



GREENIUM, GREENWASHING AND CLIMATE ADDITIONALITY: A CREDIBILITY BASED STUDY OF GREEN BONDS IN INDIA

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Abstract

Green bonds are leading as a key instrument to long term funding for renewable energy, clean transport, water and waste treatment, and climate proof infrastructure. In India their policy relevance became more prominent as climate investments have to be done hand in hand with expanding infrastructure and fiscal prudence. A green bond can only generate economic and environmental value if the green claim is credible, the proceeds can be traced and the environmental outcomes are measurable. India's green bond market is explored in this paper with four interconnected concepts of 'Greenium', 'greenwashing', 'climate additionality' and 'impact reporting'. This is a descriptive and policy analytical study covering the period 2017 to 2026 with secondary evidence gathered from SEBI greenESG debt securities data, India's Sovereign Green Bond Framework, sovereign issuance documents and the Climate Bonds Initiative's market reports. The analysis reveals that India has gone beyond initial corporate green issuances to a wider market, with infrastructure finance companies, renewable energy companies, REITs, municipal bodies, banks and sovereign issuance. SEBI listed ESG debt securities were valued at ₹11,678.59 crore as of 31 May 2026 and India's total GSS and debt stood at USD 55.9 billion by end2024, of which green debt made up 83 per cent. This paper contends that India's green bond market is viewed not simply as a labelled debt market, but as a credibility based climate finance mechanism.

Key words: *Green bonds, Greenium, Green washing, climate finance, sovereign green bonds, sustainable finance, India, climate additionality.*

Introduction

Green finance has become an integral part of financial market development, as climate change, pollution, energy transition and urban environmental stress are demanding long term capital. Governments simply can't keep up with the investment needs for low carbon infrastructure, and bank funding may be difficult due to asset liability mismatches, sectoral exposure limits and credit risk concerns. Bond markets thus provide an important channel for accessing patient funding of projects with long economic lives.

From a financial point of view, a green bond is basically the same as a normal bond, whereby an issuer borrows money and agrees to pay back interest and principal. It is distinct in that it directs proceeds to environmentally beneficial projects. Typically, these projects involve renewable energy, clean transport, energy efficiency, sustainable water management, waste treatment, green buildings, pollution control, biodiversity protection and climate adaptation.

India is highly relevant for studying green bonds due to its massive infrastructure needs and major climate policy commitments. India needs to increase energy supply and access, urban infrastructure, transportation and industrial capacity; and lower emissions intensity and increase climate resilience. This double mandate renders green finance not only the ESG question, but also a question for development finance.



The Indian market has gone through various stages. The initial phase was characterized by early green debt issuances, made by corporate and financial sector entities. The second step was to increase the regulatory focus on green debt securities and disclosure requirements. The third phase started with sovereign green bonds, which initiated the first public sector benchmark for eligible expenditure, management and reporting of proceeds. In recent years, municipal entities and sustainability related instruments have also emerged as more prominent in the larger universe of ESG debt. However, a green label has substantive value only when it is supported by credible project selection, transparent tracking of proceeds, independent external review and demonstrable environmental outcomes. However, without clear and effective monitoring and a well-defined label, green bonds can be used to facilitate green washing instead of climate financing.

The paper's main proposition is that India's green bond market needs to be looked at from a credibility perspective. This is done with four concepts. First is the potential yield premium enjoyed by a green bond compared with a comparable conventional bond. Secondly, there are false, vague or misleading environmental claims, which are known as green washing. Thirdly, climate additionality is whether the bond provides environmental benefits that are in addition to business as usual financing. Fourthly, impact reporting means communicating actual or expected environmental impacts.

The contribution of this paper is thus analytical, and not descriptive. It is not just a question as to whether India can issue more green bonds. It enquires if green bonds can create credible climate financing in India. The difference is significant because an increase in the volume of the market without credibility can have a negative impact on investor confidence, while a smaller market with good governance can generate more long term confidence.

Literature Review and Analytical Framework

The literature on green bonds has developed around three main themes, namely, pricing, environmental performance and credibility. Green bond finance is reliant on certification and transparency, as asserted by Ehlers and Packer (2017). They are important because there are two types of risks associated with a green bond, i.e. the classic credit risk and environmental claim risk. Even if the issuer is financially healthy, there can be investor doubts as long as the use of proceeds is not clear. Zerbib (2019) investigates green bond pricing, and identifies a small green bond premium. This is known in market parlance as “Greenium.” The finding indicates that there is a willingness by some investors to take slightly less yield for certifiable green assets. The studies also reveals that the premium is typically low, influenced by the quality of the issuer, credit rating, maturity, as well as liquidity and investor demand.

Tang and Zhang (2020) analyse shareholder reactions to green bond issuance and demonstrate that markets can view the issuance of green bonds as a signal of the company's environmental commitment. Flammer (2021) additionally reveals that corporate green bonds can be linked with environmental performance enhancements and sustained investor interest. These studies reflect the opinion that green bonds, in addition to being fundraising instruments, can also serve as governance and signalling mechanisms.

Fatica, Panzica and Rancan (2021) demonstrate that there are differences in green bond pricing by issuer type. Issuers can expect different market responses to their public issuance from those of financial and corporate issuers. India has this distinction as the domestic market encompasses entities in the public sector, banks, renewable energy companies, municipal corporations, real estate



investment trusts, infrastructure companies and central government bodies. Banga (2019) discusses green bonds in the context of developing countries and mentions market underdevelopment, currency risk, regulatory loopholes and limited investor appetite. This is applicable to India, where green investment needs are huge, but the corporate bond market is underdeveloped in comparison to its more advanced counterparts.

According to Kölbel et al. (2020), a question that needs to be asked is whether sustainable investing has a real-world impact. Environmental additionality is not demonstrated by the volume of green bond issues and this is a direct question with relevance to green bonds. Green' is a label that can be attached to a bond, but the true measure is whether it alters project financing or drives faster green investment, or better measurable environmental results. Deschryver and de Mariz (2020) also highlight standards, transparency and policy support as means to unleash the potential of the green bond markets.

Based on this, the analytical structure of this paper considers green bond credibility as depending on six observable pillars; use of proceeds, project eligibility, proceeds management, allocation reporting, external review and impact reporting. This can be expressed as:

$$C_i = f(U_i, E_i, M_i, A_i, V_i, I_i)$$

Where (C_i) = Credibility of Bond (i); (U_i) = Clarity of Use of Proceeds; (E_i) = Project Eligibility; (M_i) = Proceeds Management; (A_i) = Allocation reporting; (V_i) = External verification; and (I_i) = Impact reporting. This paper treats these variables as an analyser to assess market development.

The Greenium is the differential between the yield of a similar conventional bond and green bond:

$$Greenium_i = Y_i^C - Y_i^G$$

Where Y_i^C is the yield on a conventional bond with the same maturity and Y_i^G is the yield on the green bond. A positive value means that the green bond has been issued at a lower yield than the conventional benchmark. The greenium should be interpreted with care in the Indian context as matched pricing data is limited and the investor behaviour is still highly dominated by credit rating, liquidity and tenor.

Climate additionality can be understood through the connection between new financing that is green, and refinancing:

$$Additionality_i = \frac{NGF_i}{NGF_i + GRF_i}$$

Where,

NGF_i =New Green Financing

GRF_i =Green Refinancing

A higher value indicates stronger financing additionality. It helps green assets to be more financially sustainable, or free up capital for future green investments.

Data and Methodology

A descriptive and policy analytical research design has been used in this study. This approach is suitable because India's green bond market is still at a nascent stage and long period issuer level impact data is not readily available. The study employs secondary evidence and uses credibility based analytical framework. The study period is 2017–2026. This period covers the first listed green debt



securities in the SEBI data, growth in corporate issuance and municipal issuance, shifting the regulatory focus towards green debt securities, and issuance of sovereign green bonds. Table 1 provides a description of the data sources, the variables, and their analytical uses.

Table 1: Data Sources, Variables and Analytical Use

Source and material	Key variable	Analytical use
SEBI ESG Debt Securities data as on 31 May 2026	Issuer, allotment date, maturity, amount raised, coupon, tenure, ESG category	Mapping listed Indian green ESG debt market and issuer diversity
Climate Bonds Initiative, India Sustainable Debt State of the Market 2024	Cumulative GSS and debt, green debt share, sovereign green bond value	Estimating India's broad sustainable debt scale and green debt dominance
Government of India Sovereign Green Bond Framework, 2022	Eligible project categories, governance process, reporting, proceeds tracking	Assessing sovereign credibility architecture
Government sovereign green bond issuance calendar, FY 2022–23	Planned issuance amount, tenor structure, retail reservation	Understanding sovereign benchmark design
SEBI greenwashing and disclosure guidance	Disclosure discipline and ant greenwashing safeguards	Assessing market integrity requirements

The numerical analysis is descriptive in nature. Ratios, shares and simple derived indicators have been used, where the base values are available from cited source. For example, the percentage of green debt to total GSS and debt, is determined by the following equation:

$$Share_{Green} = \frac{Green\ Debt}{Total\ GSS + Debt} \times 100$$

Similarly, where Climate Bonds Initiative reports USD 55.9 billion of cumulative Indian GSS+ debt and an 83 per cent green share by end2024, the implied green debt volume is:

$$0.83 \times 55.9 = 46.4$$

Therefore:

$$Green\ Debt \approx USD\ 46.4\ billion$$

The paper does not provide estimates of project level emissions rather, it assesses the ability of the reporting architecture to provide such evidence.

Results and Discussion

India's green bond market is clearly trending towards institutionalisation from initial experimentation. The SEBI data has captured the first listed green debt security in 2017, when L&T Infrastructure Finance Company Ltd was able to raise ₹667 crore with tenor of 7 years and 7.59 per cent coupon. As of 31st May 2026, the value of debt securities listed on SEBI amounted to ₹11,678.59 crore, which are ESG securities. This number does not necessarily reflect the total debt market for India, as it represents listed ESG debt securities in the SEBI table and incorporates other types of debt securities, such as sustainability linked securities, in addition to green debt securities.



According to Climate Bonds Initiative, India's total green, social, sustainability and sustainability linked debt stood at USD 55.9 billion by end2024 which is 186 per cent higher than 2021. A 2021 base value of USD 19.5 billion is a reasonable approximation if the end2024 value is assumed to be 2.86 times the 2021 value. This represents an approximate annualised growth rate of 41.9 per cent over three years. The green debt was the largest share of the total GSS and debt, at 83 per cent, suggesting around USD 46.4 billion of green debt.

Table 2: Selected Quantitative Indicators of India's Green and Sustainable Debt Market

Indicator	Verified value / derived estimate	Interpretation
SEBIlisted ESG debt securities as on 31 May 2026	₹11,678.59 crore	Domestic listed ESG/green debt market indicator
India cumulative GSS+ debt by end2024	USD 55.9 billion	Broad sustainable debt market scale
Reported increase since 2021	186%	Indicates rapid growth from a lower base
Implied 2021 GSS+ debt base	USD 19.5 billion approx.	Derived as (55.9/2.86)
Implied annualized growth, 2021–2024	41.9% approx.	Derived as $(2.86)^{\frac{1}{3}} - 1$
Green debt share in GSS+ debt	83%	Green remains the dominant sustainable debt segment
Implied green debt volume by end2024	USD 46.4 billion approx.	Derived as (0.83)
Reported sovereign green bond value	₹477 billion, i.e., ₹47,700 crore	Indicates sovereign benchmark building role
Initial FY 2022–23 sovereign green bond calendar	₹16,000 crore	Two auctions of ₹8,000 crore each
Retail reservation in sovereign green bond auctions	5%	Indicates inclusion of noncompetitive bidding participation

There are three patterns implied by these figures. For one, the Indian market has expanded rapidly although from a small base. Second, green debt is predominant in the sustainable debt universe, as social, sustainability and transition linked instruments are still relatively small. Thirdly, the sovereign issuance has established a benchmark, which is larger than the listed domestic issuers set as per the SEBI data, and thus public borrowing has become a central theme in the credibility architecture of the market.

Sovereign green bonds are especially relevant as they transform climate finance from a corporate voluntary activity into an integrated part of the formal public borrowing programme. The Government of India's principles are consistent with the four fundamental pillars of the ICMA Green Bond Principles, namely, project evaluation and selection, management of proceeds, reporting, and use of proceeds. The framework specifies the eligible expenditures will be incurred within 12 months before the proceeds are issued and that the proceeds must be used for eligible projects within 24 months.



These two time rules are significant since they minimize risks of indefinite parking of funds and minimize the possibility of old expenditure relabeling as new. The Green Finance Working Committee, reporting of allocations annually, impact reporting and a Green Register are also part of the sovereign framework. These features set the stage for other issuers as an institutional template. So, the worth of sovereign green bonds is not just about the amount raised but also about the governance model they create.

The 'Greenium' is still a distant possibility in India. If yield can be sacrificed to enhance environmental credibility, a credible green bond can, in theory, lower the cost for the issuer. In reality, Indian investors are still sensitive to liquidity and tenor, in addition to credit rating and coupon. It is thus best thought of as a potential market outcome and not a guaranteed gain. Some green bonds that are less liquid or who have not explained themselves may not have a pricing benefit. In India, this kind of matching with conventional bond is complicated due to the fact that there are differences in issuer type, tenor, tax treatment, rating and liquidity which can affect yield comparisons. The greatest risk is that of green washing. SEBI's guidance on green washing is, thus, significant, as it acknowledges that trust in the market hinges on the moderation of claims. A weak green bond can harm the reputation of an issuer, but also of the market as a whole.

The municipal listed entities of SEBI consist of Ghaziabad Nagar Nigam, Indore Municipal Corporation, Ahmedabad Municipal Corporation, Vadodara Municipal Corporation, Prayagraj Nagar Nigam, Pimpri Chinchwad Municipal Corporation, Surat Municipal Corporation, Greater Chennai Corporation, Nashik Municipal Corporation, etc. The total amount of municipal issuances that can be identified from the SEBI table is about ₹1,549.59 crore. This is approximately 13.3 per cent, of the total corpus of ₹11,678.59 crore as listed by SEBI. Though this share is not large, it is policy relevant, as urban infrastructure plays a key role in climate mitigation and adaptation.

Municipal green bonds are being subjected to a double credibility test (Table 3). They need to be financially sound with strong revenue, discipline in accounting and timely repaying ability. They should also be an environmental game changer by means of projects eligibility, proceeds tracking and impact reporting. A sewage treatment bond, a water supply bond, a bond for solar energy or waste management can be very significant for climate resilient urban development, but only when the project pipeline, municipal books and environmental indicators are transparent.

Table 3: Credibility Risks and Risk in the Indian Market

Credibility Issue	Risk In The Indian Market
Greenium	Pricing benefit may be assumed without evidence
Greenwashing	Green label may be used for vague or weak claims
Refinancing	Old expenditure may be relabelled as green finance
Impact reporting	Allocation may be reported without outcomes
Municipal issuance	Financial and environmental risks may overlap
Investor protection	Retail investors may focus on the green label

Impact reporting is the link between investments spending and environmental impact. In the case of renewable energy, the indicators can be, for example, MW capacity supported and estimated annual emissions avoided. They can be based on ridership, electric route kilometres or fuel savings for clean transport. Water projects may include water treated, recycled or saved. They can be energy savings, certification level or emissions avoided for green buildings.



The Government of India's sovereign structure acknowledges this by mandating expected impact indicators as far as possible. This is significant because, not all the environmental outcomes are equally measurable accurately. But it's important that the lack of perfect measurement does not be used as a defence for weak reporting. Furthermore, where a project was 100% funded prior to the bond being issued, the green bond might be used to refinance the asset. This does not necessarily mean wrong, but the environmental contribution should not be viewed as a bond for the new capacity. The Indian green bond market thus has potential in the true sense of the word capital market. Market depth is achieved through multiple issuances, a variety of different issuers, trading in the secondary market, large number of investors, and reliable post issuance disclosure. While diversity of issuers and sovereign benchmarking efforts have advanced, deeper liquidity and more impact comparability remain priorities for the future for India.

Policy Implications and limitations

The policy implication of this study is that India should adopt 'credibility first' approach to green bond issuance. If the market has been expanding fast and there is no reporting discipline, there could be doubts by investors in the future.

First, the frameworks for green bonds should clearly specify eligible projects. General terms like "environment friendly infrastructure" should be avoided if there is no measurable criterion. Second, issuers should indicate if proceeds are used for new financing, refinancing or both. This will enhance the evaluation of additionality. Third, there is a need for standardisation of the impact reporting, at least at the category level. For Renewable energy bonds, capacity and expected emissions avoided should be reported, for water bonds, treatment or saving bonds should be reported, for clean transport bonds, usage or avoided emission indicators should be reported.

Fourthly, external review should be enhanced. While a second party opinion or verification mechanism will not solve all of the risks, it can help to de-risk and build confidence among investors. Fifth, the anti-greenwashing guidance must be consistently applied. Market integrity issues should be considered when misuse of proceeds or environmental claims that lack specificity are made.

Sixth, there should be a nexus between municipal green bonds and municipal finance reform. To scale up green bond issuance, cities should have better accounting, timely and regular audits, and predictable revenues and project-level monitoring. Seventh, domestic institutional investors like insurance companies, pension funds, banks and mutual funds should be encouraged to participate, but on an adequate disclosure basis. Eighth, the credit risk is not to be assumed by retail investors as if the green label has reduced the risk. However, green bonds are still subject to interest rate risk and default risk and liquidity risk.

The study is beset with limitations. It is based on secondary data and policy documents. It does not feature estimates from issuers, investors, regulators or outside reviewers. It does not compute an econometric Greenium as yield information at the matched bond level. It also fails to calculate project level environmental impact as the impact of the issuers' projects is not consistently reported on the market. Lastly, the market is dynamic and the issuance data and regulatory developments could alter the market depth assessment in the future. Nevertheless, the study offers a feasible framework to analyse Indian green bonds.



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