **Increase Issue Sizes:** For future tranches, consider issuing larger volumes of SGrBs to improve liquidity in the secondary market. Larger issuances generally attract more active trading.
- **Encourage Market Making Activities:** Incentivize primary dealers and other financial institutions to actively engage in market-making activities for SGrBs, ensuring continuous buying and selling interest.
- **Explore Bond-Lending Programs:** Facilitate bond-lending programs to improve the availability of SGrBs for trading, thereby boosting activity in the secondary market.

6.4 Developing a Robust Green Taxonomy

- **Accelerate National Green Taxonomy Development:** Expedite the development and official adoption of a **detailed, legally binding national green taxonomy** for India. This taxonomy should be aligned with national climate goals while drawing lessons from international best practices (e.g., EU Taxonomy).
- **Provide Clear Project Guidelines:** Based on the taxonomy, provide unambiguous guidelines for project eligibility and screening criteria. This will reduce ambiguity, enhance investor confidence, and minimize greenwashing concerns.

6.5 Capacity Building and Institutional Strengthening

- **Establish a Dedicated Green Finance Unit:** Create a *dedicated green finance unit* within the Ministry of Finance or a nodal agency. This unit would be responsible for coordinating green project identification, rigorous appraisal, diligent monitoring, and comprehensive reporting across various ministries.
- **Invest in Training and Awareness:** Implement *comprehensive training programs* for government officials, project managers, and financial sector professionals on green finance principles, rigorous project evaluation, impact assessment, and reporting standards.

6.6 Policy Coherence and Long-Term Vision

- **Ensure Policy Consistency:** Maintain consistent and predictable policy signals regarding green finance and climate action. Avoid sudden policy shifts that could undermine long-term investor confidence.

- **Integrate Green Objectives:** Fully integrate green objectives into all relevant government policies and budgetary allocations, ensuring that sustainable development is a cross-cutting priority.

7. Updated Statistics

- **Market Share of Green Bonds in India's Total Bond Market:** While growing, green bonds still represent a relatively small portion of India's overall debt market. As of February 2023, green bonds constituted approximately 3.8% of India's total outstanding domestic corporate bonds (TERI, 2024). Data for the overall government bond market would require specific RBI reports.
- **Investor Breakdown for SGrBs:** Initial issuances saw strong participation from domestic institutional investors, particularly public sector banks and financial institutions. However, challenges in attracting significant foreign portfolio investors (FPIs) and non-resident Indians have been noted, despite relaxed investment norms. Specific breakdowns per issuance are often available in RBI auction results.
- **Performance of SGrBs in Secondary Market:** Indian SGrBs have consistently yielded a 'greenium' of only 2-3 basis points, significantly lower than the global average of 7-8 basis points (Angel One, 2025). Secondary market liquidity remains a concern due to smaller issue sizes and a buy-and-hold investor strategy.
- **Growth of India's Overall Green Finance Market:** India's overall green finance market continues to grow, encompassing corporate green bonds, green loans, and other instruments. The total green bond issuance from India reached around USD 7.2 billion in 2023 (TERI, 2024).
- **India's Renewable Energy Capacity Additions:** India's installed renewable energy capacity (excluding large hydro) reached over 190 GW as of April 30, 2025 (Ministry of New and Renewable Energy, 2025), reflecting significant progress in the energy transition, partly supported by green investments.
- **ESG Investing Trends in India:** ESG-focused funds and assets under management in India are experiencing steady growth, reflecting increasing domestic investor interest in sustainable investments, though the market is still maturing.

8. Conclusion

In the evolution of the Indian economy as an Inclusive Green Economy (IGE) to achieve sustainable development—transitioning from a fossil fuel dependent, resource intensive, inequitable economy to a climate-resilient high-income economy—the role of sustainable finance as a catalyst is undeniable. India's Sovereign Green Bonds (SGrBs) initiative represents an evolving model of public financing system aimed at creating a sustainable finance ecosystem to regularly finance the national green projects. Even as decarbonization of the economy is imperative for both national progress and meeting global climate targets, India's success in this domain largely hinges on its ability to build and operate a robust sustainable finance ecosystem. As our analysis revealed, the Government of India is open to manipulating the market dynamics in favour of increased domestic investment and foreign direct investment (FDI) in SGrBs while integrating its green ambitions and sustainable development goals. The

SGrBs programme has been fairly successful and signals India's strong commitment to fostering a low-carbon economy, mobilizing green capital for financing eco-resilient and environmentally responsible projects of renewable energy, sustainable transport, climate-resilient infrastructure, climate-smart agriculture, sustainable water management systems, and the likes. While the SGrBs programme haz enhanced India's global reputation as a responsible nation committed to implement its NDCs, it has also paved way toward establishing the most populous country of the world and one of the largest emitters of green gas as a champion of climate and environmental sustainability and mobilizer of sustainable finance. If India overcomes the greenium issue presently undermining its SGrBs programme, India will be able to augment its global reputation as a responsible climate leader capable of attracting environmentally conscious investors, strengthening fiscal credibility, and promoter of the green finance ecosystem in the Global South.

The design and execution of India's SGrB program, as stated earlier, are not without daunting operational and structural challenges. From a pragmatic perspective, the challenges include transparency in project selection, putting in place reliable mechanisms for impact measurement—such as standardized metrics, third-party verification, and periodic disclosures, maintaining robust post-issuance reporting are indispensable for preserving investor confidence and the integrity of the SGrB framework. The government must take adequate steps to address structural and market-level barriers such as low investor awareness, regulatory uncertainties, underdeveloped ESG markets, and low greenium. To scale the SGrB program effectively and attract adequate global capital to fund its climate ambitions, India must establish a credible green finance taxonomy unambiguously defining green projects as per ICMA principles, improve market liquidity, and align its sustainability standards with the with international best practices.

Having said that, the success of India's SGrBs programme, which this paper sees as nothing short of India's New Green Deal, should be ultimately evaluated not just in terms of the capital raised, but in how effectively they contribute to long-term sustainable development outcomes. While the SGrBs should be and are sustainable financial instruments, they should be integrated with complementary policy tools of Atmanirbhar Bharat and top flagship schemes and policy frameworks like Digital India, Make in India, Ayushman Bharat, Skill India, Start-up India, Smart Cities Mission, AMRUT, Jal Jeevan Mission, MGNREGA, Digital India, PM Gati Shakti and the grand narrative and overarching master plan of Viksit Bharat@2047. India's Green Deal must go beyond infrastructure financing and evolve into a whole-of-government approach that weaves sustainability into budgeting, taxation, trade, and innovation ecosystems.

It can be concluded that by strategically addressing governance challenges and marketcraft gaps, India can enhance market confidence, thereby accelerating capital flows towards sustainability and inclusive development goals. By strategically addressing these challenges, India can consolidate its position as a credible and attractive destination for green finance. The success of its Sovereign Green Bond program is not merely about debt issuance; it's about establishing a robust, transparent, and trusted mechanism that can effectively channel global and domestic capital towards a sustainable, low-carbon future for India. Continued policy coherence and a steadfast long-term vision will be critical in transforming India into a global leader in sustainable finance.

As India advances toward its Viksit Bharat@2047 vision, SGrBs offer a promising fiscal instrument to finance the green transition. But realizing their full potential will depend on coherent policy architecture, institutional accountability, and active stakeholder engagement—including investors, regulators, civil society, and local governments. If implemented with strategic foresight and inclusive governance, India's green bond initiative can serve as a model for emerging economies striving to reconcile climate ambition with developmental needs—truly embodying a *new green deal* for a sustainable and self-reliant Bharat.

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