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Research Article

# Decoding India's Green Bond Ecosystem: Framework, Market Development, and Expansion

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**Abstract**
Since the day the European Investment Bank issued the first "Green Bond" in 2007, the world has made significant progress. The next step was the approval from numerous financial institutions to utilize this strategy for obtaining funding to develop "green assets". Currently, there are numerous global finance institutions, nations, financial institutions, and non-banking financial companies (NBFCs) that are offering green bonds.

As growth continued, it became necessary to establish rules, leading to the creation of international norms and the development of specific rules by Central bankers.

The purpose of the issuance is good, but the concern is whether investors will receive competitive returns compared to other investment options and if the current growth in green bond subscriptions is sufficient to fund the capital needed for carbon neutrality by 2070.

This paper attempts to examine all the previously mentioned factors regarding green bonds and also provides some recommendations to enhance this concept in India.

**Key words:** Sustainability, ESG, Green Bond, SRI, sustainable finance, climate bond, greenium

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## 1 Introduction
The main goal is to create a lasting environment aligned with the vision of the UN Sustainable Development Goals. In reality, the establishment of the same was what initiated "Green Finance". It also received a boost after the worldwide approval of the Paris Accord (under the United Nations Framework Convention on Climate Change). The objectives of these international agreements were to promote significant worldwide investments by utilizing cost-effective and sustainable funding. It was discovered that the cost of investment needed to tackle this problem was excessively large (estimated at 200-1000 billion USD annually). It was evident that governments providing only budget allocation and subsidies could not generate that amount. Therefore, it is essential to develop an alternative solution. Choosing the green bond was the correct option.

Green bonds are structured similarly to regular bonds, with the only distinction being their intended use. It can solely be utilized for funding environmentally friendly initiatives and building environmentally friendly resources. Essentially, they are securities that generate fixed income and support investments with environmentally friendly or climate-related goals. This introduces a factor of eco-friendliness and long-term viability. With ESG becoming a standard for many top institutions, green bonds are becoming more important and there is a noticeable rise in emphasis on them.

## 2 Objective of the study

a To assimilate the various aspects of green bonds in terms of uniqueness, categorization and the regulations around it.

b To evaluate the scenario in India w.r.t. size, challenges and future.

## 3 Literature Review

There have been substantial studies and research on green bonds. Since this concept forms the part of a larger group i.e. ESG, we have more literature and research data available in ESG. We have literature on various perspectives involved are: concept, regulations, areas, challenges & problems, returns and market size. These aspects have all been considered while doing the literature review for this paper. Efforts have been made to keep the reviews contemporary.

### 3.1 Returns

**Ehlers, Torsten and Packer, Frank (2017)** indicated that the returns of green bonds were similar to that of the regular bonds.

**Dietz, Sophia and Natrup, Maxmilian (2020)** did extensive research on the returns from green bonds in comparison to the returns of conventional bonds. According to them, green bonds traded higher than their counterparts. They also observed that there was a significant difference in perception of public towards green bonds issued by the country and that issued by private companies. The returns of corporate green bonds were much higher than the non-green bonds over a period of eight years. The limitation of the study was that it was limited to only one European country.

**Adekoya, Oluwasegun and Abakah, Emmanuel et al (2023)** compared the movement of green bonds and tried predicting the movement of price of green bonds with commodities and bonds. All the factors considered could strongly predict the returns of green bonds. Two factors namely "Economic Policy Uncertainty" and "CBOE Volatility Index" have detrimental correlation on the returns of the green bond.

**Bajra, Ujkan and Wagner, Niklas (2024)** calculated and observed that there was a correlation between green bonds issuance and economic growth. They suggest that the best model would be popularizing issuance and ensuring good returns. Though there is an interest of the investor but there is an over-bearance on the following areas i.e. energy, buildings, transport and water. This might affect returns in the long run if the diversification did not happen.

### 3.2 Governance

**Hascic, Ivan and Cardenas, Miguel et al (2015)** attempted to detail out key aspect like co-financing, mobilization, leverage and catalysing related to inflows into the climate bonds space. The study was not officially for green bonds but we have to remember that during that period, the evolution of the concept of green bonds had not been taken seriously. They were the early researchers who propounded the theory of catapulting climate bonds investment through the private suppliers but with policy interventions. A clear scientific methodology was devised by them for building the process flow for mobilizing private finance for green bonds.

**Ehlers, Torsten and Packer, Frank (2017)** were of the opinion that issuance standards of green bonds should be enhanced so as to highlight the element of financial & environmental risk. They argued that the usage of the word "green" made people think that these were absolutely safe a class to invest. They also highlighted the inconsistency in the standards of the various countries.

**Azhgaliyeva, Dina and Kapsalyamova, Zhanna (2021)** did an extensive study on green bonds across 58 green-bonds issuing countries including 11 from Asia. They postulated that there was no significance linkage between issuance of green bonds with issuance of sovereign green bonds. They also proved that tax benefit was a bigger driver than policy signals and cooperation.

**Bolton, Patrick and Kacperczyk, Marci et al (2022)** underlined the setting up of robust mechanisms around Green Bonds if it were to be taken as a serious path for attaining Net Zero targets. They call for immediate collaboration between investors, companies and policy makers.

**Bracking, Sarah (2024)** found that there was a lack of discussion on ethics when promoting or marketing green bonds. For the investor, the ethics and the green aspect were the least consideration. On the other hand for the issuer, the reasons for getting into the issuance were to be looked differently.

**Kumar, P., Taneja, S. and Ozen, E (2024)** clearly highlighted that effective policy frameworks are required to make the cause of Green Bonds more effective. They were also clear that there was lack of standardization because of which tangible measurements of the efforts being declared by the makers could not be evaluated.

### 3.3 Emergence

**Monk, Alexander and Perkins, Richard (2020)** did a study on the necessity and emergence of Green bonds. The researchers investigate the influencing factors, the processes and other dynamics that have led to the growing strength of Green Bonds. They also reason out the logic behind the element of sustainability in the issuance of the bonds.

**Liberati, Danilo and Marinelli, Giuseppe (2021)** did detailed analysis on the growth of green bonds in Europe. Europ, China and the US were the major players in terms of issuance. Within Europe, France and Germany were largest issuers. The authors also try to address the greenium puzzle i.e negative yield difference between Green Bonds and other bonds. Though the study was limited to Europe, yet the study is important as it was comprehensive (covering returns, importance, details of as many bonds and the yield) and it sets the framework for similar studies on other parts of the globe.

**Vulturius, Gregor and Maltais, Aaron et al (2022)** did a detailed study on the alignment of Sustainability Linked Bonds with protocols of Paris Agreement. The researchers offer substantial space for future research. They suggest the future research on governance mechanisms, evolution of newer factors of growth and ability to sustain the element of sustainability.

**Elbannan, Mona A and Loffler, Gunter (2024)** evaluated that while green bonds could help finance carbon reductions, a large part of the bonds issuance did not support the environment.

**Singh, Uday Veer and Shrivastava, Manish (2024)** stated that Green Bonds were both suitable as an investment in the context of investments options in India as well as had clear benefits for buyers and sellers. Their perspective emanated from the fact that the bond market was mature in Indi and Indians were used to it and hence if a bond was properly designed with the elements of sustainability into it, it would fly.

There is one unique issue with respect to Green Bonds namely: usage of multiple terms. We have Climate bonds, GSS (Green Social & Sustainability) bonds, Sustainability bonds, Sustainability-linked bonds which have similar objectives and may be confusing for every researcher. Different organisations and different countries use their own terms. There is no uniformity which must be acknowledged by all.

## 4 Green Bond Principles

It is a set of guidelines to help green bonds issuers in financing pro-environmental projects with a sustainable vision of net-zero carbon emission as mandated by UNSDG. It lists out the best practices in issuance of Green Bonds. The Principles help the investors suggest investment options (availability of information and design of metrics to evaluate them). They also guide the aligned underwriters with vital information required to allow transactions keeping integrity in mind. The framework is collaborative and is based on consultations with members and all stakeholders.

The four components are as follows

a Use of proceeds: The usage of the proceeds should clearly have the green objective in mind. The issuer must ensure declaration of the objective and financial benefits of the project. If there is a case of re-financing, it should be clearly mentioned. The typical areas where the projects can be executed are typically (described in details later): reduction or control of pollution, water management, clean transportation, green buildings and aquatic bio-diversity.

b Process for project evaluation and selection: The process for arriving at any of the allowed categories must be clearly elaborated by the issuer. Any information related to the project in the social, political or environmental must be transparently shared.

c Management of proceeds: There should be a clear and defined process in the form of a document by the issuer detailing the process of utilization of funds. The proceeds of the collections should be parked in a designated account. If there is any green bond which is outstanding, it should be allocated separately to the appropriate project. The documentation and the finances must be evaluated from time-to-time by an external auditor.

d. Reporting: The issuers should have all possible comprehensive data related to the usage of the money. Towards this, there are some templates by key institutions like ICMA. The list of reports that is expected of the issuers are list of each of the projects, expected financial impact, expected environmental impact, baseline details of each projects, present stage of money utilization, projected completion year et al. It may also include the risk management plans, list of regulations to which the projects adhere to, environmental impact, social impact, governance themes used, KPIs identified (and the respective rationale), geographical coverage, motivation & involvement of employees, benchmarks of targets, calibration & elaborations of Sustainability Performance Targets (SPTs), type of the bond and characteristic of the bond. The list of items covered can vary from country to country as well as be project-specific.

Since these are the defined core areas, it is expected of the issuer to offer all possible information to the stakeholders keeping authenticity, transparency and integrity in mind. Globally, the accepted guidelines are mentioned in various documents like ICMA Green Bond Principles 2021, Social Bond Principles 2021, Sustainability Bond Guidelines 2021, LMA Green Loan Principles 2021, Social Loan Principles 2021 and the EU taxonomy. Researchers may come across these independently while researching on Green Bonds. However, it is to be noted that the fundamentals of each of them revolve around the four pillars as mentioned above.

## 5 Types of Green Bonds

Though conceptually, all green bonds issued will be related to environment and address sustainability, they vary depending upon the usage of proceeds, addressing scenarios of liquidation and nature of the project. Accordingly, some broad acceptable types of green bonds are as follows

a Use of proceeds bonds: In the scenario of liquidation of the project, the subscribers have access to the other assets of the issuers. Such a bond is backed by the issuers' balance sheet.

b Use of proceeds Revenue bonds: The collateral for the same comes from the revenue collected from the issuer. Typically, Urban Local Bodies seem to opt for this option.

c Project bonds: In case of an unforeseen scenario, the investors have access to the assets related to the said project only (not on the assets of the issuer).

d Secured green bond: An issuer may secure the issued green bonds with specific underlying assets to tide off the scenario in case the issuer becomes insolvent.

## 6 Areas of usage of Green Bonds

Some of the defined areas that have seen investments and have been theorized are mentioned below. It is to be noted that the list is not comprehensive.

| Areas | Sub Areas |
|---|---|
| Energy | Solar, wind, geothermal, hydropower, nuclear, bio-energy, Mixed Energy, grids & storage, renewable involving ocean, transmission and distribution |
| Water management | Monitoring, distribution, desalination, flood prevention |
| Buildings | Energy efficiency, low carbon materials, neighborhood environment |
| Transportation | Public & private transport, aviation, road & rail freight, zero-emission vessel |
| Land use | Agriculture, water bodies, forestry |
| ICT | Power management in the ICT domain, broadband & IT solutions |
| Waste management | Waste storage & disposal, biological treatment, recycling, waste to energy, landfill management, e-waste management, radioactive disposal |

Most of the items mentioned above are Paris Agreement compliant.

**7 Rules of Green Bonds in India**

a SEBI Regulations of 2008 which govern public issuance of debt instruments also cover the issuance of Green Bonds in India. The details are defined under official Gazette No. LAD-NRO/GN/2008/13/127878 dated 06 June 2008. The original order has been modified and amended multiple times. The last modification happened on 24 March 2015.

b “Framework for Sovereign Green Bonds”, issued by Department of Economic Affairs, Ministry of Finance. This document is as per the Green Bonds issued by Government of India. The document upholds the Green Bond Principles of 2021 as cited by International Capital Market Association. It shares the same set of components and also suggests external evaluation of the projects. This document is unique in terms of clearly defining the principles which should govern a green project. They are as follows

- Encourages energy efficiency in resource utilization
- Reduces carbon emissions and greenhouse gases
- Promotes climate resilience and/or adaptation
- Values and improves natural ecosystems and biodiversity especially in accordance with SDG principles

The areas in which the public sector will be utilizing he proceeds are as follows: renewable energy, clean transportation, climatic change adaptation, terrestrial & aquatic biodiversity conservation, energy efficiency, green buildings, pollution prevention and control, sustainable water & waste management, sustainable management of living natural resources & land use and The paper also defines the required environmental objective and the eligibility criteria.

c The central bank of India has been proactive in the area of green financing and green deposits. Reserve Bank of India (RBI) came up with a discussion paper on “Climate Risk and Sustainable Finance” as early as July 2022. The idea was to entice the countrymen and the policy makers to bother about climatic changes and the necessity & importance of green funding. Based on the feedbacks it received, it released a press note titled: Statement on Developmental and Regulatory Policies on 8 February 2023. Subsequently, the complete framework was defined on 11 April 2023.

This set of guidelines talks of

a Denomination: It mentions the interest rates, the possible tenors and the denomination

b Policy: RBI clearly states that each company should have a board approved policy on green deposits

c Financing framework: RBI clearly states that there should be a board-approved financing policy which should clearly define the eligible projects, the process of evaluation, the audit by third parties and the allocation procedure of funds

d Responsibilities of Regulated Entities (REs): They revolve around use of proceeds, end-use of funds, third party verification and annual assessments

e Reporting and disclosures: RBI mandates that the board of RE must receive an update on all green projects before the end of three months of every financial year

**8 Global scenario**

From 2008 till 2023, World Bank alone had disbursed USD 16.3 Bn in Green Bonds through various projects across its member countries. On the equivalent side of SDG, this had resulted in a reduction of 27.3 m Tonnes of CO2 of GHG. In the year 2023 itself, the disbursement was USD 955 Mn.

**Table 1:** Region wise Green Bonds disbursement through World Bank

| | ***Cumulative*** | | ***Fiscal 2023*** |
|---|---|---|---|
| | Committed | Disbursed & Outstanding | Disbursed |
| East Asia & Pacific | 6,631 | 4350 | 336 |
| Latin America & Caribbean | 4308 | 2964 | 70 |
| South Asia | 4481 | 2686 | 260 |
| Europe & Central Asia | 3643 | 1836 | 220 |
| Middle East & North Africa | 1514 | 870 | 44 |

| | | | |
|---|---|---|---|
| Africa | 315 | 77 | 24 |
| *Total* | ***20,893*** | ***12,784*** | ***955*** |

*All figures in USD Mil*

Source: World bank Impact Report 2023

In 2023, the aligned global volume of Green bonds reached USD 587.6 Bn. Out of this, the sovereign space was USD 120 Bn recording a jump of 45 percent. In the year.

A Top 3 issuing countries were: China (USD 83.5 Bn), Germany (USD 67.5 Bn.) and USA (USD 59.8 Bn.).

B Top 3 issuing institutions were: KfW (USD 14 Bn), European Investment Bank (USD 13.6 Bn.) and European Union (USD 11.6 Bn.).

C According to categories, the issuers were: Non-financial corporate, Financial corporate and Sovereign.

D As a currency, most of the deals were in Euro.

E India entered the sovereign green bonds space with an issuance of USD 3.1 Bn through four deals.

The key areas covered under these projects can be subdivided into the following broad categories: Renewable Energy & Energy Efficiency, Clean Transportation, Water and Wastewater, Solid Waste Management, Living Natural Resources and Land Use, Resilient Infrastructure, Built Environment and Other and Biodiversity. These projects are all aligned as per the multiple SDGs of the United Nations.

Stock exchanges have been doing their bit in promoting green bonds trading. Stock exchanges like Oslo, Stockholm and London have started a green bond section as early as 2015. Shanghai, Mexico and Luxembourg joined this league in 2016. Bombay Stock Exchange stated this service in June 2019. Now we have more than 27 stock exchanges offering this globally.

**9 Present scenario in India**

Initiatives by major players

a Issuance of 61.1 Bn JPY Green Bonds by REC Limited ( a Public Sector Undertaking under the Ministry of Power, Government of India) on 12 January 2024. The tenure options were: 5 years, 5.25 years and 10 years. The proceeds of the same would be used for projects which would come under the Green Finance Framework and the funding would adhere to the ECB guidelines of RBI. This was part of the long term vision of the company to issue and undergo projects of USD 10 Bn.

b SBI has raised 250 Mn USD through its London branch which will mature in 2028.

c Sovereign Green Bonds have started being issued by Government of India since 2023 post declaration of this in the budget of the previous Financial Year.

As per Securities and Exchange Board of India, details of Green Bonds issuance across industries are as follows

| *Sr. No.* | *Issuer* | *Amount Raised (In Rs. Crs)* | *Company Category* |
|---|---|---|---|
| 1 | Indian Renewable Energy Development Agency Limited | 590 | Govt. PSU |
| 2 | Indian Renewable Energy Development Agency Limited | 275 | |
| 3 | Indore Municipal Corporation | 244 | Municipality |
| 4 | Ahmedabad Municipal Corporation | 200 | |
| 5 | Ghaziabad Nagar Nigam | 150 | |
| 6 | Vadodara Municipal Corporation | 100 | |
| 7 | L&T Infrastructure Finance Company Ltd | 667 | Private Company |
| 8 | Yarrow Infrastructure Private Limited | 581 | |
| 9 | Mindspace Business Parks REIT | 550 | |
| 10 | Avaada Solarise Energy Private Limited | 499 | |
| 11 | Vikas Telecom Private Limited | 495 | |
| 12 | Fermi Solarfarms Private Limited | 337 | |
| 13 | Clean Sustainable Energy Private Limited | 334 | |
| 14 | Avaada SataraMH Private Limited | 270 | |
| 15 | Rattanindia Solar 2 Private Limited | 227 | |

| | | | |
|---|---|---|---|
| 16 | Malwa Solar Power Generation Private Limited | 197 | |
| 17 | Sepset Constructions Limited | 197 | |
| 18 | Tata Cleantech Capital Limited | 180 | |
| 19 | Citra Real Estate Limited | 19 | |
| 20 | Priapus Infrastructure Limited | 16 | |

Total issued amount is Rs 6128 Cr. as of 31-Mar 2024

**10 Challenges to Green Bonds in India**

1 Low awareness: There is an inherent lack of awareness of green bonds in India both from the side of issuer and that from the side of investor.

2 Low Greenium: Greenium refers to the premium which the issuer receives on issuance of green bonds. Towards this, the history of greeniums in India is very low. The greeniums received by Government of India through the issuance of sovereign green bonds was just 2 bps.

3 Lack of diversified projects: Even if there is an awareness level of the investors, we do not have a diversified variety to choose from because of which investors do not think green.

4 Tax benefits: There is no specific tax incentive or benefits for investors of green bonds. In India, we have this trend of popularity of instrument being dependent on tax incentives.

5 Small market: The green bonds market is still relatively small in comparison to normal bonds market. For an investor, he / she has options of infrastructure, commodities, corporate bonds which there are not much options in the green bonds segment.

6 Lack of standard definitions: We have lack of clarity on green-ness of a green bond. This refers to the asset in which the money raised under bonds is being used.

**11 Greenwashing as an issue**

Greenwashing as a term is in vogue since 1986 as a mix of two words namely “green” and “brain washing” (Jay Westerveld in 1986). It is seen that often a company or entity spends more time, energy and money on marketing themselves as environmental friendly than on minimizing their environmental impact. Companies resort to this practice when they observe that saying or branding “green” would help them get access to funds easily and it may give them a competitive advantage.

It builds in negativity on consumers‘confidence in green products and dampens the area & scope of genuine companies trying to make a green-difference. It creates confusion at the purchase point.

It is an extremely serious problem particulary in the modern context as we are popularizing green bonds, central bankers are bringing in policies around green deposits and there is increasing trends of companies which wish to take the green bonds route to genuinely do something for the environment.

**12 Suggestions based on the research**

The growth of Green Bonds in India will pivot on the following factors:

a Creation and development of an active market

b Curating incentives for the issuers and subscribers and

c Awareness build-up among the investor community

Accordingly, few suggestions are mentioned below

1 Multi-institution collaboration: Since the transaction cost of the projects are large and the tenure of the projects are large, we need to involve the large fund managers like Insurance Regulatory and Development Authority (IRDAI) and Pension Fund Regulatory and Development Authority (PFRDA).

2 Going global: Given the growing reputation of Brand India, we ought to market our projects among sovereign authorities and pension fund managers across the globe. This could be used as an avenue for FDI. Infact, we can propose a model where the government (read sovereign) guarantee can be sought for some large project involving a (or multiple) FDI.

3 Tax benefit: This would go a long way in eliciting interest by corporate and retail investors. We have a whole list of avenues for tax saving or reduction. This could come as an option improving the chances of higher investments in green bonds.

4 Improving risk perspective: We are seeing improvements in debt restructuring and NPA management across the country through various initiatives of the government. A dedicated framework to address instances of possible failures of these projects would help improve the confidence level of investors.

5 We have clear benefits for organizations to go for Carbon credits by pursuing some pollution reduction mechanisms and getting the said approved for its uniqueness through the National Physical laboratory. Accordingly, we must have some mechanism developed for organizations where the corporate can see some direct benefit.

6 Exchanges may be asked to indulge in promoting green bonds in a manner in which they are doing for sovereign bonds.

7 We are aware of the risk involved with particularly smaller projects. This can be reduced to a substantial extent by introducing securitization. This is a common thing already in some Western pockets.

**13 Conclusion**

Till recently, we had CSR and ESG being used interchangeably. Offlate, we are seeing a clear distinction between the two. Infact, we had academic literature also doing the same mistake. Companies are realizing that CSR is mere utilization of the company’s profits for undertaking designed social initiatives but ESG is more on the development of the sustainable framework. The difference can also be referred as “being kind” and “doing whats right”. Towards the later, green bond remains one of the most sought after option.

It is to be noted out here that under the guise of green bonds and promoting green assets, companies are clearly just in the competition of showcasing bizarre things on the Sustainability or the ESG Report which are published and showcased along with the annual report on business & finance. If the government and the other regulators are actually serious about going green through the corporate world, they must showcase tangible benefits to the corporate to make green bonds and the allied investments truly green.

We have seen specialized efforts being taken by either dedicated bodies or the governments itself to promote green bonds in foreign countries particularly Europe, UK and the US. We are seeing interest in sovereign bonds by countries like Malaysia, Indonesia and Egypt. The day is not far when we will see more traction in India. Government's push (through sovereign and Indian Public Sector Undertakings) is visible and we will have a greater visibility even on the global scene on the metric of green bonds.

As a type of debt instrument, green bonds carry risks related to their vulnerability to currency inflation as any other instrument. Trustworthiness of the issuer of the bond is also an issue; but again, that is normal to every bond issuance. This trickiness ought to be handled properly along with suitable risk mitigation plans. Green bonds can go a long way in enhancing bond investments in totality besides building the requisite eco-system aimed at net-zero by 2070. We can safely say that the potential of this instrument is grossly under-valued; it can and it will flourish.

## 14 Limitations of the study

a There is a need to check the greenium which is generated through green bonds

b We need to check the awareness of green bonds among the general public else it will remain a discussion in academic classrooms and forums

c In India, we have a clear distinction on issuers of bonds i.e. Government, Public Sector Undertakings and Non-Banking Financial Institutions. The bond issued size are as follows: FY 23-24: Rs 19167.88 Cr., FY 22-23: Rs 9211.64 Cr., FY 21-22: Rs 11589.41 Cr., FY 20-21: Rs 10588.02 Cr. We need to do a micro-check on the projects being handled by each of the bond. There could be a scope of recalibrating some of these projects as green.

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