

## The Role of Green Finance in Promoting Sustainable Economic Development in Emerging Economies

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### ABSTRACT

*Green finance has emerged as an important instrument for promoting sustainable economic development in emerging economies by channelling financial resources toward environmentally sustainable and climate-resilient investments. This paper examines the role of green finance in supporting sustainable economic development with special reference to India, one of the fastest-growing major economies facing significant climate challenges. The study adopts a descriptive and analytical research design based on secondary data drawn from government reports, international financial institutions, and sustainability publications. It reviews recent trends, major instruments, and policy frameworks related to green finance, including green bonds, green loans, sustainability-linked bonds, and blended finance. The analysis shows that India's green finance ecosystem has expanded rapidly, with cumulative GSS+ debt reaching about USD 55.9 billion by 2024 and strong growth in sovereign and corporate green bond issuances. Green finance has supported renewable energy expansion, with non-fossil fuel capacity exceeding 190 GW, and has contributed to significant emission reductions, pollution control, and resource efficiency. It has also generated employment and supported climate-resilient infrastructure. However, a large financing gap persists between current flows and estimated investment needs for achieving climate targets. Structural challenges such as limited market depth, green washing risks, and institutional capacity constraints remain. The paper concludes that stronger regulatory clarity, standardized taxonomies, fiscal incentives, and public-private partnerships are necessary to scale up green finance and achieve inclusive, low-carbon, and resilient development.*

**Keywords:** Green Finance, Sustainable Development, Green Bonds, Climate Finance, Emerging Economies.

### Introduction

In the context of emerging economies, sustainable economic development has increasingly become inseparable from the evolution of *green finance* a financial mechanism designed to support environmentally beneficial projects and climate-aligned investments. Green finance encompasses a range of instruments including green bonds, sustainability-linked and ESG instruments, green credit, and other capital flows that internalize environmental and social considerations into economic planning. For India, the world's fifth-largest economy and one of the fastest growing major markets, green finance is rapidly transitioning from a niche concept to a strategic imperative for resilient and low-carbon growth.

Recent data demonstrate the scaling of India's sustainable finance ecosystem. By the end of 2024, cumulative issued GSS+ debt reached approximately USD 55.9 billion, reflecting a 186% increase since 2021, with an overwhelming 83% share attributed to green debt directed primarily toward clean

energy and sustainable transport projects. In the fiscal year 2024-25 alone, the Government of India mobilized ₹21,697.40 crore through sovereign green bonds for eligible climate-aligned initiatives across ministries, underlining the rising policy focus on sustainable public finance. Moreover, the Union Budget for FY2026-27 has earmarked nearly ₹31,000 crore for development projects to be funded mainly via green bonds an increase of almost 33 % over the previous year signaling a stronger fiscal commitment to green investment pathways.

The Indian sustainable finance landscape is also characterized by a growing domestic market of issuances and regulatory advancements. Issuances of green bonds in the domestic market crossed ₹131.42 billion in the first half of 2025, despite variability in investor demand. In parallel, regulators such as the Securities and Exchange Board of India have introduced comprehensive frameworks for ESG and sustainability-linked instruments, enhancing transparency and investor confidence in sustainability-focused capital markets. Importantly, this growth in green finance occurs as India advances its renewable energy capacity solar power capacity alone is projected to surpass 135 GW by the end of 2025 illustrating how finance and clean infrastructure investments are increasingly intertwined.

Despite these gains, significant challenges remain. India is estimated to require over INR 162.5 trillion (approx. USD 2.5 trillion) by 2030 to achieve its Nationally Determined Contributions (NDC) under the Paris Agreement, with current tracked green finance covering only about 30% of this investment requirement. Additionally, the nascent nature of domestic green capital markets, periodic muted investor response, and structural obstacles to project bankability underscore the need for a more robust and comprehensive policy ecosystem to fully harness green finance for inclusive economic development.

Given this backdrop, the Indian perspective on green finance offers rich insights into the dynamics, opportunities, and constraints shaping sustainable economic development in emerging economies. This paper thus explores how green finance mechanisms are mobilized, regulated, and aligned with broader sustainable development goals in India, and assesses their implications for economic growth, environmental resilience, and inclusive prosperity.

### **Objectives**

- To examine the concept and significance of green finance in promoting sustainable economic development in the Indian context.
- To analyse recent trends and instruments of green finance in emerging economies with special reference to India.
- To evaluate the role of green finance in supporting environmental sustainability, renewable energy, and climate-resilient growth.
- To identify the key challenges and policy measures needed to strengthen green finance for inclusive and sustainable development in India.

### **Methodology**

This study adopts a descriptive and analytical research design to examine the role of green finance in promoting sustainable economic development in emerging economies with a special focus on India. The research is primarily based on secondary data sources, including recent reports from international financial institutions, government publications, policy documents, sustainability reports, and peer-reviewed journal articles related to green finance and sustainable development. Latest statistical data on green bonds, climate finance flows, and renewable energy investments are used to understand current trends. A qualitative review approach is applied to interpret policies, regulatory frameworks, and financial instruments that support green finance. Comparative analysis is also used to relate India's progress with broader emerging-economy trends. The methodology enables a systematic assessment of patterns, opportunities, and challenges in green finance and their implications for sustainable economic development.

### **Scale of Green Finance in India**

Green finance in India has expanded rapidly in the last decade, reflecting its growing role in sustainable development. India is among the leading emerging economies in climate-related investments. Recent estimates show that India needs about USD 170-200 billion annually in green investments until 2030 to meet climate and sustainability targets. However, current annual green finance flows are estimated at around USD 45-50 billion, indicating a large financing gap. India's green bond market has also grown significantly. Since 2015, cumulative green bond issuance by Indian entities has

crossed USD 25 billion. Sovereign green bonds issued by the Government of India have mobilized tens of thousands of crores for climate-friendly projects such as renewable energy, metro systems, and energy efficiency. These numbers show that green finance is becoming a mainstream funding source rather than a niche segment.

### Environmental Significance in Measurable Terms

Green finance contributes directly to environmental sustainability through investments in clean energy and resource efficiency. India’s non-fossil fuel electricity capacity has reached over 190 GW, accounting for roughly 44% of total installed power capacity. A major share of this expansion has been supported by green investments and climate-focused funding. Investments in renewable energy have helped India avoid millions of tonnes of CO<sub>2</sub> emissions annually. For example, solar and wind projects together reduce an estimated 250-300 million tonnes of CO<sub>2</sub> emissions per year. Financing for green projects also supports water conservation, waste management, and pollution control, which improve environmental quality and public health. Institutions like the Reserve Bank of India are increasingly recognizing climate risks in the financial system, encouraging banks to consider sustainability in lending decisions. This indicates that green finance is not only about funding projects but also about reducing systemic environmental risks.

### Economic and Developmental Impact

From a development perspective, green finance supports job creation and economic growth. India’s renewable energy sector alone employs over 1 million people, and this number is expected to rise as green investments increase. Energy efficiency and clean transport projects also generate employment in manufacturing, construction, and services. Green finance also reduces long-term economic costs. Climate-related disasters cost India billions of dollars annually in damages and productivity losses. Financing climate-resilient infrastructure lowers these risks and protects economic stability. The scale and developmental significance of green finance in India can be clearly understood from the key numerical indicators presented in Table 1 below.

**Table 1: Indicators of Green Finance in India**

| Indicator                              | Value                  | Development Meaning        |
|--|------------------------|----------------------------|
| Annual green finance need              | USD 170-200 billion    | Required for climate goals |
| Current annual green flows             | USD 45-50 billion      | Shows financing gap        |
| Cumulative green bonds                 | USD 25 billion         | Growing market confidence  |
| Non-fossil power capacity              | 190GW                  | Clean energy transition    |
| CO <sub>2</sub> emissions avoided year | 250-300 million tonnes | Environmental benefit      |
| Renewable energy jobs                  | 1 million jobs         | Inclusive growth           |

Source: CPI, IEA, and Government of India (2023–2025)

The above Table 1 highlights the status of green finance in India by showing the gap between the large annual investment needed (USD 170–200 billion) and the current flows (USD 45–50 billion). It reflects growing progress through green bonds and rising non-fossil power capacity, while also emphasizing environmental gains (CO<sub>2</sub> emissions avoided) and socio-economic benefits like renewable energy jobs. Overall, it shows both momentum and the need for scaled-up financing to meet climate goals.

### Growth Trends in Green Finance India& Emerging Economies

Green finance has grown rapidly around the world, driven by climate goals and sustainable development priorities. In 2024, global sustainable debt issuance (including green, social, sustainability, and sustainability-linked bonds) reached over USD 1.3 trillion, underscoring the scale of capital flowing toward climate and sustainability goals. India’s sustainable finance market has shown strong momentum:

- Cumulative GSS+ debt issuance in India (by end 2024): USD 55.9 billion, with green bonds accounting for 83 % of this total.
- In the fiscal year 2024–25, India issued ₹21,697.40 crore (USD 2.6 billion) in sovereign green bonds.
- Issuances in the domestic green bond market are expanding, crossing ₹13,142 crore (USD 1.6 billion) in the first half of 2025.

Emerging economies such as China and Brazil also showed strong sustainable issuance, but India's market is among the fastest-growing in South Asia, highlighting increasing investor confidence and policy support.

- **Green Finance Instruments: Scale & Usage**

Several green financial instruments are being deployed in India and other emerging markets, each attracting measurable capital:

- **Green Bonds**
  - India's green bond issuance has cumulatively crossed USD 25 billion since inception.
  - Sovereign green bonds contributed nearly ₹30,000 crore (USD 3.6 billion) planned for FY 2026-27.
- **Green Loans & Climate Credit**
  - Public and private banks in India have allocated over ₹1.2 lakh crore (USD 14.5 billion) toward priority green sectors including renewable energy and clean transportation.
- **Sustainability-Linked Bonds (SLBs)**
  - SLBs issuance in India exceeded USD 4-5 billion in 2024, showing that performance-linked environmental financing is gaining traction.
- **Blended Finance & Climate Funds**
  - Multilateral institutions and climate funds contributed USD 10-12 billion to India's climate projects in 2024 through co-financing and risk-sharing arrangements.

#### Comparative Position: India vis-à-vis Emerging Markets

While India's figures are robust, there remains a gap compared to larger emerging economies:

- China's green and sustainable bond market exceeded USD 200 billion in 2024.
- Brazil's green bond issuances reached USD 15 billion in the same period.

However, India's 186% increase in sustainable debt since 2021 shows rapid growth, positioning it as a key emerging green finance hub. Recent trends and the growing scale of green finance instruments in India and emerging economies are summarized in Table 2 below.

**Table 2: Overview of Green Finance Instruments**

| Instrument                             | Value                      | Primary Use                           |
|--|----------------------------|---------------------------------------|
| Global sustainable debt (2024)         | USD 1.3 trillion           | Climate & sustainability projects     |
| India cumulative GSS+ debt (2024)      | USD 55.9 billion           | Green infrastructure & climate action |
| India sovereign green bonds (FY 24-25) | ₹21,697 cr (USD 2.6 bn)    | Clean energy, transport               |
| Domestic green bond market (2025)      | ₹13,142 cr (USD 1.6 bn)    | Renewable & low-carbon projects       |
| Sustainability-Linked Bonds (India)    | USD 4-5 bn                 | ESG-linked corporate finance          |
| Green loans (India)                    | ₹1.2 lakh cr (USD 14.5 bn) | Priority green lending                |

Source: Climate Bonds Initiative, RBI, and Govt. of India reports (2024–2025)

The above Table 2 presents a concise overview of major green finance instruments and their recent estimated values, highlighting their primary uses in supporting climate action, renewable energy, green infrastructure, and other sustainability-oriented projects. It reflects the growing scale of green financing globally and in India, as well as the increasing role of bonds and loans in funding low-carbon and ESG-linked initiatives.

#### Green Finance and Environmental Sustainability

Green finance plays a critical role in promoting environmental sustainability by directing capital toward projects that reduce pollution, conserve natural resources, and lower greenhouse-gas emissions. In India, environmental degradation has significant economic and social costs, including poor air quality, water stress, and land degradation. Green finance helps address these issues by funding pollution control technologies, waste management systems, afforestation, and sustainable water infrastructure.

Financial flows toward environmentally friendly projects encourage industries to adopt cleaner production methods and energy-efficient technologies. This reduces carbon intensity and improves resource efficiency. For example, green financing for wastewater treatment and recycling projects contributes to water conservation, which is crucial for a water-stressed country like India. Moreover, sustainability-linked financing motivates corporations to meet environmental targets by linking borrowing costs to environmental performance. Policy support from the Government of India through climate missions and sustainability programs has strengthened the link between finance and environmental outcomes. Thus, green finance acts as a bridge between ecological protection and economic planning, ensuring that growth does not come at the cost of environmental damage.

**Role in Expanding Renewable Energy**

One of the most visible impacts of green finance in India is in the renewable energy sector. India is among the global leaders in solar and wind capacity expansion. Large-scale solar parks, wind farms, and hybrid renewable projects often rely on green bonds, green loans, and blended finance structures. India’s non-fossil fuel power capacity has crossed 190 GW, forming roughly 44% of total installed capacity. Achieving the national target of 500 GW of non-fossil capacity by 2030 requires continuous green investment. Green finance reduces the cost of capital for renewable projects, making them competitive with fossil fuels. Financial institutions increasingly view renewable energy as a viable and stable investment sector. Support from international agencies and climate funds further strengthens this transition. Organizations such as the International Energy Agency highlight that emerging economies must significantly scale up clean energy investment to meet climate goals. In this context, green finance is a key enabler of India’s clean energy transition.

**Supporting Climate-Resilient Growth**

Climate-resilient growth focuses on reducing vulnerability to climate risks such as floods, heat waves, and droughts. India is highly climate-sensitive due to its geography and dependence on agriculture. Green finance supports adaptation measures including resilient infrastructure, climate-smart agriculture, and disaster-resilient housing. Investments in resilient infrastructure lower long-term economic losses from climate disasters, which cost India billions of dollars annually. Green finance also supports insurance products and risk-sharing mechanisms that protect farmers and vulnerable communities. This improves livelihood security and stabilizes rural economies. By integrating climate resilience into development planning, green finance ensures that economic progress is sustainable and risk-informed. It not only funds mitigation but also strengthens adaptive capacity, making growth more durable. The multidimensional role of green finance in supporting sustainable development outcomes is illustrated in Table 3 below.

**Table 3: Role of Green Finance in Sustainable Development**

| Area                         | How Green Finance Helps                | Development Outcome              |
|------------------------------|--|----------------------------------|
| Environmental sustainability | Funds pollution control, conservation  | Cleaner air, water, and land     |
| Renewable energy             | Finances solar, wind, hydro            | Lower emissions, energy security |
| Climate resilience           | Supports adaptive infrastructure       | Reduced disaster losses          |
| Sustainable agriculture      | Funds climate-smart farming            | Stable rural incomes             |
| Green infrastructure         | Promotes efficient buildings/transport | Resource efficiency              |

Source: UNEP, World Bank, and Govt. of India sustainability and climate finance reports

The above Table 3 highlights how green finance supports sustainable development across key sectors. It shows that green finance channels funds toward environmentally responsible activities such as pollution control, renewable energy, climate-resilient infrastructure, sustainable agriculture, and green infrastructure. These investments lead to positive outcomes like cleaner natural resources, lower carbon emissions, improved disaster preparedness, stable rural livelihoods, and greater resource efficiency. Overall, the table emphasizes that green finance is a practical tool for linking financial investment with long-term environmental and developmental benefits.

**Scale of Financial Gaps and Structural Challenges**

A major challenge in strengthening green finance in India is the large investment gap between what is needed and what is currently mobilized. India is estimated to require around USD 170-200 billion

per year in climate and green investments to meet its 2030 climate and sustainable development targets. However, current tracked green finance flows are roughly USD 45-50 billion annually, meaning only about 25-30% of required finance is being met. This gap highlights the urgency of scaling up green finance.

Another issue is the risk of green washing due to the absence of a fully standardized national taxonomy. Studies show that globally, nearly 15-20% of ESG-labelled funds face scrutiny over classification credibility. Without clear definitions, investors may hesitate to commit funds. The Securities and Exchange Board of India has introduced ESG disclosure requirements, but harmonization with global standards remains a work in progress. High transaction and project preparation costs also act as barriers. Preparing a large renewable energy or climate-resilient infrastructure project can increase upfront costs by 5-10%, discouraging smaller developers and local bodies.

#### **Institutional and Market Limitations**

Institutional readiness is another constraint. Surveys indicate that only about 30-40% of financial institutions in emerging markets have dedicated climate-risk assessment frameworks. While the Reserve Bank of India has initiated discussions on climate risk and sustainable finance, full integration into banking operations is gradual.

Market depth is also limited. India's cumulative green bond issuance is about USD 25-30 billion, which is less than 3% of the total Indian bond market. This shows that green instruments still occupy a small share of overall finance. Additionally, secondary market liquidity for green bonds is relatively low, reducing investor participation. Foreign investment in green sectors also faces currency and policy risks. For instance, currency fluctuations of 5-8% annually can affect returns for international investors, making them cautious.

#### **Policy Measures**

To close these gaps, targeted policy measures are essential. Expanding blended finance can be highly effective. Globally, every USD 1 of public climate finance has been shown to mobilize USD 3-4 of private investment in well-structured projects. Increasing such leverage in India could significantly narrow the funding gap. Fiscal incentives also matter. Tax benefits or interest subsidies of even 1-2% can improve project viability and attract investors. Continued sovereign green bond issuance by the Government of India helps create benchmarks and confidence in the market. Capacity building is equally important. Training programs for bankers and regulators can improve project evaluation and risk assessment. International cooperation with institutions such as the World Bank supports technical expertise and risk-sharing facilities. Digital ESG reporting platforms can also reduce information gaps and increase transparency, improving investor trust.

The major numerical gaps, challenges, and corresponding policy requirements for strengthening green finance in India are presented in Table 4 below

**Table 4: Overview of Challenges and Policy Needs**

| <b>Area</b>               | <b>Key Numbers</b>      | <b>Policy Implication</b> |
|---------------------------|-------------------------|---------------------------|
| Annual green finance need | USD 170-200 bn          | Scale up funding sources  |
| Current annual flows      | USD 45-50 bn            | Large financing gap       |
| Share of green bonds      | 3% of bond market       | Deepen capital markets    |
| Project prep cost premium | 5-10% higher            | Provide subsidies/support |
| Public private leverage   | 1:3 or 1:4              | Expand blended finance    |
| ESG scrutiny risk         | 15-20% funds questioned | Clear taxonomy needed     |

Source: CPI, OECD, and International sustainable finance reports (2023-2025).

The above Table 4 presents a numerical snapshot of major challenges and policy needs in green finance. It highlights a significant financing gap between the high annual green finance requirement (USD 170-200 billion) and current flows (USD 45-50 billion), indicating the need to scale up funding. The small share of green bonds (3%) shows underdeveloped capital markets, while higher project preparation costs (5-10%) suggest the need for subsidies and technical support. Public-private leverage ratios (1:3 or 1:4) underline the role of blended finance, and ESG scrutiny risks (15-20% of funds questioned) emphasize the importance of clear taxonomies and standards. Overall, the figures point to the need for stronger policy support, market development, and regulatory clarity in green finance.

### Findings and Interpretation

The study shows that green finance is increasingly contributing to sustainable economic development in India, though its overall scale still falls short of what is required to fully achieve climate and sustainability goals. India's cumulative GSS+ debt reached about USD 55.9 billion by 2024, with green bonds dominating the sustainable debt market and reflecting rising investor interest and policy support. However, current annual green finance flows (USD 45–50 billion) meet only a limited portion of the estimated USD 170–200 billion needed each year, indicating a persistent financing gap. Even so, green finance has delivered measurable environmental benefits by supporting non-fossil fuel capacity beyond 190 GW and helping avoid an estimated 250–300 million tonnes of CO<sub>2</sub> emissions annually, while also encouraging energy efficiency, pollution control, and better resource management.

The developmental impacts of green finance are also significant. Investments in renewable energy and green infrastructure have generated over one million jobs, expanded income opportunities, and improved energy access in several regions. Climate-resilient infrastructure financed through green channels has helped reduce disaster-related economic risks and protect vulnerable sectors such as agriculture and rural livelihoods. These outcomes highlight that green finance not only addresses environmental concerns but also supports inclusive growth, economic stability, and long-term development by linking sustainability with employment and resilience.

At the same time, several structural and institutional challenges constrain progress. The absence of a unified green taxonomy, risks of greenwashing, high project preparation and transaction costs, shallow green bond markets, and limited institutional capacity reduce the pace and scale of green investments. Regional disparities and weak subnational project development further restrict the pipeline of bankable projects. These findings suggest that green finance must be more deeply mainstreamed into the financial system through clearer regulations, standardized taxonomies, blended finance, fiscal incentives, risk-sharing tools, and stronger ESG disclosures. With improved capacity building and coordinated policy support, green finance can become a powerful driver of inclusive, resilient, and low-carbon growth in India and other emerging economies.

### Conclusion

The green finance has become an essential driver of sustainable economic development in emerging economies, especially in India, by aligning financial flows with environmental and climate priorities. The study highlights that instruments such as green bonds, green loans, and blended finance have supported renewable energy expansion, emissions reduction, employment generation, and climate-resilient infrastructure, thereby linking economic growth with environmental sustainability and social inclusion. At the same time, the large gap between required and actual green investment indicates that current efforts are not sufficient to meet long-term climate and development goals. Challenges such as the absence of a unified taxonomy, greenwashing risks, limited market depth, and institutional constraints must be addressed to strengthen investor confidence and scale up financing. A coordinated policy framework involving regulatory clarity, fiscal incentives, stronger ESG disclosures, and public–private partnerships is therefore necessary. With sustained reforms and capacity building, green finance can serve as a transformative tool for promoting inclusive, resilient, and low-carbon economic development in India and other emerging economies.

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