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Study on Impact of Green Bonds in Sustainable Infrastructure Projects

Bhavana Madishetty¹, Dr. Vara Lakshmi Thavva²

Department of Master of Business Administration Institute of Aeronautical Engineering Hyderabad, Telangana, India. -500043

ABSTRACT

“Green bonds are debt instruments specifically earmarked to raise money for climate and environmental projects. These bonds are typically asset-linked and backed by the issuer’s balance sheet, often subject to independent third-party verification for green project alignment.”

Green bonds have become an essential financial tool in supporting environmentally sustainable projects while encouraging corporate responsibility. With climate change and sustainable infrastructure, and environmental protection. This study analyses key trends in India’s green bond market, including issuer participation, coupon rates, and corporate investments in sustainability-linked projects. It assesses the influence of SEBI’s regulatory measures on bond issuance and explores how companies like Lauren & Toubro (L&T) integrate sustainability into their financial frameworks. Additionally, the research evaluates employee engagement in corporate sustainability efforts through a field survey, offering insights for boosting awareness and participation in green finance.

By exploring these aspects, this study adds to the conversation on sustainable finance, highlighting how policies, corporate efforts, and employee involvement come together to make a real impact. The findings reinforce India’s shift towards a low-carbon economy, showing how green finance play a key role in shaping both business and financial markets. Ultimately, raising awareness, strengthening regulations, and fostering corporate commitment will be essential in building a more sustainable and greener future

Keywords: Green Bonds, SEBI, ESG Compliance, sustainability, Low-carbon economy, Financial Market.

1. INTRODUCTION

In Today’s world, where environmental concerns are more concerning than ever, green bonds have emerged as a powerful tool to finance sustainable projects. SEBI’s regulations have played a key role in shaping this market, ensuring transparency and encouraging more issuances. Major players like Lauren & Toubro(L&T) and many other municipal corporations in India have actively embraced green finance strategies through green bonds, decarbonization effects, and ESG Compliance. This study explores SEBI’s green bonds issuance and L&T’s sustainability-driven financial model, looking at how well employees understanding green bond’s role in corporate sustainability. By identifying gaps in awareness, we can explore ways to enhance investments and drive meaningful change.

2. OBJECTIVES OF THE PAPER

1. This study helps to examine the development and impact of SEBI’s green bonds issuance, offering insights into the role of sustainable finance within the regulatory framework.
2. The research looks into L&T’s approach to implementing sustainable practices, with a focus on its compliance with Environmental. Social, and governance (ESG)
3. Conducting a field survey to understand sustainability awareness among employees to identify existing gaps, gain insights to design effective strategies to enhance employee’s awareness and encourage active participation in sustainability initiatives.

3. NEED OF THE STUDY

As climate concerns continue to grow, it’s more important to know about how financial tools like green bonds can support sustainability efforts. Climate change is one of the biggest challenges we face today. Taking initiative to reduce environmental damage is essential. Green n=bonds provide a way to fund eco-friendly projects, from renewable energy to sustainable infrastructure, helping both government and businesses to invest in sustainable future. They also build investors’ confidence in sustainable finance. Regulatory bodies like SEBI ensure these bonds are issued with transparency and credibility.

This study aims to conduct detailed examination how green bonds are making an impact in helping businesses in creating a more sustainable and adaptable economy.

4. SCOPE OF THE STUDY

The study on impact of green bonds in sustainable infrastructure projects aims to assess the effectiveness of green finance in promoting environmentally sustainable investments. The research specifically focuses on the Indian green bonds market, regulatory frameworks, and corporate strategies in sustainable financing. We will explore SEBI's role in regulating green bonds issuance. By analysing key trends like which companies are issuing these bonds, interest rates they offer etc., to understand how green finance is evolving in India.

Further focusing on how companies like L&T integrate green bonds into their financial strategies while meeting ESG compliance. Additionally, the study explores employees' investments through a field survey, we aim to identify awareness gaps and explore ways to encourage more active participation.

Beyond finance, this study rootles around how green bonds directly impact infrastructure projects, From renewable energy to eco-friendly urban development. By examining both the opportunities and challenges in this space.

Ultimately, this research is about how money can be used as a good source in creating a more sustainable and responsible future for businesses, Investors, and society as a whole.

5. REVIEW OF LITERATURE

Green Finance: Fostering Sustainable

Development in India

This study is conducted by **Babita Jha, Priti Bakhshi**, published in "International Journal of Recent Technology and Engineering (IJRTE)

ISSN: 2277-3878, Volume-8 Issue-4, November 2019" mainly addressing green finance fosters inclusive and sustainable economic growth by channelling funds toward environmental priorities. This study examines green financing initiatives by public and private entities in India, highlighting challenges and proposing solutions. It relies on secondary data from government and institutional reports to assess funding needs and strategies.

Green Finance in India: Progress and Challenges

This article written by [Abhishek Ranjan](#) focuses on reviews the developments in green finance globally and in India. We use a variety of data sources to assess both the extent of public awareness (Google

Trends) and financing options (bank credit and bond issuances) for green projects. Our findings indicate that while there have been improvements in public awareness and financing options in India, a reduction in asymmetric information through better information management systems and increased coordination amongst stakeholders could pave the way towards a greener and sustainable long term economic growth.

Green Finance: A Shift Towards Sustainable Economic Growth

Written by [Bazgha Khan](#), here in this article it conveys that green finance supports environmentally sustainable projects by increasing financial flows from public, private, and nonprofit sectors. UNEP aligns financial systems with the 2030 SDGs (Sustainability development goals), promoting green bonds, loans, and climate insurance. India has prioritized green finance since 2007 through RBI initiatives, NAPCC (2008), and a renewable energy target of 450GW by 2030.

Green Bond as an Innovative Financial Instrument in the Indian Financial Market

This article from Sage Jornal aims Idia's ambitious renewable energy for 2050 have driven strong interest in ESG- focused financial products. However, research on the Indian green bond market remains limited, particularly from an emerging market perspective. This study fills gap through a systematic review of literature (2010-2022), analysing growth, challenges, and future prospects. Key barriers include the lack of a proper framework, high transaction costs, non-labelling of bonds, greenwashing, poor issuer creditworthiness, limited government support, unattractive sovereign rates, financial disincentives, and low awareness. The study recommends policy measures and active stakeholders' involvement to accelerate market growth.

A Study of Green Bond Market in India

An article from IOP publishing Ltd, by **Ashima Verma and Rachna Agarwal** on green bonds market in India states that green bonds, a key component of Green Finance, funds environmentally friendly projects and promote socially responsible investing (SRI) in areas like energy efficiency, green infrastructure, renewable energy, and water improvement. With rising global temperatures and urgent climate challenges, green bonds offer a financial pathway to sustainability. This study provides a comprehensive analysis of India's green bond market, exploring its current status, future prospects, and practical recommendations for growth in the Indian context.

6. PROBLEM STATEMENT

Green bonds have gained prominence for funding sustainable infrastructure projects. While India has taken steps to expand its green finance market, the true impact of these bonds on long term sustainability remains unsettled. Despite SEBI's regulatory measures and increasing participation, challenges such as limited awareness regulatory constraints, and investor confidence continue to influence their effectiveness. This study aims to evaluate the impact of green bonds in India, focusing on issuer participation, ESG compliance, and employee partaking in sustainability initiatives to identify existing gaps and potential improvement in the green finance investments.

7. METHODOLOGY

7.1 DATA COLLECTION

The data utilized to support this article is **primary data** includes green bonds issuance as on 30 April,2024 acquired from SEBI for time period of FY 2017-2024, L&T Integrated Annual Report FY 2023-24, and Survey conducted on employees of various organizations to understand the green bonds awareness and investment contributions towards sustainability.

7.2 TECHNIQUE FOR DATA ANALYSIS

Graphical representation using clustered Column Chart representing the amount raised by issuers in Indian green bond market with coupon rate as on 30 April, 2024.

Descriptive analysis to estimate the highest and lowest investments, sectoral investments, highest and lowest coupon rates offered by issuers.

7.3 ANALYSIS OF DATA

7.31 SEBI's Green Bonds Issuances Analysis:

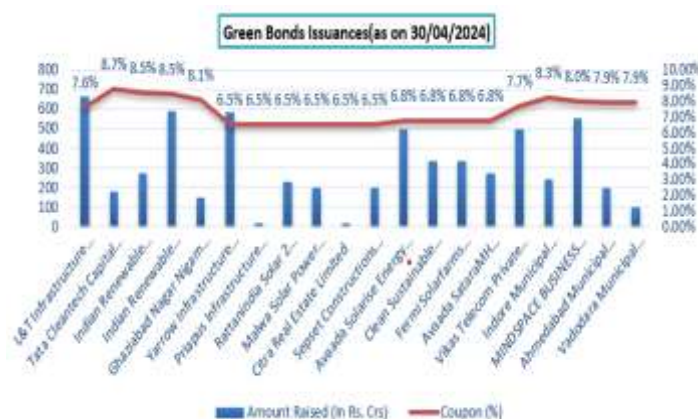


Fig. 1: Green Bonds Issuances Visualization (as on 30/04/2024)

Green bonds are the debt instruments used to finance projects with environmental benefits like renewable energy, sustainable water management, pollution control, and green infrastructure projects.

Trends and Market Participation: Green Bonds Market in India comprises of diverse range of participants categorised as Corporate Entities, Financial Institutions, Mindspace Business Parks REIT's, Municipal Corporations summing up total issuances of INR 6,128 Crores of investments. Amongst which L&T Infrastructure Finance Company Limited standardizes as standalone example contributing largest issuance of INR 667 Crore, while Priapus Infrastructure Limited being smallest contributor with INR 16 Crore.

Municipal Corporations in India (Ghaziabad, Indore, Ahmedabad, Vadodara MC's) depicts Government's role in assisting the green finance contributing the total of INR 694 Crore, while private entities contribute INR 5,434 Crore towards green bonds issuance, providing their fair share of assistance towards sustainable environment.

Coupon rate and Tenure analysis: Over the years Tata Cleantech Capital Limited maintains it's legacy offering highest coupon rates of 8.74% @ 5 years of tenure, IREDA (Indian Renewable Energy Development Agency Limited) follows the lead by offering 8.51% @ 10 years and 8.47% @ 10 years respectively. Whereas other Corporate Institutions and Municipal Corporations also offer coupon rates 6.49% @ 2,3 years.

L&T remains as a role model by attracting most of the investors by understanding investor's behavior i.e., maintaining balance between coupon rates and tenure offering 7.59% @ 7 years tenure.

S.no	Issuer	Issuance Date	Date of Maturity	Amount Raised (INR)	Coupon rate	Tenure	ISIN
1.	L&T Infrastructure Finance Company Ltd	29-06-2017	18-11-2024	667	7.59%	7.00	INE691I07DZ9
2.	Tata Cleantech Capital Limited	18-12-2018	18-12-2023	180	8.74%	5.00	INE857Q07216
3.	Indian Renewable Energy Development Agency Limited	03-01-2019	03-01-2029	275	8.51%	10.00	INE202E07260
4.	Indian Renewable Energy Development Agency Limited	17-01-2019	17-01-2029	590	8.47%	10.00	INE202E07278
5.	Ghaziabad Nagar Nigam	31-03-2021	06-04-2025	150	8.10%	4.02	INE0GVF24014
			06-04-2026			5.02	INE0GVF24022
			06-04-2027			6.02	INE0GVF24030
			06-04-2028			7.02	INE0GVF24048
			06-04-2029			8.02	INE0GVF24055
			06-04-2030			9.02	INE0GVF24063
			06-04-2031			10.02	INE0GVF24071
6.	Yarrow Infrastructure Private Limited	01-07-2021	01-07-2024	581	6.49%	3.00	INE001W07011
7..	Priapus Infrastructure Limited	01-07-2021	01-07-2024	16	6.49%	3.00	INE964M07011
8.	Rattan India Solar 2 Private Limited	01-07-2021	01-07-2024	227	6.49%	3.00	INE935V07012
9.	Malwa Solar Power Generation Private Limited	01-07-2021	01-07-2024	197	6.49%	3.00	INE999X07014
10.	Citra Real Estate Limited	01-07-2021	01-07-2024	19	6.49%	3.00	INE969M07010
11.	Sepset Constructions Limited	01-07-2021	01-07-2024	197	6.49%	3.00	INE961M07017
12.	Avaada Solarise Energy Private Limited	02-03-2022	28-02-2025	499	6.75%	2.00	INE07H107012
13.	Clean Sustainable Energy Private Limited	02-03-2022	28-02-2025	334	6.75%	2.00	INE00JT07017
14.	Fermi Solar farms Private Limited	02-03-2022	28-02-2025	337	6.75%	2.00	INE404X07015

15.	Avaada SataraMH Private Limited	02-03-2022	28-02-2025	270	6.75%	2.00	INE0CSU07013
16.	Vikas Telecom Private Limited	30-08-2022	29-08-2025	495	7.65%	3.00	INE466P07010
17	Indore Municipal Corporation	20-02-2023	20-02-2026	244	8.25%	3.00	INE00QS24019
			20-02-2028			5.00	INE00QS24043
			20-02-2030			7.00	INE00QS24027
			20-02-2032			9.00	INE00QS24035
18	MINDSPACE BUSINESS PARKS REIT	15-03-2023	13-04-2026	550	8.02%	3.00	INE0CCU07074
19	Ahmedabad Municipal Corporation	06-02-2024	06-02-2029	200	7.90%	5.00	INE117E08029
20	Vadodara Municipal Corporation	06-03-2024	04-03-2029	100	7.90%	5.00	INE0KDG08023
	TOTAL			6,128			

Table 1: Green Bonds Issuances Data

SEBI's Green Bond Framework: The Securities and Exchange Board of India (SEBI) has established a compendious regulatory framework to enhance transparency, accountability, and impact investments in green bond issuances.

Issuers must provide **pre-issuance disclosure**, like project's environmental impact, use of proceeds, ESG compliance and alignment with global sustainability standards, such as the **Green Bond Principle (GBP)** and the **Climate Bonds Initiative (CBI)**. It is mandatory that top-listed companies comply with the **Business Responsibility and Sustainability Reporting (BRSR) Core Disclosures**, where a third-party audit the Environmental, Social, Governance (ESG) performance indicators. Issuers are also required to disclose a **Post- Issuance Reporting** that includes the allocation of funds, project status, and environmental impact assessments, to ensure green taxonomy, prevent green washing which builds investor's confidence in credibility.

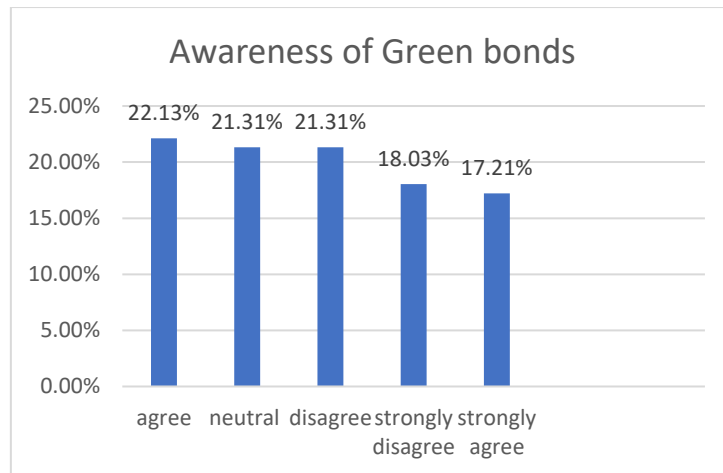
7.32 Green bonds, Sustainability Strategies and ESG Compliance: A Case study of L&T

Larsen & Toubro (L&T) has strategically blended green financing into its business model, capitalizing sustainable debt instruments to fund Low-Carbon infrastructure, clean energy, and environmental conservation projects. Aiming to raise capital through green bonds and sustainability-linked loans to secure SEBI's BRSR Core framework, allocation of funds to renewable energy, energy-efficient buildings, water conservation, and green mobility projects to contribute to India's sustainable development goals has been its main motive. Few strategies implemented in L&T's business model to strengthen its commitment to sustainable urbanization includes **Carbon Neutrality Commitment** (i.e., target net-Zero emissions by 2040), **Water Conservation and Circular Economy** (aims for water neutrality by 2035 employing wastewater recycling, rainwater harvesting, and innovative water-saving technologies), **Green Infrastructure Investments** implementation of energy-efficient mass transit systems i.e., Metro Rail Transit Systems, and smart city solutions, financing Solar, hydro, and nuclear power projects have significantly contributed to 50% of L&T's total revenue i.e., INR 634 billion in the FY 2023-24.

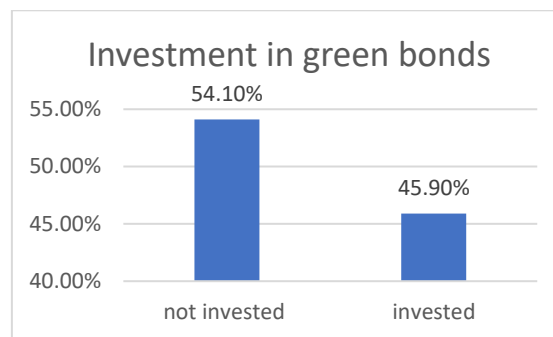
ESG Compliance & Regulatory Alignment: L&T aligns its operations with SEBI's evolving ESG compliance requirements **BRSR Core disclosures**, **Global Standards Compliance** by following ISO 14001, ISO 45001, SA8000 and Global Reporting Initiative (GRI), Transparency & Stakeholders management.

7.32 A Survey on Green Bonds:

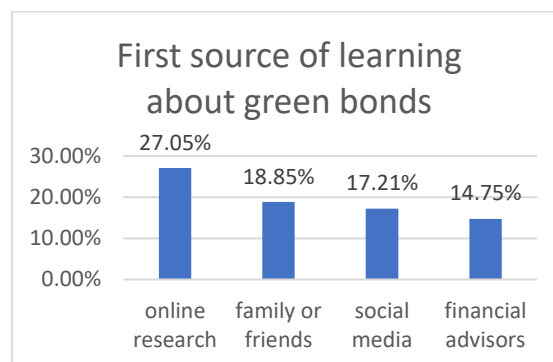
A survey on green bonds is conducted on employees of various sectors, covering aspects such as awareness, investment behavior, benefits, challenges, and improvement factors to understand the employee contribution towards sustainability development. The survey dataset has 122 survey responses as follows:



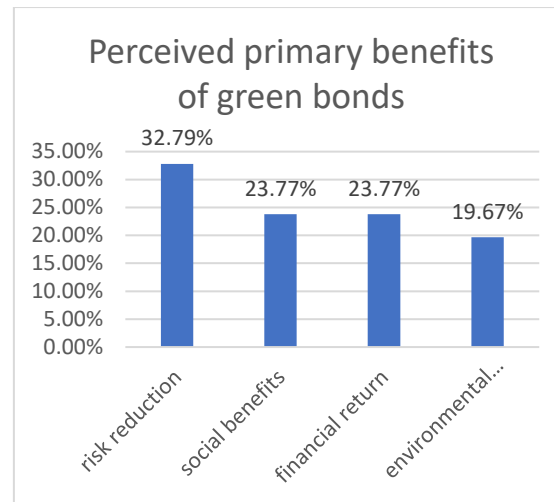
* Awareness of Green bonds: 22.13% Agree and 21.31% Neutral responses dominate indicating moderate awareness, 21.31% disagree and 18.03% strongly disagree show a significant lack of awareness, while only 17.21% strongly agree suggesting that very few are highly aware.



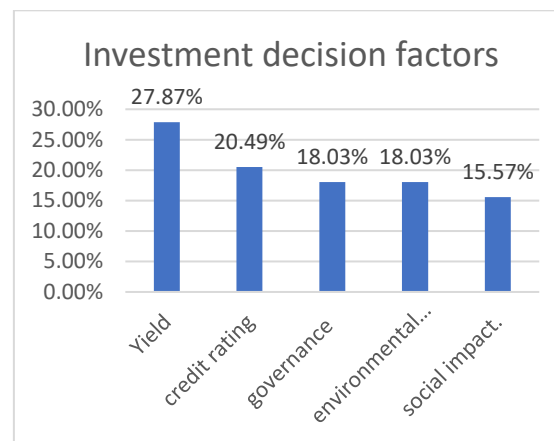
* Investment in green bonds: 54.10% respondents have not invested, showing hesitation or lack of opportunity while 45.90% have invested, indicating a growing interest in green bonds.



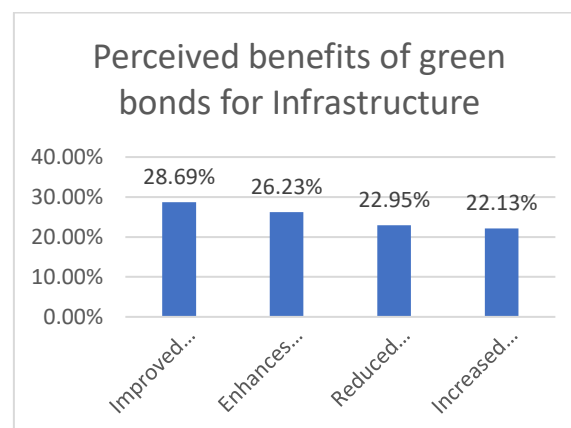
* First source of learning about green bonds: 27.05% learned through online research showing that self-learning is a key method, 18.85% learned from family or friends suggesting personal influence plays a role, 17.21% via social media and 14.75% from financial advisors highlighting the role of digital and professional sources.



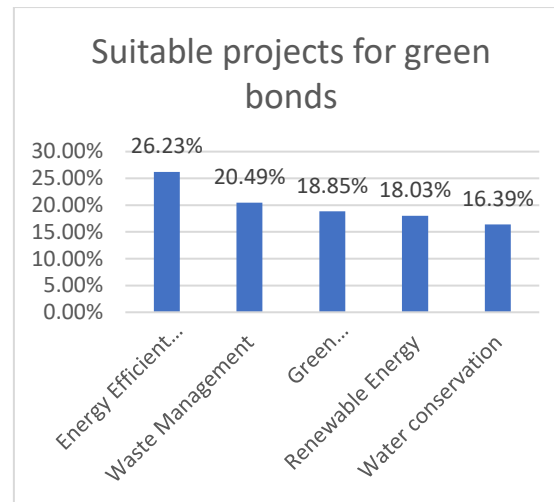
* Perceived primary benefits of green bonds: 32.79% see risk reduction as the main benefit suggesting stability attracts investors, 23.77% each for social benefits and financial return showing a balance between ethical and monetary motives, 19.67% value environmental benefits which is lower than expected for a sustainability-focused instrument.



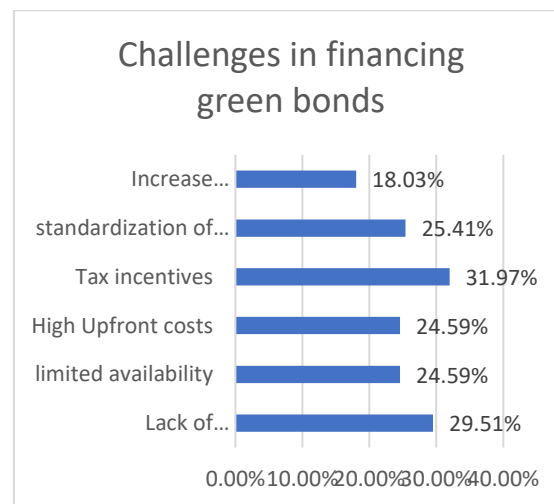
* Investment decision factors: 27.87% prioritize Yield indicating financial returns drive investment choices, 20.49% consider credit rating showing trust in bond security is crucial, 18.03% each for governance and environmental impact reflecting moderate ESG concerns, 15.57% focus on social impact.



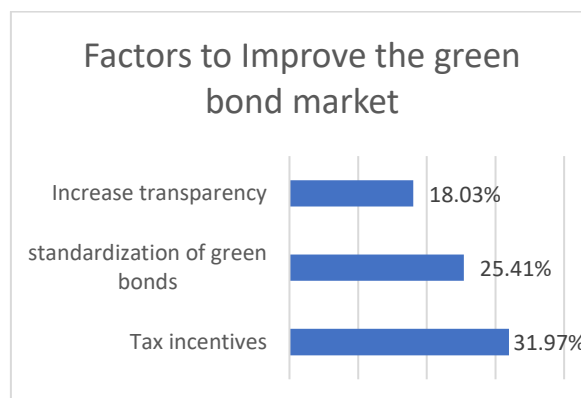
* Perceived benefits of green bonds for Infrastructure: 28.69% selected "Improved Environmental Sustainability" showing the strongest perceived benefit, 26.23% believe it "Enhances Social Responsibility" highlighting ethical impact, 22.95% value "Reduced Greenhouse Gas Emissions" indicating climate-related concerns, 22.13% see "Increased Financial Returns" suggesting economic viability is still key factor.



* Suitable projects for green bonds: 26.23% favor “Energy Efficient Buildings” as the most preferred category, 20.49% chose “Waste Management” highlighting sustainability concerns, 18.85% support “Green Transportation” showing interest in eco-friendly mobility, 18.03% selected “Renewable Energy” indicating a need for further promotion in this sector, 16.39% prefer “Water conservation”.



* Challenges in financing green bonds: 29.51% identified “Lack of standardization” as the biggest challenge highlighting regulatory concerns, 24.59% cited “limited availability” and “High Upfront costs” showing accessibility and financial barriers.



* Factors to Improve the green bond market: 31.97% selected “Tax incentives” indicating financial incentives are key to boosting investment, 25.41% emphasized “standardization of green bonds” supporting the need for clear regulatory frameworks, 18.03% choose “Increase transparency” highlighting trust concerns.

8. LIMITATIONS

While this study provides valuable insights into the impact of green bonds on sustainable infrastructure projects, there are some limitations:

Limited Data Scope: The research primarily focuses on the Indian green bond market and may not capture global trends or regional variations.

Survey Constraints: The employee survey was conducted with 122 responses, which may not be fully representative of the larger corporate workforce.

Evolving Regulations: SEBI's policies and the green bond market are constantly evolving, which means some findings may change over time.

Limited Long-Term Impact Analysis: The study primarily assesses current trends, but the long-term effects of green bonds on infrastructure development require further research.

9. FINDINGS

Growing Interest but Low Awareness: While green bonds are gaining traction, awareness remains moderate, with 39% of survey respondents either unaware or unsure about them.

Investment Hesitation: 54.1% of respondents have not invested in green bonds, indicating a lack of confidence, accessibility, or knowledge about their benefits.

Yield and Risk Drive Investment: Investors prioritize financial returns, with 27.87% selecting yield as the primary decision factor, followed by credit rating and governance.

Benefits Recognized: Risk reduction (32.79%) and financial returns (23.77%) are the most valued benefits, but environmental advantages (19.67%) are not as widely recognized as expected.

Regulatory and Market Challenges: The lack of standardization (29.51%) and complex issuance processes hinder wider adoption.

Corporate Participation is Increasing: Companies like L&T are integrating sustainability-linked financing models, demonstrating the potential for large-scale adoption.

10. RECOMMENDATIONS

Enhancing Awareness and Education: Conduct awareness campaigns and corporate training sessions to bridge knowledge gaps about green bonds and sustainable finance.

Regulatory Simplification: Policymakers should streamline issuance procedures to encourage more organizations to participate in the green bond market.

Stronger Incentives for Investors: Introducing tax benefits (as preferred by 31.97% of respondents) and risk mitigation strategies can boost investor confidence.

Expanding Accessibility: Financial institutions should offer diverse green bond products to attract a wider range of investors, including retail and institutional participants.

Strengthening ESG Compliance: More companies should align with SEBI's green bond regulations and adopt transparent reporting mechanisms to ensure credibility.

11. CONCLUSION

Green bonds play a vital role in financing sustainable infrastructure projects, offering both environmental and financial benefits. While the Indian market is growing, challenges like limited awareness, regulatory complexity, and investment hesitation remain barriers. Companies like L&T showcase how corporate participation can drive sustainable finance adoption, but broader engagement is necessary. Addressing regulatory hurdles, improving investor confidence, and promoting education will be key to unlocking the full potential of green bonds in building a greener and more sustainable future.

12. REFERENCES

1. Jha, B., & Bakhshi, P. (2019). Green Finance: Fostering Sustainable Development in India. *International Journal of Recent Technology and Engineering (IJRTE)*, 8(4), 2277-3878.
2. Ranjan, A. (n.d.). Green Finance in India: Progress and Challenges. Retrieved from Google Trends and financial reports on bank credit and bond issuances.
3. Khan, B. (n.d.). Green Finance: A Shift Towards Sustainable Economic Growth. United Nations Environment Programme (UNEP), aligning financial systems with the 2030 Sustainable Development Goals (SDGs).

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4. Verma, A., & Agarwal, R. (n.d.). A Study of the Green Bond Market in India. IOP Publishing Ltd.
 5. Sage Journal. (n.d.). Green Bonds as an Innovative Financial Instrument in the Indian Financial Market. Systematic literature review (2010-2022) analysing growth, challenges, and future prospects.
 6. Securities and Exchange Board of India (SEBI). (2024). SEBI's Green Bond Framework and Issuance Regulations. Retrieved from SEBI official reports.
 7. Larsen & Toubro (L&T). (2024). L&T Integrated Annual Report FY 2023-24. Retrieved from L&T's official sustainability reports.
 8. Mindspace Business Parks REIT, Tata Cleantech Capital, IREDA, & Various Issuers. (2024). Green Bond Issuance Reports. SEBI Green Bond Market Data, April 2024.