



# GreenFinance

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## 1. Introduction

### 1.1. Background

The term green finance is used to refer to the financing of investments that have environmental benefits in the wider context of environmentally sustainable development (Fu, Lu & Pirabi, 2023). As global awareness for the issue of climate change and environmental degradation deepened, it evolved into contemporary instruments such as green bonds, climate risk disclosure and the standards of sustainable investments in line with Michaelowa & Dutschke (1998) since early attempts like Earth Summit of 1992 and Kyoto Protocol. Over time, green finance progresses to other forms of financial instruments such as green loans, renewable energy project financing, ESG integration and impact investing motivated by policy support, regulatory mandates and voluntary commitments from the financial institutions (Xiao *et al.*, 2023). Consequently, the importance of the green finance is that it intervenes on both its capacity to mobilize capital for low carbon and climate resilient infrastructure and to stimulate economic growth, job creation, the technological innovation, but at the same time directing private and public resource to the sustainable projects, the risk of the environmental is mitigated and energy security is improved as well as the income is distributed and inclusive developed.

Green Finance can play a crucial role in the strategic integration of green finance to align national fiscal policies with key UN Sustainable Development Goals (SDGs), namely Goal 7 (Affordable and Clean Energy), Goal 11 (Sustainable Cities and Communities) and Goal 13 (Climate Action), to realize India's vision of Viksit Bharat 2047. Turning India towards renewables and environmentally sustainable farming and urban development can be achieved through green financial mechanisms. That is why this approach helps reduce poverty through green employment opportunities, promotes responsible consumption patterns and decarbonization speed. Integration of such a nature not only serves to boost India's global economic

competitiveness, but also facilitates equitable and inclusive growth and helps the country approach holistic and sustainable development by 2047 (Mahida, 2024).

## 1.2. Research Aim and Objectives

### 1.2.1. Aim

The goal of this research is to understand the central role of Green Finance in promoting synergistic development of commerce, management and social sciences, evaluate the challenges and potential of India's Green Finance ecosystem, and put forward policy and institutional frameworks for scaling its impact to make way for a strategic roadmap towards Viksit Bharat 2047.

### 1.2.2. Objectives

- To analyze the role of Green Finance in fostering synergistic development.
- To evaluate challenges and opportunities in India's Green Finance ecosystem.
- To propose policy and institutional frameworks for scaling Green Finance.

## 1.3. Research Questions

- 1) How does Green Finance contribute to synergistic development across commerce, management, and social sciences in India?
- 2) What are the key systemic challenges and untapped opportunities in India's Green Finance ecosystem that hinder or enhance its growth?
- 3) What policy interventions and institutional innovations are critical to scaling Green Finance in India to align with the Viksit Bharat 2047 mission?

## 2. Literature Review

### 2.1 Theoretical Foundations

There are three interlinked theoretical pillars that constitute green finance. Embedding of environmental, social and governance (ESG) considerations into the decisions can ensure that the most suitable capital meet its low carbon, resilient projects that tackle risk and impacts. According to Junaedi (2024), traditional financial metrics are expanded to include social ("people") and environmental ("planet") outcomes as well as economic ("profit") performance in what is known as the Triple Bottom Line (TBL) and for firms to create holistic value. The Circular Economy theory opposes to the linear 'take-make-dispose' model through advocates for loops reuse, remanufacture and recycle, to decouple growth from environmental degeneration (Kyriakopoulos, 2021).

However, Paris Agreement (2015) is seen as an agreement reached among the leaders of the states to limit global warming to well below 2°C, triggering green finance instruments such as green bonds and climate funds (Mor & Ghimire, 2022). The UN Principles for Responsible Investment (PRI) provides a voluntary framework of inclusion of ESG for institutional investors through transparency and accountability (Kim & Yoon, 2023). These theories and frameworks together form a roadmap for synergistic development and constitute the basis of India's vision of a sustainable "Viksit Bharat 2047".

## 2.2 Global and Indian Perspectives

Green finance adoption is led by developed economies that shall continue to leverage the maturity of the markets, maturity of the technology, and the robustness of their policies to propel their issuance of green bonds and renewable investments, though securing their infrastructure around carbon has been a worry (Shafqat *et al.*, 2023). According to Hussain & Dill (2023), developing economies, such as India, may take on barriers, such as limited capital access and high borrowing costs, but they have sovereign green bonds issuing INR 80 billion in 2023 (National Informatics Centre (NIC), 2023) and ambitious targets (500 GW renewables by 2030), utilizing policies, including 100% FDI in renewables.

While the studies highlight India's advances in conformity with the global standards (ICMA principles) and its outperformance over its peer Bangladesh in the green banking, the challenges remain: balancing growth with sustainability, dependence on international funding, and high capital costs (Rahman *et al.*, 2023). On the environmental Kuznets curve, while innovation is present in developed regions, their emissions are lower than those in developing regions, which lead to initial environmental degradation (Leal & Marques, 2022). While India's success demonstrates the strengths of private sector engagement and cross border cooperation, it is private sector engagement, cross border cooperation and filling gaps in the financial side that will continue to be critical for a more equitable global sustainability on the domestic financing, tech transfer side.

## 2.3 Literature Gaps

Although, there are still gaps to be filled in green finance literature, namely, with regards to social equity and spatial inclusivity. Current models that exist tend to focus on environmental outcomes and financial returns but do not pay attention to outputs produced on disadvantaged communities. Thus, socio-economic dimensions, especially income inequity, gender bias and community participation are virtually under researched both in theory and practice. In addition, access barriers are increased by rural–urban disparities, which are usually ignored by investors and policymakers, who focus on the infrastructural constraints, financial literacy gaps, institutional gaps in rural areas. This social justice cannot be bridged without integrative, inclusive approaches including holistic social justice principles, and tailored mechanisms of green finance opportunities that are equitably distributed across the country.

### 3. Methodology

To examine the role of green finance in India's sustainable development in line with Viksit Bharat 2047 vision, this study adopts a qualitative, desk-based research design. Rigorously analyzed secondary data include government supply side (RBI, SEBI, MNRE); corporate (e.g. Tata Power, YES Bank) supply and demand side (India and global); international agency publications (IRENA, CEEW); peer reviewed literature. Systemic challenges are discussed through policy framework (i.e. National Green Hydrogen Mission), regulatory guidelines (RBI's Sustainable finance norms) and case studies (e.g. SELCO India's microfinance model) based upon document analysis. The greenwashing risks, capital access barriers, and equity gaps are identified with thematic coding, and comparative analysis is carried out with respect to the extent of progress of India with respect to global standards (e.g. ICMA principles).

Such theoretical lenses as the Triple Bottom Line and the Circular Economy help interpret synergies going across commerce, science of management and social sciences. The reliance on public data does extend deep into context, and companies report subjectively, mitigating for such via triangulating numerous different sources (academic, gov, NGO reports). It is a methodology of critical synthesis of existing evidence to propose scalable policy and institutional reforms in India's green finance ecosystem, without making quantitative claims and focusing on qualitative insights of India's green finance ecosystem.

### 4. Green Finance in the Indian Context

#### 4.1 Current Trends and Practices

##### 4.1.1. Growth of Green Bonds, ESG Investing, and Renewable Energy Financing.

Green finance sector in India is witnessing a robust growth with the expansion of green bonds, ESG investing and renewable energy financing in India. In 2023, there has been some momentum in the green bond market with sovereign green bonds of ₹160 billion issued and plans of ₹20,000 crore in FY25 to be issued for renewable energy and clean transport projects. This is aligned with global standards and helps transparency as per SEBI (TIMES OF INDIA, 2024). Private companies like REC Ltd. help market depth through their 10 billion Global Medium Term Notes Program (PV magazine, 2024). AUM of ESG investing has grown from 331.4 million in 2020 to 1.18 billion in March 2024 (IBEF, 2024), although the latter remains lagging in adoption as a result of greenwashing concerns (IBEF, 2024).

##### 4.1.2. RBI's Sustainable Finance Guidelines, SEBI's ESG Disclosure Norms

According to Ministry of New and Renewable Energy's report on financial constraints in the sector (Saha, 2024), India needs INR 15,000 crores to INR 20,000 crores of annual Foreign Direct Investment (FDI) in renewable energy. For this, the government has allowed 100 per cent annual FDI in renewable power generation and distribution projects. Invest India, the government's investment agency, says that renewable



energy projects worth US\$196.98b are ongoing. The RBI also plays a vital role in advancing climate risk frameworks and the RB-CRIS data system as well as a regulatory sandbox for sustainable finance, SEBI mandates BRSR disclosures for top firms and eases supply chain reporting norms (PricewaterhouseCoopers, 2024). Though there are challenges in balancing India's growth with environmental commitment and to gain investor's trust, these efforts standardize disclosures, minimize risks and align India's login financial ecosystem with global sustainability goals.

## 4.2 Case Studies

YES Bank's Green Infrastructure Bonds, Tata Power's solar projects and community driven microfinance spearheads to green finance in India's sustainable development under Viksit Bharat 2047 mission. In 2015, YES Bank set the stage for India's green bonds market by raising INR 1,000 crores to finance renewable energy projects, thereby avoiding 2.3 million tons of CO<sub>2</sub> annually and attaining alignment with national targets (YES BANK, 2020). These are innovative financial mechanisms in the commerce, building linkage between institutional investment to clean energy, and foster transparency through impact report. In addition to this, Tata Power's utility scale solar initiatives such as 126 MW Omkareshwar floating solar plant, which can deploy this infrastructure at scale, projects 173,893 tons of CO<sub>2</sub> reduction annually while engaging in engineering resilience (Tata Power, 2024b). Tata Power's 11.5 GWp portfolio reflects the leadership role of corporate leadership in securing energy and reducing fossil dependency (Tata Power, 2024a).

Microfinance models in the likes of SELCO India at the grassroots bridge energy poverty gaps at the level of the 450,000+ rural households who can participate in solar adoption via affordable loans (Skoll Foundation, 2015). This social finance approach equips communities to replace 8.5 million liters of kerosene per year, improve livelihoods, education and health, and avoid 22,000 tons of CO<sub>2</sub>. For example, a bike garage owner in North Karnataka said that he increased his income by 50% by working extra hours with a solar lamp (Climate Impact Partners, 2023). Altogether, the collective approach encompasses these initiatives tangentially, as they represent a synergistic experience, and YES Bank mobilizes capital, Tata Power deploys technology, microfinance attracts inclusion. This triad is an amalgamation of the environmental, economic and social objectives and provides a roadmap for green finance that integrates commerce, management and social equity, which are the key pillars of Viksit Bharat 2047. India can speed up its low carbon economy transition by intermixture of financial innovation, technological evolution, and community engagement.

## 4.3 Challenges

India's Viksit Bharat 2047 vision requires green finance, which is challenged from multiple angles. Although there are high borrowing costs that hindering the investment and financing of them, such as renewable energy and sustainability projects as a result perceived risk and asymmetric information, financial barrier is high. As stated by Ghosh, Nath & Ranjan (2021), the standardization of what is considered green activities generates confusion and contributes to greenwashing, and consequently affects investor confidence.

This is further compounded by information asymmetry at the level as India does not have a single platform to monitor climate finance, making transparency less transparent (Pandey 2022). In the case of long-term green projects vying with short term financing preferences, costs rise (Damodaran & van den Heuvel, 2023).

Capital flow is hampered by underdeveloped market infrastructure and lack of policies in the form of a fragmented perspective (Misra, 2021), regulatory gaps such as that of pending RBI guidelines, and having contradicting ESG frameworks. A small pool of available capital to deploy impedes it, as project pipelines are too thin, while risk returns are out of balance. MSMEs and institutions lack the capacity to innovate and scale given the deficits in capacity and lack of training. In order to address these paradigms, these challenges require integrated thinking: Commerce needs to focus on a more sustainable business model, management must adopt ESG principles, and social sciences must take part in the process of collaborative governance. Standardized taxonomies, blended finance, policy coherence and capacity buildings are essential to bridging these gaps to enable green finance to realize India's sustainable development goals.

## **5. Synergistic Development - Integrating Commerce, Management, and Social Sciences**

### **5.1 Interdisciplinary Linkages**

India's green finance ecosystem is a synergistic integration of commerce, management and social sciences that promotes sustainable development through interdisciplinary collaboration (Raman *et al.*, 2025). In commerce, economic growth driven by strategic investments in sectors of green hydrogen, battery storage and other such climate smart agriculture projects under the National Green Hydrogen Mission (₹19,744 crore) while tackling environmental challenges (Kashyap & Pal, 2025). Gaps in greenwashing and high borrowing costs are filled by risk management strategies such as standardized frameworks and transparency measures, which make the viability of green bonds, sustainable projects. This is reinforced by management practices such as mandatory Business Responsibility and Sustainability Reports (BRSR) for top corporates, and alignment of business operations with environmental accountability as per SEBI and RBI guidelines. To sustain itself, these have made companies integrate the thinking of sustainability into the corporate strategy while trying to maintain a balance between making money and not hurting the planet.

Equity is anchored in social sciences in order to ensure that green finance benefits are distributed to marginalized communities (Van Niekerk, 2024). Skill development programs like Surya Mitra have supported the Renewable Energy Projects which have created 330,000 jobs (2022) and initiatives of distributing 2.57 million solar lamps and installing 250,000 biogas plants have improved rural livelihoods as mentioned in Energy (2019). Policies that focus on equity include inclusive resource allocation and participation of women and poverty impact assessments. Commerce unites capital, management holds to account, social sciences embed inclusion, and together they form a cohesive model that is in line with India's climate goals and SDGs.

India's standing on a synergy of economic imperatives, governance rigor and social equity in holistic and sustainable development makes it a front runner in this space.

## 5.2 Social Impact of Green Finance

### 5.2.1. Poverty Alleviation through Green Jobs and Inclusive Financing

Green finance is linked to poverty alleviation, gender empowerment and renewable investment in India, but these are also transformative social impacts. Green financing of the sector has increased of 988 000 jobs (2022), in solar PV (281 400 jobs), wind (40 000), and hydropower (466 000), with rural focused distributed renewables generating 25 times more jobs per MW than fossil fuels (Anand, 2023; IRENA, 2023). They are job that provide stable income in impoverished regions and help in poverty reduction. This growth is being fueled by India's ambitious targets, including achieving 500 GW of non-fossil electricity capacity by 2030, which could bring up to 3.5 million jobs by 2050, of which 3.2 million are projected in renewable energy, according to CEEW (2019). But small-scale projects present also have challenges like high capital costs posing a problem to equitable access which has to be targeted.

### 5.2.2. Gender-Responsive Finance

Gender responsive finance is helping to include women in the socio-economic sphere. For example, the solar technician program of Gujarat (training 1,000 women, 60 of which were the first) and SEWA's partnerships on clean energy projects show how clean energy projects can be a tool for skill development and employment (MINISTRY OF NEW AND RENEWABLE ENERGY, 2022). Clean energy gives women access to education and entrepreneurship, reduces women's domestic burdens (e.g., fuel collection), and improves health. Rural electrification improves women's non-farm self-employment and girls' school enrollment (IE Online 2021). Cultural norms and equal pay are things that have not changed and continue to remain a problem. Subsidies for women led solar installations and skill programs are also policy measures to scale participation and could add 3.2 million jobs by 2025, with 30% women workforce inclusion (Energética India, 2025). Green finance is the combination of environmental and economic goals and provides conditions for inclusive growth. Clean energy is used by India to eliminate gender disparities and poverty through gender responsive projects and green jobs.

## 6. Policy Recommendations and Roadmap for Viksit Bharat 2047

For Viksit Bharat 2047, institutional reforms, technological integration and stakeholder collaboration are the key to India's roadmap. Strengthening regulatory framework includes, expanding ESG reporting up to the topping 1,000 listed companies mandatorily under BRSR framework of SEBI by 2030, and improving transparency and sustainability compliance. The national greenest energy and climate adaptation will be funded through a National Green Finance Corporation by 2027 and established on the model of green banks around the globe, besides provisions for tax incentives on green bonds and collaboration with global platforms

such as the Green Climate Fund. Deploying blockchain by 2028 and AI-driven platforms in 2030 that will assess green project viabilities, use R&D hubs and open-source tools for skills development in renewable energy and agriculture (Ministry of Power, 2023), these steps will ensure tamper proof carbon trading provided under India's Carbon Credit Trading Scheme (CCTS), reduce greenwashing technologically (Ministry of Power, 2022).

By 2027, stakeholder collaboration focuses on streamlining PPP frameworks to garner institutional investors while closing the infrastructure funding gaps, and academia industry linkages under the skill India and NEP reforms to have vocational training to match up with the new emerging sectors such as AI by 2028. Mitigating such challenges of funding gaps and implementation delays (CCTS rollout delayed to 2025-26) requires foreign investment, digital project management and skill development. These strategies together helped ESG compliance, green financing, adoption of blockchain-AI, PPPs and academic innovation to propel India towards \$30 trillion economy with inclusive growth, sustainability and global competitiveness by 2047, provided adaptive policies and cross sector synergy (Urban Infra Group, 2024).

## 7. Conclusion

Under the Viksit Bharat 2047 vision, India's transition toward a sustainable and inclusive economy is enabled by green finance. It connects commerce and social equity with management and renewables, using capital to act as a catalyst for solar energy and resilience to climate change as well as equitable social impact that supports economic growth and even environmental stewardship. But institutional reforms based on robust institutional challenges, not just ecological problems as this raises greenwashing risks, broken policies or rural/urban inequalities, are needed. All of these should be standardized taxonomies, blended finance mechanisms and frameworks that are gender responsive to improve transparency, trust and inclusion.

Tata Power's solar ventures and SELCO's microfinance examples provide case studies of agency integration of financial innovation and technology with community engagement that can affect a transformative course. A replenishment of green finance can be unlocked through ESG mandates that are getting stronger, through cross sector collaboration, and through prioritization of building capacity. Given India's challenges of attaining dual goals of development and sustainability, it shall be imperative to develop a cohesive policy roadmap based on the principles of the Triple Bottom Line (TBL) and Circular Economy (CE) to achieve the holistic progress, independence on carbon and equitable access to green opportunities for all citizens by 2047.



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