

Green Finance for a Sustainable Indian Economy

Himanshi

Research Scholar

Dept. of Management Studies

BPSMV, Khanpur,

Kalan, Sonipat

Abstract

Green finance is vital for a sustainable economy, especially given its rapid economic growth and significant environmental issues. It involves financial tools and regulations supporting initiatives that improve energy efficiency, reduce environmental damage, and promote renewable energy. Integrating green finance is crucial for both economic resilience and climate change mitigation in India. This study investigates green finance's potential to foster a sustainable and resilient economy in India, addressing challenges like rapid industrialization, increasing energy demands, and climate vulnerabilities. It focuses on financial instruments like green bonds and carbon trading, which support environmental sustainability and economic growth.

The research also analyzes policy frameworks like SEBI's Green Bond Guidelines and RBI's clean energy financing initiatives, which align financial systems with global climate goals. It uses a comprehensive review of reports, guidelines, and case studies, assessing stakeholders like policymakers and financial institutions to understand their roles and challenges. The main goal is to identify strategies to strengthen green finance, promoting a low-carbon, inclusive, and resilient economic future for India. The findings suggest that collaboration, innovative financing models, and strong regulatory frameworks are needed to overcome barriers and achieve sustainable development goals.

Keywords:

Green Finance, Sustainable Economy, Renewable Energy, Climate Change Mitigation, Environmental Sustainability, Low-Carbon Economy

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1. Introduction

Green finance is the alignment of economic development with environmental sustainability through strategic and financially driven investment to enable climate-resilient infrastructure and renewable energy initiatives or other eco-friendly activities. It is a tri-dimensional approach to the solution of global challenges, including issues of climate change, loss of biodiversity, and depletion of natural resources. It provides a window into forayed economic stability and advancement; thus, in the Indian context, green finance assumes much greater salience on account of rapid industrialization, ever-growing energy requirements, and extreme susceptibility to climate-related risks such as temperature rise, erratic monsoons, or natural disasters.

The socioeconomic aspects of India a huge population, pressures of urbanization, and dependency on fossil fuels for power generation bring forth environmental challenges that are beyond easy rectification. Huge finance mobilization for an ambitious net-zero emission target by 2070 and increasing the share of RE in its energy basket calls for huge financial commitments. Longer-term environmental and social benefits from green investments are overlooked by most of the conventional financial models. Thus, green finance underscores the need for capital mobilization for sustainable development projects in compliance with international climate accords and national goals.

In fact, the art of green finance lies in its ability to communicate and internalize environmental risks into financial decision-making. Green finance incorporates data analytics, environmental risk assessments, and sustainable investment frameworks to reduce carbon footprints, promote circular economies, and enhance energy efficiency. Green bonds, sustainability-linked loans, and carbon trading are some of the key financial instruments that enable the financial sector to incentivize green practices across sectors.

Green finance supports innovation through the development and use of clean energy technologies like photovoltaics, wind turbines, and battery storage systems. Its importance lies in reducing the carbon footmark generated by energy systems, enhancing energy security, and curtailing reliance on importing fossil fuels. Advanced analytics and digital platforms also allow more effective oversight and reporting on green projects and, therefore, greater transparency and wider scope for investors.

Besides the economic and environmental benefits, then, green finance plays a role in supporting projects to extend clean energy, water, and sustainable livelihoods to underserved communities, thereby promoting social equity. Yet the realization of these advantages requires overcoming systemic challenges, like insufficient regulatory frameworks, a lack of standardized definitions and metrics for green investments, and limited public awareness of sustainable financial products.

The chapter explores how green finance can become the engine of change in achieving a sustainable economy for India by exploring the interventions in the country's policy landscape, the present level of financial instruments available, and the outputs in the industry levels from key stakeholders to illustrate green finance as a driver for a low-carbon, inclusive, and resilient economic future. This will be supported by the scientific analysis and evidence-based recommendations to give actionable insights for policy-makers, financial institutions, and industry leaders to expedite the advancement of green finance in India.

2. Key Instruments of Green Finance

Green finance encompasses a wide range of instruments aimed at linking finance with a maximally effective utilization of funds towards promoting projects that are involved in environmental sustainability, carbon abatement, and ecological protection. This bridging of the financial gap in sustainable development, therefore, incites investment in renewable energy, energy efficiency, and

climate adaptation. Some of the primary instruments, therefore, driving the advance of green finance in India are discussed below.

1. Green Bonds

Green bonds actually are a class of fixed-income security for provides money for projects that offer evident ecological benefits such as renewable power plants or green buildings. These create large green projects with safe means of financing with secured and stable returns to the investor. Green bond issues gained momentum in India while, to drive more issuance, entities such as the Reserve Bank of India took steps to recommend adoption. Another reason is the development of a transparent market underpinned by global standards such as the Green Bond Principles, accountability, and transparency.

2. Sustainability-Linked Loans

Sustainability-linked loans are incentives tied to the environmental performance of a borrower. Such loans include interest rates or other conditions tied to predefined expectations of how much sustainability a borrower should achieve, such as reductions in carbon emissions or energy consumption. Using this flexible form of external financing, a company can align itself with environmental goals while enjoying the benefits of flexibility in the use of these funds.

3. Carbon Trading and Carbon Credits

In this context, the preferred instrument for carbon trading is being able to trade market-based mechanisms permitting units to sell carbon credits, which are, essentially, chances granted for a set amount of emissions of greenhouse gases. Under a cap-and-trade market, a limit is placed on emissions in which companies are provided a market incentive for increased levels of efficiency, as their emissions were capped under law. India has an evolving framework for carbon trading under its Perform, Achieve, and Trade (PAT) scheme, encouraging energy-intensive industries to improve their efficiency while contributing to emission reductions.

4. Green Insurance Products

Green insurance products prevent environmental disasters from happening and safeguard businesses and individuals from situations such as climate change-induced natural disasters. These products guarantee financial protection to individuals or companies investing in activities such as renewable energy investments or climate-resilient infrastructure. Critical integration of environmental risk into the policy of insurance ensures sustainable practices.

5. Green Equity Investments

Equity investments in green companies or projects strategize an investor to fund businesses that give importance to environmental sustainability. India's venture capital and private equity fund scenario is fast evolving, with big investments coming into clean technology, renewable energy, and sustainable agriculture. These can create both financial and social returns by matching investor goals with long-term environmental benefits.

6. Climate Funds and Grants

International climate funds, such as the GCF, play vital roles in financing climate adaptation and mitigation projects in developing countries like India. The GCF also offers grants, concessional loans, and guarantees for projects addressing climate-related vulnerabilities. This combination of international funds on domestic initiatives bolsters the efficiency of renewable energy expansion and the improvement of disaster resilience.

7. Tax Incentives and Subsidies

Tax incentives and subsidies are indirect financial tools designed to spur green investment. The government provides subsidies for renewable energy consumption, EV manufacturing, and energy-

efficient appliances in India. This facilitates the smooth transition of businesses and consumers toward sustainable practices by lowering upfront costs.

Emerging Trends in Green Finance Instruments

The evolution of green finance instruments in India highlights the growing commitment to environmental sustainability as well as financial innovations. The growth of technology-driven platforms for green crowdfunding, blockchain-based verification of green projects, and artificial intelligence applications for environmental risk assessment further increases the scope and accessibility of green finance. This would allow India to use its diverse instruments to attract both domestic and international capital towards the transition to a low-carbon, climate-resilient economy. The instruments all play their role in solving the financial challenge of sustainable development, creating innovation and inclusiveness.

3. Policy and Regulatory Landscape

Green finance initiatives are significantly informed by the policy environment and regulatory framework wherein they operate. India is developing and implementing a variety of laws and policies to foster low-carbon economic growth, combat environmental degradation, and secure sustainable economic progress. The framework for facilitating green finance is created by these policies by assuring that investments in sustainable projects are attractive, viable, and fit with national and international climate goals.

The framework for the green financing of the country is determined internationally as per India's commitments through various agreements and in line with its domestic priorities. India's regulatory environment has largely taken the shape of keeping the rise in temperatures below 2°C in line with the objectives of the Paris Agreement signed back in 2015. More products in green finance are taking shape in India, like the Green Bonds, Sustainability-linked loans, and carbon trading, because of the push of renewable energy targets set in India to attain net zero carbon emissions by 2070.

Green finance regulation was largely defined by the Securities and Exchange Board of India (SEBI). It has put out many frameworks and guidelines to promote green investments. The 2017 Green Bond Guidelines issued by SEBI provide a specific framework for the issuance of green bonds in the Indian marketplace. Projects that have green aspects under SEBI criteria are those that support environmental sustainability in line with energy efficiency, pollution control, sustainable waste management, and renewable energy. As a result of the regulatory framework fashioned by SEBI, which emphasizes accountability and transparency, green bonds are becoming an increasingly attractive option for both domestic and foreign investors.

SEBI has also included Environmental, Social, and Governance (ESG) Disclosures for the listed companies apart from the guidelines for green bonds. Through this regulation asking them to disclose ESG risks and opportunities, businesses are urged to integrate sustainability into their corporate strategies. Such disclosures play a crucial role for investors whose investment choices are informed by the long-term environmental record of a company.

By supporting the funding of renewable energy projects, where the Reserve Bank of India has had a significant role in advancing green finance. It issued regulations regarding financing for clean energy projects and energy-efficient projects, giving banks an institutional framework to direct credit toward sustainable projects. Besides, by encouraging banks to commit to sustainable projects, the RBI's acceptance of green bonds as eligible assets under the priority sector lending (PSL) criteria has given a further boost to green financing.

India is working on aligning its policies towards international frameworks on a global scale. The National Action Plan on Climate Change (NAPCC) vividly outlines India's climate strategy and edifies

the development of green finance instruments to bolster the country's efforts towards meeting climate benchmarks. Besides the National Solar Mission, it includes mission statements for developing clean energy technology and energy efficiency to create a definite investment pipeline for green funding.

The transition to such green finance regulation, however, is fraught with several challenges. The lack of a comprehensive uniform framework for green investment is one of the biggest obstacles for companies in complying with the regulations and for investors in assessing the environmental impact of the projects. The challenge of evaluating or managing the long-term financial effects of sustainable expenditures is compounded by the dearth of reliable data regarding environmental risk assessments.

The shift to integrating green finance within the larger financial system also has its uniqueness. Though inroads in developing green bonds and other financial products have been made, there is a need yet to increase collaboration between the regulatory agencies, financial institutions, and other stakeholders to build a stronger and more dynamic green finance environment.

4. Role of Financial Institutions

In other words, they help bring investors to green projects; financial institutions serve as the facilitators of green finance in its formation and growth. In other words, some include banks, non-banking financial companies (NBFCs), insurance companies, and fintech platforms which are also important for the managing of risk, allocating funds to sustainable projects, and developing financial products that promote environmental sustainability. Thus, their involvement is critical in facilitating green finance into conventional economic institutions while ensuring the efficacy, transparency, and financial viability of green projects.

Another area of activity for financial institutions within green finance centers on funding initiatives that seek to minimize their harmful effects on the ecosystems. For example, banks may provide credit lines and loan purposes for waste management, energy efficiency, renewable energy, and sustainable infrastructure projects. Since financing often huge capital investments requires a lot of time to finish or provide, financial institutions are in many cases competent to help with these projects by both providing greater certainty of commitment and providing financing at an affordable rate. The result is the easing of fit where small companies and entrepreneurs are concerned regarding finance within the green setting leading to the transition towards a low-carbon economy.

Some of the most common forms in which financial forms raise money for green initiatives are through green bonds and sustainability-linked loans. Green bonds are one of the most common tools for financing projects that have environmental benefits, which can be issued by governments, which can be issued by companies and financial institutions. These bonds, in particular, attract institutional investors because of their growing demand for contributions that are in line with environmental, social, and governance (ESG) criteria. Banks underwrite, and facilitate the anticipated issuance of green bonds and thereby in turn enable the underwrite and facilitate the financing of green investments into the green economy. They also help ensure the proceeds from these bonds are used exclusively for green projects.

In a similar vein, loans that are related to sustainability are aimed at convincing borrowers to achieve pre-set sustainability goals. These loans can be issued by the financial institutions on preferential rates, including lower interest rates, if the borrower meets some environmental goals such as a reduction in energy consumption or carbon emissions. This is thereby encouraging businesses to take on sustainable enterprises and provide them with the necessary funding for green projects. By pricing that cost of funding relative to sustainability performance, financial institutions are calling for a change to more ethical business practices.

In addition to providing capital, financial institutions greatly assist in the management of risks. Although green projects may provide long-term benefits, they are commonly tied to specific

risks like changing government regulations, technology uncertainty, and environmental hazards. Financial institutions help mitigate these risks through a combination of financial products like insurance and hedging instruments alongside their expertise in evaluating financial and environmental risks associated with green ventures. To illustrate this, as climate change causes extreme weather events with a certain frequency and severity, insurance companies have developed climate risk insurance to protect businesses against the economic fallout from these natural disasters. Such insurance thus motivates the businesses to invest in green technologies by lowering the risks attached to unforeseen financial losses.

Financial institutions develop and provide, along with different business stakeholders, frameworks for green financing. There are groups working with sustainable finance in most financial institutions that advise companies on how to integrate sustainability into their business activities. This encompasses guiding the companies through legal processes, assessing the environmental impact of the projects, and finding suitable sources of funding. Advisories facilitate the decision-making processes within the companies, thus averting greenwashing while integrating sustainability mechanisms.

Fintech platforms are emerging as new actors establishing their contribution to green finance. These fintech platforms employ technology to enhance efficiency, transparency, and access to green finance. For example, some fintech organizations are creating platforms to promote peer-to-peer lending for green projects as well as allowing small investors to participate in green bonds. The power of supportive fintech is to democratize green finance by reducing the barriers to entry for a diverse range of investors to participate in the green economy. Additionally, by using blockchain technology and data analytics to enhance transparency, track the impacts of investments, and streamline financial transactions, FinTech may work to scale green finance.

To forge a way to promote green finance, financial institutions face a variety of challenges that impede it on sustainable economic growth. It is sometimes difficult for financial institutions to have an accurate assessment of the impacts due to the absence of standard indicators for considering additional aspects of the projects. Moreover, the risk of investment in green initiatives is in fact considerable in emerging economies, and so financial institutions may have reservations about participating in such sectors. Closer engagement and cooperation between financial institutions, governments, and other actors are to be promoted to reach the solution-all the more to come forward to initiate great strides towards creating an agreeable and credible set of globally accepted standards for green finance.

Financial institutions and regulators must control the full spectrum of issues for them to be able to create their own enabling framework for almost everybody to embrace green finance. More concerted efforts are needed to standardize reporting frameworks, improve transparency regarding the set of ESG disclosures, and keep a steady stream of innovative financial products that could possibly lower the cost of capital for green projects. Financial institutions may also take advantage of technological innovations in utilizing data analytics, blockchain, and artificial intelligence in better risk assessment, simplification of processes, and upgrade reporting and monitoring of the investments directly relating to green.

Conclusion

Green finance will be the cornerstone of a sustainable and resilient Indian economy, addressing the various environmental challenges while actually fostering the economic growth. It will have multiple positive and synergistic impacts by ensuring economic development alongside environmental sustainability through the investment in renewable energy, sustainable infrastructure, and green

technologies. Policy frameworks like SEBI's green bond guidelines and RBI's support of clean energy financing provide a very strong foundation that would allow for the scaling up of green finance in India.

It is quite obvious that the banking institutions are very important in this transition by providing the necessary innovative products, managing risks, and giving green proposals support. The key aspects that have to be solved through collaboration include the fragmented regulations and the lack of standard metrics. With innovation continuing, strong policy support, and the commitment of stakeholders, green finance can become a means to transform India into a world leader in sustainable development and to ensure a balanced pathway to economic prosperity and environmental stewardship.

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