Financing the Renewable Era: A Study of India's Sovereign Green Bond Index

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Abstract

This paper examines green bonds as a financing tool for India's transition to renewable energy and sustainable development. It outlines the concept of green finance and the structure of green bonds, which are fixed-income instruments whose proceeds are earmarked for environmental and climate projects such as renewable energy, clean transport and water management. It also reviews the global market, led by the US, the UK, France, Germany and China, and SEBI's regulatory framework for ESG debt securities, including disclosure, impact reporting and third-party verification. A literature review covers India's progress in green finance, the cost advantages of green bonds, their effect on corporate innovation and value, and issues such as greenwashing and the "greenium". The paper also analyses the Nifty India Sovereign Green Bond Jan 2028 Index. It grew from 1,000 to about 1,300 between January 2023 and September 2026, a return of about 7.4% a year, although momentum has eased recently.

Keywords: Green Bond, Sustainable Finance, SEBI ESG Debt Securities, Renewable Energy Financing and Sovereign Green Bond Index

Introduction

Green bonds are financial instruments that generate capital to support environmental or climate-related initiatives. While they share similarities with traditional bonds, such as having a fixed or variable interest rate, they are distinct in that they are specifically allocated for the financing or refinancing of projects that positively impact the environment or climate, including the utilization of renewable energy, energy-efficient transportation, clean energy, sustainable water management, and the mitigation of greenhouse gas emissions. These bonds are issued by governments, corporations, or international development banks. Green bonds are financial instruments that generate capital to support environmental or climate-related initiatives. While they share similarities with traditional bonds, such as having a fixed or variable interest rate, they are distinct in that they are specifically allocated for the financing or refinancing of projects that positively impact the environment or climate, including the utilization of renewable energy, energy-efficient transportation, clean energy, sustainable water management, and the mitigation of greenhouse gas emissions. These bonds are issued by governments, corporations, or international development banks.

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Green Finance

There is no internationally agreed definition of green finance. The term describes a broad range of funding for environment-oriented technologies, projects, industries or businesses. A more narrow definition of green finance refers to environment-oriented financial products or services, such as loans, credit cards, insurances or bonds.

- Green investing recognizes the value of the environment and its natural capital and seeks to improve human well-being and social equity while reducing environmental risks and improving ecological integrity.
- Other terms used to describe green finance include “environmentally responsible investment” and “climate change investment”.

Green Bonds

Green bonds are a novel financial product that was designed with the purpose of rerouting resources towards the finance of new sustainable projects or the refinancing of existing sustainable enterprises. This action was taken as a response to the fact that there is a decrease in the availability of sustainable funding. In spite of the fact that it operates in the same manner that a traditional bond does, the utilization of the income is predetermined to be invested in just particular kinds of projects. In an ideal world, a green bond would be a type of fixed-income instrument that is specifically designed to raise funding for projects that are related to the environment and climate change. In addition, green bonds might be eligible for tax breaks, which would make them more desirable to investors (Source: Investopedia).

Global Green Bonds scenario

The global green bond market has experienced rapid growth in recent years and is regarded as one of the fastest-expanding segments within the fixed-income market. As the emphasis on the environmental sustainability of projects increases, green bonds have gained widespread acceptance as a means to raise capital for climate and environmental initiatives, often at a comparatively lower cost of capital than traditional bonds.

Major nations that have turned to green bonds for funding include the UK, France, Germany, the USA, and China.

• In the United States, green bonds have been issued by municipal corporations, state governments, and various corporations, as well as by international organizations such as the World Bank.

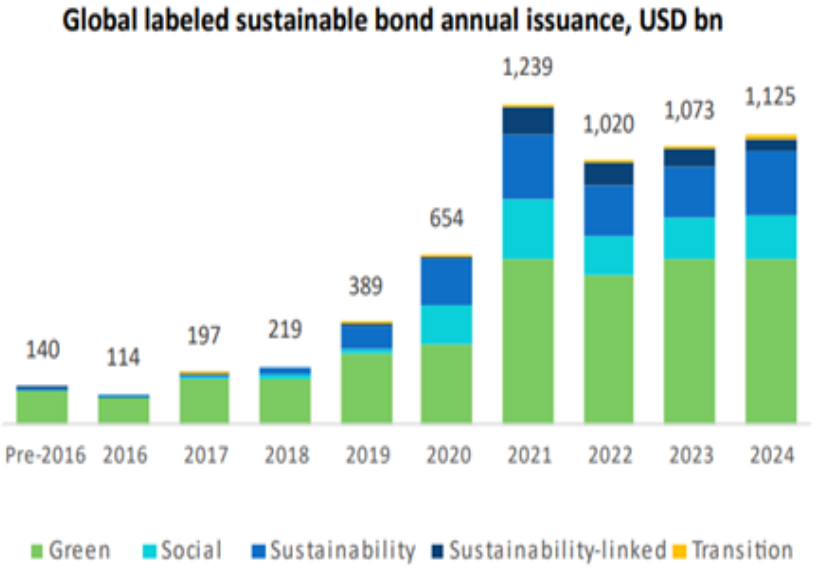
• In Europe, the issuance of green bonds has been spearheaded by France, Germany, and the United Kingdom, with the European Investment Bank being one of the largest issuers of these bonds.

• In China, the issuance of green bonds has been rapidly increasing, partly driven by the government's ambitious renewable energy goals and the necessity to finance large-scale infrastructure projects.

• In Canada and Australia, the issuance of green bonds has been relatively limited thus far; however, the market is anticipated to expand as more issuers in these countries seek to fund environmentally beneficial projects.

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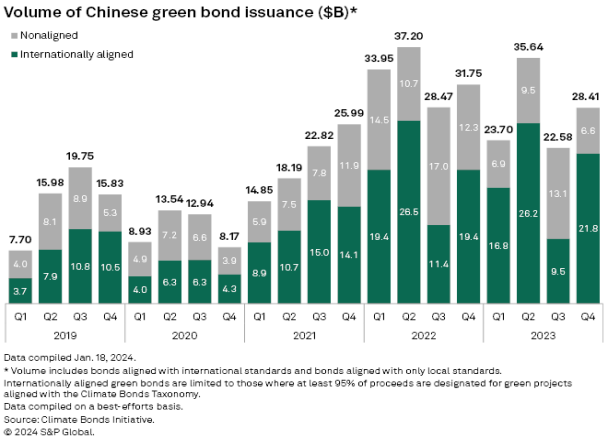
Overall, the green bond market is evolving into a more mature and globalized sector, with an increasing number of countries and regions participating in green bond issuance. This trend is projected to persist in the future as the demand for financing environmentally beneficial projects intensifies.

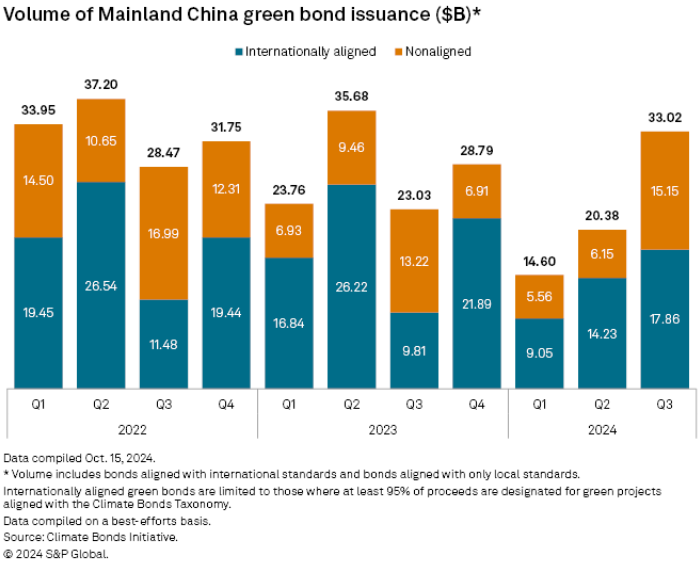


Source:https://www.sebi.gov.in/statistics/greenbonds.html



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Initial disclosure requirements for issue and listing of green debt securities

SEBI's initial disclosure requirements apply to green debt securities issued by companies and other listed issuers, under Chapter IX of its Operational Circular as revised on February 6, 2023. They don't directly govern sovereign green bonds. Those are issued by the Government of India under its own Sovereign Green Bond Framework (Department of Economic Affairs, 2022), which is already in your reference list. I haven't pulled that framework's details, so I'd treat it as a separate point in the paper.

An issuer must make these additional disclosures in the offer document, for both public issues and private placements:

1. A statement of the environmental sustainability objectives of the issue.

2. The decision-making process for judging whether projects or assets are eligible, including:

- how they fit the eligible green project categories in the NCS Regulations;

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- the eligibility criteria;
- any Indian or global taxonomies, standards or certifications referenced, and the exclusion criteria;
- for transition bonds, how the issue aligns with India's Nationally Determined Contributions.

3. The system for tracking how the proceeds are deployed.

4. The projects, assets or areas where the proceeds will be used, including any refinancing of existing green projects.

5. An indicative split of proceeds between financing and refinancing.

6. The intended temporary placement of unallocated or unutilised proceeds.

7. The perceived social and environmental risks of the projects, and the proposed mitigation plan.

8. The appointment of an independent third-party reviewer or certifier to review the processes, including project evaluation, selection criteria and eligible categories. This applies on a "comply or explain" basis for two years from the circular.

The circular applies to issues launched on or after April 1, 2023. Issuers must also continue disclosing after listing, including utilisation of proceeds verified by an external auditor, impact reporting, and selected BRSR elements. Their responsibilities include using proceeds only for the stated purpose and following SEBI's February 2023 "dos and don'ts" circular on avoiding greenwashing.

Continuous disclosure requirements for listed green debt securities

An issuer with listed green debt securities must provide the following with its annual report and financial results:

Utilisation of proceeds: how the proceeds were used, as tracked through the internal process disclosed in the offer document. An external auditor's report must verify the internal tracking method and the allocation of funds to the projects or assets.

Unutilised proceeds: details of any unutilised proceeds, including the temporary placement of unallocated funds, for each ISIN of green debt security issued.

Annual report disclosures:

a list of the projects or assets that received proceeds, with a brief description and the amounts disbursed;

qualitative performance indicators and, where feasible, quantitative measures of environmental impact. If the impact can't be quantified, the issuer must say so and give the reasons;

the methods and key assumptions used to prepare these indicators;

how the mitigation plan for social and environmental risks, as set out in the offer document, has been put into practice.

Impact reporting: project-by-project reporting of the environmental impact of the financed projects, along with any reporting standards or taxonomies followed.

BRSR disclosures: major elements of the Business Responsibility and Sustainability Report, in the format given in Annex I of the circular. These cover energy use, water, air emissions, greenhouse gas emissions, waste and related indicators.

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Third-party review: a third-party reviewer or certifier must oversee post-issue management of proceeds and verify the internal tracking and impact reporting. This is also on a two-year "comply or explain" basis. An issuer that hasn't fully complied by then must explain why in its annual report, and what it is doing to comply.

Responsibilities of the issuer

Keep a decision-making process to confirm that projects remain eligible.

Make sure all funded projects meet the documented green objectives.

Use the proceeds only for the purpose stated in the offer document.

Follow SEBI's February 3, 2023 circular on dos and don'ts to avoid greenwashing.

Literature Review

Thirumala Rao (2021) in the study 'Transitioning to sustainable development necessitates financial resources for investments. Over the past decade, green bonds have emerged as a remarkable innovation in the field of sustainable finance. Green bonds serve as fundamental financial instruments for funding green projects. Given the rapid growth of the green bond market in the current context, only a limited number of research studies have been conducted in this domain. Therefore, the present research focuses on the advancements in green finance in India and the issue of green bonds. To evaluate the progress achieved, data was gathered from secondary sources, specifically from official portals such as the RBI and SEBI websites, along with journals, articles, and other relevant websites. Ultimately, it was discovered that green finance has experienced significant progress over the past seven years, from 2013 to 2019, with India ranking 4th in the amount issued in green bonds as a percentage of total bond issuance among 12 countries.

Starks (2023) The study in particular, what factors influence the cost of financing instruments like green bonds and loans intended to finance the global green transition? Given the diversity of nations' economies and risk profiles, the amount and cost of climate funding are also significant factors. The two main viewpoints discussed in the literature on climate financing support the idea that green loan instruments need to be less expensive than traditional debt instruments. There are two perspectives: the "Values perspective" and the "Value perspective"**Muhammad Usman Khurram (2023),** This research examines the influence of green bond issuance on corporate performance and additionally evaluates the mediating effect of corporate innovation performance on the primary relationship. The study utilizes quarterly panel data from Chinese non-financial listed companies across 11 distinct industry categories, covering the period from January 1, 2016, to September 30, 2020. Employing the difference-in-difference (DID) model along with the parallel trend test, the results indicate that the issuance of green bonds by companies significantly enhances both corporate innovation performance and corporate value. Moreover, the enhancement of innovation performance contributes to amplifying the positive impact of green bond issuance on corporate value. Despite certain data limitations, the insights derived from this study can be highly beneficial for all relevant stakeholders, particularly regulators, in formulating supportive policies for green bond issuance in China. Our findings may also provide valuable guidance for other emerging markets facing similar challenges related to growth and sustainability through green bonds.

ICMA (2021) Green bonds are fixed-income instruments whose proceeds are earmarked for projects that deliver environmental benefits, such as renewable energy, energy efficiency, sustainable transport, and water management. The green bond market has expanded rapidly since the first

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labelled green bond issuances in the late 2000s, attracting interest from sovereigns, subnational governments, supranationals, banks, and corporates. Scholars have focused on market growth and governance frameworks, determinants of issuance, pricing and investor demand (including the "greenium"), environmental impacts and legitimacy concerns (e.g., greenwashing), and policy drivers supporting market development.

Leonid Sopotnitskiy, (2024) The global financial markets represent fundamental components of the contemporary economic system, facilitating the seamless execution of all economic activities. The international financial markets include both equity and debt markets, with the debt market constituting more than two-thirds of the total value of outstanding securities.

Objectives of the study

- To explain the concept, structure and global growth of green bonds, and their role in financing renewable energy and sustainable projects in India.
- To examine SEBI's regulatory framework for green debt securities, covering initial and continuous disclosure, proceeds management, impact reporting and third-party verification, and how these provisions support transparency and limit greenwashing.
- To analyse the performance of the Nifty India Sovereign Green Bond Jan 2028 Index from January 2023 to September 2026, using returns, descriptive statistics and trend analysis**.**

Research Methodology

This study adopts a descriptive and analytical research design based entirely on secondary data drawn from SEBI, RBI and NSE Indices publications, ICMA principles, company annual reports and green bond frameworks, and reports and articles from the World Bank, IFC and reputed journals. Content analysis is applied to SEBI's ESG debt securities framework and to the disclosure practices of green bond issuers to understand regulatory requirements, use of proceeds and impact reporting. The performance of the Nifty India Sovereign Green Bond Jan 2028 Index is examined for the period January 2023 to September 2026 using descriptive statistics (mean, median, standard deviation and range), CAGR and trend analysis. Findings are presented through tables and charts. The study is limited by its dependence on secondary data, the single-constituent nature of the index, and the use of overlapping return windows and approximate index values, so the results are indicative rather than robust.

Nifty India Sovereign Green Bond Jan 2028 Index

NSE Indices Factsheet – September 2026

Index Overview

Field	Details
Index Name	Nifty India Sovereign Green Bond Jan 2028 Index
Publisher	NSE Indices (NSE Indexogram)
Report Month	September 2026
Objective	Measures performance of a portfolio of G-Secs issued as Sovereign Green Bonds (SGrBs) maturing during the six-month period ending January 31, 2028

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Features

Feature	Value
Methodology	Total Returns
No. of Constituents	1
Base Date	January 27, 2023
Base Value	1000
Index Maturity Date	January 31, 2028

Methodology

#	Point
i	Represents performance of maturity-targeted G-Secs issued as Sovereign Green Bonds (SGrBs)
ii	Holds G-Secs issued by Central Government of India (GOI), maturing during the six-month period ending January 31, 2028
iii	Reviewed at the end of each month

Statistics (Returns as on Sep 30, 2026)

Metric	Value
Avg. Yield %	-
Avg. Macaulay Duration	-
Avg. Maturity	-
3 Months	1.12
6 Months	3.24
1 Year	5.35
3 Years	7.57
Since Inception	7.37

The index has delivered positive returns across every horizon, gaining 1.12% over three months, 3.24% over six months, 5.35% over one year, 7.57% a year over three years, and 7.37% a year since inception.

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However, momentum is easing. The one-year return of 5.35% sits well below the three-year annualised figure, and the three-month gain annualises to roughly 4.5%, lower than the six-month pace of about 6.5%, which suggests the strongest gains came earlier. The since-inception return is close to the three-year figure, showing a fairly steady long-run performance that has been slightly dragged down by recent weakness. Average yield, Macaulay duration and maturity are shown as blank, so the drivers of these returns, whether price gains from falling yields or interest accrual, cannot be confirmed, nor can interest-rate sensitivity be assessed. Since the return windows overlap and only five data points exist, this is a descriptive reading rather than a statistically robust one, and risk measures like volatility and drawdown would need daily index values. Overall, the index has given steady returns of around 7.4% a year, but recent returns are noticeably lower than its historical average.

Chart Summary (Index Values)

Period	Approx. Index Value
Start (Jan 2023)	~1,000
Jul 2023	~1,030
Jan 2024	~1,065
Jul 2024	~1,105
Jan 2025	~1,150
Jul 2025	~1,215
Jan 2026	~1,250
Jul 2026	~1,285
Latest (Sep 2026)	~1,300

The index rose steadily from about 1,000 in January 2023 to roughly 1,300 by September 2026, a gain of about 30% over nearly four years. Growth was consistent throughout, with half-yearly increases of about 30 to 40 points in 2023 and 2024 (1,000 to 1,030 to 1,065 to 1,105 to 1,150). The pace was fastest in the first half of 2025, when the index climbed from about 1,150 to 1,215, a gain of around 5.65%. Since then it has slowed, adding only about 35 points to reach 1,250 by January 2026 and another 35 to reach 1,285 by July 2026, roughly 2.8% per half-year. The latest reading of about 1,300 in September 2026 adds only around 15 points over two months, which is consistent with the recent moderation in returns. The path shows no meaningful declines at the half-yearly checkpoints, which fits a smooth, single-bond, maturity-targeted index. Since these are approximate values read at six-month intervals, short-term dips between checkpoints would not be visible, and daily index data would be needed to measure volatility or drawdowns. Overall, the index shows a steady, low-volatility climb, with the strongest phase in early 2025 and a gradual slowdown as the bond approaches maturity.

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Descriptive Statistics

A. Reported returns, compared on an annualised basis (n = 5 horizons)

Statistic	Value (%)
Mean	6.29
Median	6.58
Minimum	4.56 (3 M, annualised)
Maximum	7.57 (3 Yr)
Range	3.01
Standard deviation (sample)	1.30

3 M (1.12%) and 6 M (3.24%) are period returns, compounded to annual equivalents of 4.56% and 6.58%. 1 Yr, 3 Yr and Since Inception are used as reported; 3 Yr and Since Inception are treated as annualised (CAGR), because 7.37% p.a. over about 3.67 years gives an index of roughly 1,299, which matches the chart.

The five return figures average 6.29%, with a median of 6.58% slightly above the mean, which suggests the numbers are pulled down a little by the weakest reading. That weakest value is 4.56%, the annualised three-month return, while the highest is 7.57%, the three-year annualised return. This gives a range of 3.01 percentage points, and the sample standard deviation of 1.30 shows a moderate spread around the mean. The dispersion mainly reflects the gap between long-horizon returns of around 7.4% to 7.6% and the lower short-horizon figures, which fits the earlier observation that momentum has eased recently. Because the five figures come from overlapping time windows and mix annualised and non-annualised measures, these statistics describe the reported returns only and should not be read as a measure of the index's true volatility or risk. Daily index values would be needed for that. Overall, the statistics show returns that are solid on average but skewed lower by the most recent period.

B. Index level, half-yearly points Jan 2023 – Jul 2026 (n = 8, chart-read estimates)

Statistic	Value
Mean	1,137.5
Median	1,127.5
Minimum / Maximum	1,000 / 1,285
Range	285

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Statistic	Value
Standard deviation (sample)	105.1
Coefficient of variation	9.2%

The eight index readings average 1,137.5, with a median of 1,127.5 slightly below the mean, which suggests the values are pulled up a little by the higher readings in the later period. The series ranges from a minimum of 1,000 at the January 2023 start to a maximum of 1,285 in July 2026, a range of 285 points. The sample standard deviation of 105.1 and a coefficient of variation of 9.2% indicate a moderate spread around the average. This dispersion does not reflect volatility in the usual sense, because the index climbed steadily rather than swinging up and down. The spread mainly comes from the long upward trend, since values naturally differ widely when measured across nearly four years of growth. Note that the maximum of 1,285 excludes the latest reading of about 1,300 in September 2026, so these statistics cover only the eight half-yearly checkpoints. Because the figures are approximate and taken at six-month intervals, they describe the level of the index over time and should not be read as a measure of risk. Daily index values would be needed to assess true volatility or drawdowns. Overall, the statistics show a steadily rising index whose variation is driven by trend rather than instability.

C. Half-yearly % change in index level (n = 7, chart-read estimates)

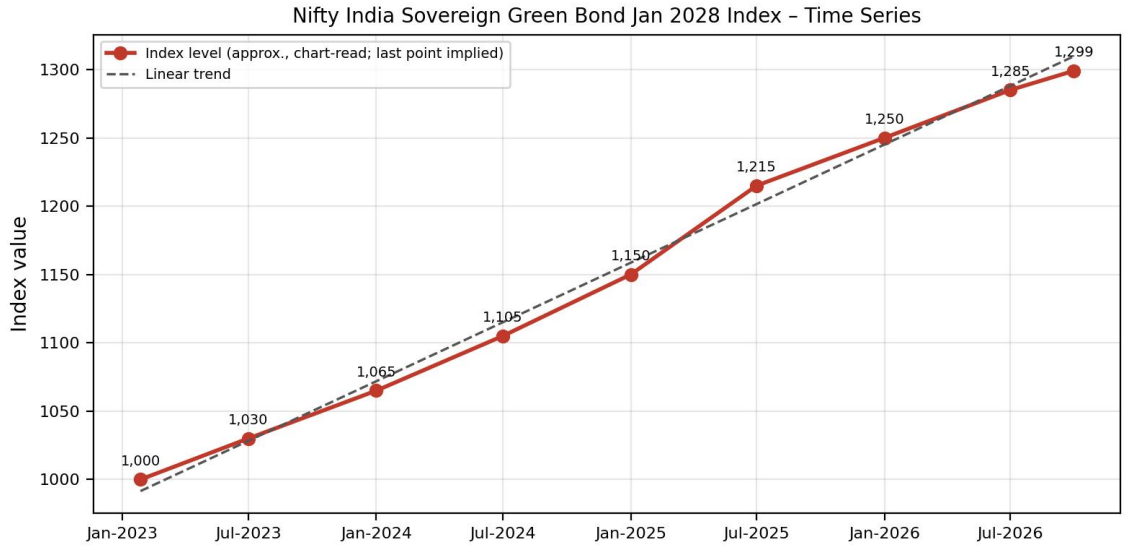
Statistic	Value (%)
Mean	3.65
Median	3.40
Minimum	2.80 (Jan 2026 – Jul 2026)
Maximum	5.65 (Jan 2025 – Jul 2025)
Standard deviation (sample)	1.00

The seven half-yearly returns average 3.65%, with a median of 3.40% slightly below the mean, which suggests the figures are pulled up a little by the strongest period. That peak was 5.65% between January and July 2025, while the weakest was 2.80% between January and July 2026, giving a range of 2.85 percentage points. The sample standard deviation of 1.00 shows a fairly narrow spread around the average, meaning most half-years delivered gains in a similar band of roughly 2.8% to 3.5%. The 2025 surge is the main outlier, and it is also the main reason the mean sits above the median. The most recent half-year return is the lowest in the series, which supports the earlier observation that growth has been easing as the bond moves closer to maturity. Because these figures are based on approximate index readings at six-month intervals, they describe the pace of growth only and should not be treated as a precise measure of volatility or risk. Daily index values would be needed for that. Overall, the

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statistics show consistent, positive half-yearly gains, with one strong phase in early 2025 and a gradual slowdown since.

Time Series Analysis



Index level implied by the reported returns

Date	Implied index	Period ending on this date	Return in period	Annualised pace
Jan 27, 2023	1,000.0 (base)	-	-	-
Sep 30, 2023	~1,043	Inception to Sep 2023 (~8 months)	+4.33%	~6.5%
Sep 30, 2025	~1,233	Sep 2023 to Sep 2025 (2 years)	+18.15%	~8.7%
Mar 31, 2026	~1,258	Sep 2025 to Mar 2026 (6 months)	+2.04%	~4.1%
Jun 30, 2026	~1,284	Mar 2026 to Jun 2026 (3 months)	+2.10%	~8.7%

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Date	Implied index	Period ending on this date	Return in period	Annualised pace
Sep 30, 2026	~1,299	Jun 2026 to Sep 2026 (3 months)	+1.12%	~4.6%

Derived by working backwards from the Sep 30, 2026 level of about 1,299 using the 3 M, 6 M, 1 Yr and 3 Yr returns.

The index grew from a base of 1,000 on January 27, 2023 to about 1,299 by September 30, 2026. The first eight months added 4.33%, an annualised pace of about 6.5%. The strongest stretch was the two years from September 2023 to September 2025, when the index rose 18.15%, or about 8.7% a year, reaching roughly 1,233. Growth then cooled. The six months to March 2026 returned only 2.04%, about 4.1% annualised, taking the index to around 1,258. The quarter ending June 2026 recovered to 2.10%, an annualised pace of about 8.7%, but the latest quarter to September 2026 slowed again to 1.12%, or about 4.6% annualised. Every period shows a positive return, so the path has been steady with no visible declines at these checkpoints. The pattern fits a maturity-targeted bond whose returns lean more on interest accrual and less on price gains as it approaches maturity. The June 2026 quarter looks like a short-lived rebound within a broader slowdown. Note that the periods are uneven in length, and the short quarterly figures are annualised from small gains, so they can swing sharply and should be read with caution. Overall, the index has delivered consistent positive returns, with its strongest growth in 2024 and 2025 and a gradual loss of momentum since.

Trend measures

Measure	Value
Total return since inception	about +29.9%
CAGR since inception	7.37% p.a.
Average compound monthly growth	about 0.59%
Linear trend slope (chart-read points)	about +85 index points per year
R-squared of linear trend	0.99
Time left to index maturity (from Sep 30, 2026)	about 1.34 years

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Interpretation

The index has shown a steady upward trend, growing from 1,000 to about 1,299, a gain of roughly 30% or 7.37% a year. A straight line explains about 99% of its movement, which points to a smooth path typical of a single-bond, maturity-targeted index, though this high fit reflects smoothness rather than predictability. Returns are positive across every horizon, ranging from 1.12% over three months to 7.57% a year over three years, with only a tiny dip after the base date and a minor pullback in 2026. However, growth is slowing. The one-year return of 5.35% sits well below the three-year annualised figure, and the latest quarter (about 4.6% annualised) is weaker than the one before (about 8.7% annualised). Half-yearly gains peaked near 5.65% in early 2025 and have recently been around 2.8%. The cause of the strong 2025 phase cannot be confirmed, as the factsheet shows average yield, duration and maturity as blank. Generally, such gains come from falling yields plus interest accrual. With about 1.34 years remaining, price sensitivity to yield changes keeps shrinking, so returns should lean more on interest accrual, making the path smoother and less volatile, though this is general bond behaviour, not a forecast. The index also holds just one constituent, so its performance mirrors a single government bond, and the monthly review adds no diversification. Finally, only five overlapping return figures are available, so the statistics are indicative rather than robust. Volatility, drawdown and correlation require daily index values from NSE Indices. Overall, the index has delivered smooth, positive returns of about 7.4% a year, with momentum easing as maturity approaches.

Findings

1. Green bonds work like conventional fixed-income instruments, but their proceeds are earmarked for environmental and climate projects such as renewable energy, clean transport and water management. The global market is one of the fastest-growing segments of fixed income, led by the US, the UK, France, Germany and China.

2. The literature shows that India ranked 4th among 12 countries in green bond issuance as a share of total bond issuance between 2013 and 2019. Evidence from China shows that green bond issuance improves corporate innovation performance and corporate value. Greenwashing and the greenium remain the main concerns.

3. SEBI's framework for ESG debt securities requires initial disclosure of objectives, project selection and use of proceeds. It also requires continuous disclosure of utilised and unutilised proceeds, annual impact reporting, external auditor verification and an independent third-party reviewer. Together these provisions form a sound transparency base.

4. The Nifty India Sovereign Green Bond Jan 2028 Index rose from 1,000 in January 2023 to about 1,300 in September 2026, a gain of about 30%, or 7.37% a year since inception. Returns are positive across every horizon: 1.12% (3 months), 3.24% (6 months), 5.35% (1 year) and 7.57% a year (3 years).

5. Momentum is easing. Half-yearly gains peaked at 5.65% in the first half of 2025 and fell to 2.80% in the first half of 2026. The latest quarter annualises to about 4.6%, against about 8.7% in the quarter before. The one-year return of 5.35% is well below the three-year annualised figure.

6. The index path is smooth, with a linear trend R-squared of 0.99 and about 85 index points added each year. This smoothness reflects a single-bond, maturity-targeted index and should not be read as predictability.

7. The index holds a single constituent with about 1.34 years left to maturity, so its performance mirrors one government bond and offers no diversification. Average yield, duration and maturity are

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blank in the factsheet, so the drivers of returns cannot be confirmed. As maturity nears, returns should rely more on interest accrual and less on price changes.

Conclusion

Green bonds are a credible and increasingly regulated channel for financing India's transition to renewable energy. SEBI's disclosure, verification and impact-reporting requirements give the market a transparency base that should help limit greenwashing, although this study has not tested its effectiveness empirically.

The Nifty India Sovereign Green Bond Jan 2028 Index shows that green bonds can deliver steady, low-volatility returns of about 7.4% a year. Returns have eased recently, and with the bond nearing maturity they are likely to be driven mainly by interest accrual. The results are indicative rather than robust, because the study relies on secondary data, the index has a single constituent, the return windows overlap and the index values are approximate.

Future research could use daily index data to measure volatility and drawdown, compare green bonds with conventional government securities to test for a greenium, and study corporate green bond issuers in India.

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