Green Finance: Key Driver of Renewable Energy Growth in India

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Abstract
Renewable energy is the key source of futuristic developments in India and green financing has become an essential tool for mobilizing investment for renewable energy projects as the nation strives to reach its high targets for renewable energy. The study investigates how government initiatives, such India's National Action Plan on Climate Change (NAPCC) Renewable Purchase Obligations, affect the flow of capital into the renewable energy industry. It also examines how market mechanisms & instruments, such as carbon pricing, green bonds, and private sector investment, can hasten the adoption of renewable energy. Through a comprehensive analysis of extant literature and policy frameworks, this paper pinpoints important elements that have expedited the expansion of green financing in India, including regulatory backing, fiscal incentives, and private funding. The study also emphasizes market obstacles, particularly for small-scale ventures, such as regulatory uncertainties, high-risk perceptions, and restricted access to financing. The paper highlights the potential for expanding green finance to fulfill India's renewable energy goals through case studies of successful green finance projects, including the issue of green bonds and the participation of development banks. The paper concludes with recommendations for enhancing policy support, encouraging private investment, and developing innovative financial instruments to further stimulate the flow of green finance into India's renewable energy sector.
Keywords: Green Finance, Sustainable Finance, ESG, Green Investment, Renewable Energy Funding

Introduction

India being the fastest developing economy, grows at a 7% CAGR (Compound Annual Growth Rate) and achieved the position of world's largest fifth economy with the GDP of approx. $ 3.6 trillion. It is projected to become it the world's third largest economy by 2030. But growth in the economy has come at the expense of the environment. India is the third largest emitter of CO2 after USA and China. Even though India emission is only annually 2 tons per capita only. But as power demand is growing faster than GDP growth due to an increase in manufacturing and general economic development, India's absolute emissions will continue to rise.

Growing environmental concerns and the world's shift to sustainable development have made green finance an indispensable force in promoting the expansion of renewable energy, especially in

developing countries like India. The term "green finance" refers to a broad category of financial tools and regulations designed especially to assist ecologically friendly initiatives. These include efforts that help mitigate and adapt to climate change, energy efficiency initiatives, and renewable energy projects.

India has acknowledged the value of green finance in bridging the funding gap required to accelerate the deployment of clean energy, given its ambitious targets to reach 500 GW of renewable energy capacity by 2030. In order to reach its goals, the nation's renewable energy sector is highly dependent on large investments, and green finance has shown to be a crucial enabler by drawing in both domestic and foreign money. Investment in sustainable energy infrastructure is being accelerated by programs like the Green Bonds framework, sovereign green bonds, tax breaks, and concessional financing plans.

This paper's goal is to investigate how green financing instruments and policies support the growth of renewable energy in India. It will evaluate regulatory frameworks, look at the effects of green financing instruments, and see how well they function to speed up renewable energy projects. In addition, the paper will offer perspectives on the obstacles and possibilities related to expanding green financing, with a particular emphasis on India's endeavors to establish a sustainable and equitable energy future.

Green Finance: An Overview

Green finance is the mobilization of funds to support projects that contribute to environmental sustainability. As per World Economic Forum- "At its simplest, green finance is any structured financial activity – a product or service – that's been created to ensure a better environmental outcome." The primary objectives of green finance are to promote climate resilience, reduce carbon emissions, and encourage energy efficiency. It encompasses a range of financial tools, including loans, equity investments, insurance mechanisms, and green bonds. Globally, green finance is seen as a crucial driver for meeting the goals set under the Paris Agreement.

In India, green finance has been recognized as a key enabler of renewable energy development. India has started emphasizing on green finance as early as 2007. The pre guidelines have been prepared by authorities for green finance. In December 2007, the Reserve Bank issued a notification on "Corporate Social Responsibility, Sustainable Development and Non-financial Reporting – Role of Banks" and mentions the importance of global warming and climate change in the context of sustainable development. The country's commitment to expanding its renewable energy capacity is heavily reliant on financial flows directed towards sustainable projects. India aims to generate 175 GW of renewable energy by 2022 and 500 GW by 2030, but achieving these goals requires significant capital investment. Green finance policies and instruments are thus crucial for ensuring the availability of funds for clean energy projects.

Literature Reviews

Green finance policies have emerged as pivotal mechanisms in driving the renewable energy sector in India. According to Jain and Kumar (2022), the integration of financial instruments such as green bonds, renewable energy funds, and concessional loans has significantly enhanced the capital flow towards sustainable energy projects. These financial tools not only lower the cost of capital but also attract a diverse range of investors, including institutional and retail participants, thereby expanding the investment base. The study highlights the effectiveness of government-backed initiatives like the Green Energy Corridors and the issuance of sovereign green bonds, which have provided the necessary fiscal support and risk mitigation for large-scale renewable projects. Additionally, regulatory frameworks that mandate Environmental, Social, and Governance (ESG) criteria have further incentivized private sector participation by aligning financial returns with

sustainable outcomes (Sharma & Gupta, 2021). This alignment has been crucial in scaling up renewable energy capacities, particularly in solar and wind sectors, thereby contributing to India's commitment to the Paris Agreement and its national climate goals. The literature underscores that robust green finance policies are essential not only for mobilizing investments but also for fostering innovation and technological advancements in the renewable energy landscape of India.

United Nations Development Programs are always focusing upon the developing measures to protect environment and involves strategies to foster the development along with safe and secure environment. Increases in investment in clean and green technologies, financing for green economies based on sustainable natural resources and climate-smart blue economies, harmonizing public financial incentives, increasing green financing from various sectors, aligning public sector financing decision-making with the environmental dimension of the Sustainable Development Goals, increasing the use of green bonds, and so on are some strategies to promote green financing, according to the United Nations Environment Program. It could serve as path maker for the development of renewables. It is added that the enormous amount of money invested in renewable energy through green financing represents an opportunity rather than a risk because the long-term benefits of these investments far outweigh any initial expenses. The economic logic of climate investments is also becoming more widely acknowledged. Clean energy has more economic and financial justifications than ever before. Going solar now costs less than constructing new coal power facilities in the majority of countries. Investments in clean energy have the potential to generate 18 million new employments by 2030, contributing to economic growth.

In RBI bulletin of 21 Jan, 2021, it was referred as a key topic in the conversation about the sustainability of economic growth is green finance. The ecology is frequently sacrificed in the name of rapid economic development. Reduced availability of natural resources, deteriorating environmental conditions, and widespread pollution endanger public health and hinder long-term economic expansion. Using environmentally friendly technologies has become more and more important for countries all over the world as a means of safeguarding and significantly improving the environment. To encourage more funding allocation for the establishment or adoption of ecologically sustainable projects, a suitable incentive structure is necessary. Other resources like labor and land may also follow if money is diverted from the traditional industries and into the green and environmentally friendly sectors. This ultimately results in the best possible distribution of resources2, which over time promotes sustainable growth. Targeted green finance strategies have been developed in major nations to accomplish these goals, engaging corporations, governments, and central banks—all parties involved in economic growth.

In the research study Green Finance And Renewable Energy: Worldwide Evidence Samar S. Alharbi, Md Al Mamun, Syed Kumail Abbas Rizvi has discussed that Initial public offerings (IPOs) have been floated by a number of clean energy companies in the United States and other OECD nations with highly developed equity markets. It has been suggested that, in light of this experience, the growth of the credit market will enable the issue of green bonds, much like equity financing. According to the most advanced development forecasts, countries with more developed credit and financial markets tend to have stronger effects from green finance on renewable energy.

Objectives

In this research paper we want to explore how green finance policies and instruments serve as a foundation for renewable energy development in India. It forms us to analyze some basic questions- Research Questions

- What role does green finance play in promoting renewable energy in India?
- What are the key policies and instruments supporting green finance in India?

- How effective have these policies and instruments been in fostering renewable energy development?

Research Methodology

The research study has a descriptive and analytical focus. The data was gathered from secondary sources, including government reports, newspapers, journals, research articles, and websites.

The accessible data and information have been examined, analyzed, and presented with a description to produce useful study results.

Policy Drivers of Green Finance in India

- **National Action Plan on Climate Change**

The Prime Minister unveiled the National Action Plan on Climate Change (NAPCC) on June 30, 2008. It presents a national policy intended to improve India's ecological sustainability and allow the nation to adjust to climate change. It emphasizes that raising the living conditions of the great majority of Indians and lessening their susceptibility to the effects of climate change depend on sustaining a high growth rate. The National Action Plan is centered around eight ―National Missions. Their main objectives are to increase public knowledge of climate change, its adaptation and mitigation, energy efficiency, and the preservation of natural resources.

1. National Solar Mission
2. National Mission for Enhanced Energy Efficiency
3. National Mission on Sustainable Habitat
4. National Water Mission
5. National Mission for Sustaining the Himalayan Eco-system
6. National Mission for a Green India
7. National Mission for Sustainable Agriculture
8. National Mission on Strategic Knowledge for Climate Change

The National Action Plan on Climate Change (NAPCC), in particular, and the Government of India's commitment to addressing climate change are highlighted, along with a number of other significant programs and legislative measures that support renewable energy and sustainable development. Through the advancement of solar energy programs, the National Solar Mission, a flagship program under NAPCC, plays a critical role in addressing energy security. Among the significant actions made to increase India's use of renewable energy are:

1. **Foreign Direct Investment (FDI) Policy:** Up to 100% FDI is permitted under the automatic route for renewable energy projects, encouraging foreign investment in the sector.

2. **Waiver of Inter State Transmission System (ISTS) Charges:** ISTS charges for the inter-state sale of solar and wind power are waived for projects to be commissioned by 30th June 2025, reducing transmission costs and promoting the expansion of renewable energy.
3. **Renewable Purchase Obligation (RPO):** A declared RPO trajectory up to 2029-30, which mandates that electricity distribution companies and large power consumers purchase a specific percentage of their power from renewable sources, helps ensure long-term demand for clean energy.
4. **Ultra Mega Renewable Energy Parks:** The government is setting up large-scale renewable energy parks that offer land and transmission infrastructure to developers, enabling the rapid and efficient deployment of large renewable energy projects.
5. **Specific Renewable Energy Schemes:** Initiatives like PM-KUSUM, aimed at promoting solar power for agricultural irrigation, and Solar Rooftop Phase II, incentivizing the installation of rooftop solar, along with the 12000 MW CPSU Scheme Phase II, are designed to scale up renewable energy adoption across sectors.
6. **Green Energy Corridor Scheme:** Under this scheme, new transmission lines and sub-station capacity are being developed to facilitate the efficient evacuation of renewable energy, ensuring that the generated power reaches consumers without bottlenecks.

These policies and initiatives collectively aim to accelerate the growth of renewable energy in India, ensuring the country meets its ambitious climate and energy goals. These measures can have a significant positive impact on the growth of renewable energy in states like Maharashtra, especially given the region's renewable potential.

- **Renewable Purchase Obligations**

In India, a policy mechanism known as the Renewable Purchase Obligation (RPO) requires certain organizations, including open access consumers, captive power producers, and electricity distribution companies (DISCOMs), to acquire a minimum percentage of their overall energy consumption from renewable sources. In order to achieve the nation's clean energy ambitions, RPO's main objective is to encourage the production and usage of renewable energy. It has been categorized in two parts

1. Solar RPOs
2. Non-Solar RPOs

To facilitate compliance with RPO, entities can either directly procure renewable energy or purchase Renewable Energy Certificates (RECs). RECs are tradable certificates issued to renewable energy producers for every unit of energy they produce. Entities that cannot meet their RPO targets through direct purchase of renewable power can buy these certificates to meet the obligations.

The Ministry of power has set a trajectory for RPO Targets up to 2029-30, which include specific percentage for Solar, wind & other renewable sources. The minimum share of renewable energy is set to progressively increase over the years. In 2024-25, 29.91 per cent of the total energy must come from renewable energy sources. This will gradually rise to 43.33 per cent in 2029-30.

- **Green Energy Corridor**

The construction of new transmission lines, substations, and related infrastructure with a focus on integrating renewable energy is part of the Green Energy Corridor Project. It encompasses several Indian states. The project's goal is to build a dependable, integrated grid that can effectively transport renewable energy from resource-rich states to places where demand for electricity is strong. GEC comprises of both Inter State Transmission System (ISTS) and Intra State Transmission System (InSTS) along with the setting up of Renewable Energy Management Centre (REMC).

- **SDGs & India**

A particularly ambitious and all-encompassing plan for global development by 2030 is outlined in the Sustainable Development Goals. As the country's premier organization for accomplishing the SDGs, NITI Aayog is spearheading the 2030 Agenda with a competitive yet cooperative federalism mindset. There are 17 goals & goal no 7 is focusing on the clean energy. Green finance promotes investments in renewable energy projects such as wind, solar, hydro, and bioenergy, which are essential for achieving universal access to affordable, reliable, and sustainable energy.

The nation's overall SDG score increased from 60 in 2019 to 66 in 2020–21, a gain of 6 points. The excellent national performance in Goal 6 (Clean Water and Sanitation) and Goal 7 (Affordable and Clean Energy), where the composite Goal scores are 83 and 92, respectively, is largely responsible for this encouraging step towards reaching the targets.

- **Net Zero Emission**

India declared its goal to reach net zero by 2070 at the 26th Conference of Parties to the UNFCCC in November 2021. This goal is aligned with the target of 500 GW production by 2030 by renewable sources only. As of April 2022, India had 165 GW of total non-fossil fuel capacity, including nuclear. It amounts to 41 percent of the 401GW3 built total electrical capacity (MNRE, 2022). By 2030, the goal of having 40% of electricity capacity come from non-fossil fuels has already been met. By 2022, India has also reduced its emissions by 28%. India's Commitment on decarbonization presented in 2021: COP 26 is as below –

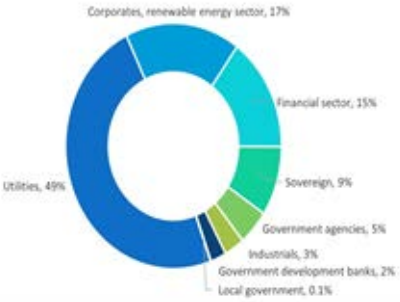
- By 2030, India will reduce the carbon intensity of its economy by less than 45%.
- India will take its non-fossil energy capacity to 500 GW by 2030.
- India will meet 50% of its energy from renewable energy by 2030.
- India will reduce the total projected carbon emissions by one billion tonnes from now ¬till 2030.
- By the year 2070, India will achieve the target of net- zero.

Instruments Providing Strong Base

- **Green Bonds**

Green bonds have started playing a significant role in India's plan for funding its climate objectives. The very first green bond was issued in 2007. And the major development has been started since 2015. These bonds are meant to finance initiatives like clean transportation, sustainable water management, and renewable energy that have a favorable impact on the environment or the climate. India has advanced much in this field recently. To finance green infrastructure projects, the Indian government, for example, issued its first sovereign green bonds in January 2023, earning INR 80 billion (about $980 million). In RBI press release of 6 January 2023, it was mentioned that the Government of India will be issuing Sovereign Green Bonds (SGrBs) as part of its overall market borrowings, as indicated in the Union Budget 2022–2023, in order to mobilize funds for green infrastructure. The money raised will go toward public sector initiatives to lower the economy's carbon footprint. Accordingly, on September 29, 2022, it was announced that SGrBs for a total of Rs. 16,000 crore would be issued in the Half-yearly Issuance Calendar for Marketable Dated Securities for the Second Half of the Fiscal Year 2022–2023.

Since 2015, the tool has been utilized by government organizations and financial firms. A total of $21 billion in green bonds have been issued in India as of February 2023. Of the total, 84% was attributed to the private sector. (12) As in the given figure it is represented –



Green bond amounts issued in India by type of issuer. Source: World Bank with data from Bloomberg.

- **Credit Enhancement for Green Projects**

The program's goal is to establish a market-based system for rewarding environmentally friendly behavior in the form of Green Credits to individuals, Farmer Producer Organizations, cooperatives, forestry companies, sustainable agriculture companies, urban and rural local bodies, the private sector, industries, and organizations. Individuals, the commercial sector, small-scale businesses, cooperatives, forestry operations, and farmer-produce organizations will all receive incentives under this program for taking environmental action. The below table presents the details for renewable sector credits given by scheduled banks.

Bank Credit Outstanding to the Non-Conventional Energy as on March, 2020				
	Public Sector Banks	**Private Sector Banks**	**Foreign Banks**	**All Banks**
Amount outstanding (Rs.Cr.)	21,655	12,302	2,586	36,543
As per cent of power sector credit	6.2	11.9	27.1	7.9
As per cent of total bank credit (excluding personal loans)	0.5	0.5	0.7	0.5
Note: Excludes Regional Rural Banks and Small Finance Banks.				

Source: RBI Bulletin 21 Jan 2021

- **Subsidies and Tax Incentives**

International Institute for Sustainable Development (IISD) released statement on Dec 2022 that government subsedies for renewable energy development rose from Rs 5774 Crore in 2021 to Rs 11,529 crore in 2022. Government of India has also permitted 100% foreign direct investment through automatic rout in renewable energy projects.

Government initiatives such as Production Linked Incentive Scheme, reduction in solar power tariffs, roof top solar mission are some famous steps taken by government to focus on green energy. Government has also provided subsidies for solar panel installation such as

1. Up to 2kW: (Rs. 30,000/Kw)
2. 3Kw: (Rs. 78,000)
3. Over 3Kw: (Rs. 78,000 fixed)

To lessen down the burden in production & to accelerate the growth the government has provided various tax incentives such as -

1. Generation-Based Incentives (GBI): To incentivize producers of renewable energy, the Indian government provides generation-based incentives. This initiative gives renewable energy producers cash incentives based on their electrical output. Renewable energy projects are commercially appealing because of the GBI, which offers firms a direct cash gain.
2. Customs Duty Exemptions: These are offered to make it easier for the import of equipment used for renewable energy sources. Businesses can import biomass generators, wind turbines, and solar panels at a lower cost because to this exception.
3. Service Tax Exemptions: The building, installation, and commissioning of renewable energy projects are exempt from service taxes. Businesses are encouraged to create renewable energy through this exemption, which lowers the project's overall expenses.
4. Excise charge Exemptions: Solar water heaters and solar lighting are free from excise charge. By further reducing the cost of purchasing and installing renewable energy equipment, this exemption encourages companies to use these environmentally friendly practices.

- **Public-Private Partnerships (PPP)**

With the aim of 100% electrification government is focusing on the root cause problems. It is related with operations & maintenance both. This provides a way for public-private partnerships, because private mini-grid operators have gained significant experience. Some of case are likely - Reliance Power Ltd. created the $ 147.5 million Dahanu Solar Power Project, next to the village of Dhursar in the Jaisalmer region of Rajasthan, with assistance from the Asian Development Bank (ADB), which gave a $ 48 million loan. In addition to producing more than 60 million kilowatt hours of electricity annually-enough to power over 70,000 typical Indian households-the 40 MW plant is anticipated to prevent the production of more than 60,000 metric tons of damaging carbon dioxide annually.

A collection of solar parks under construction in Gujarat, India, are together referred to as Gujarat Solar Parks. Gujarat is now the largest solar park center in Asia as a result. With the help of the IFC, a Gandhinagar prototype solar rooftop project on PPP mode is currently producing 5MW of electricity and reducing yearly greenhouse gas emissions by more than 7 million tons. About 10,000 more people now have improved access to power as a result. About $12 million in private funding was drawn to it.

Along with it the major infrastructure projects requiring massive use of energy such as railways, hospital, and airports etc. has complete focus on PPP way to full fill its energy needs.

Conclusion

The development of green financing tools and policies is essential to the expansion of renewable energy in India. A combination of financial instruments like as green bonds, RECs, and green banks, along with the government's proactive legislative actions, has expedited the adoption of renewable energy, especially solar power. Contributing to India's overall renewable energy ambitions, Maharashtra is a prominent state that has benefited from both national policy and its regional green finance structures. Nevertheless, issues like erratic policy, trouble funding small projects, and poor grid infrastructure continue to exist. Maintaining the momentum of renewable energy growth requires addressing these difficulties with solid policy frameworks, improved financial accessibility for smaller businesses, and focused investments in grid development.

India's renewable energy efforts and green financing laws have worked together to lower prices, promote innovation, and fortify the country's renewable energy infrastructure. Reducing

carbon emissions, tackling climate change issues, and maintaining energy security all depend on this financial support. Going ahead, sustaining the momentum of renewable energy expansion in India would require improved public-private partnerships, increased market incentives, and constant policy support. In the end, green finance will be essential to ensuring that India meets its targets for sustainable development and spurs economic growth by establishing a more robust and environmentally friendly energy system.

In conclusion, India's development of renewable energy has been greatly aided by green finance; however, in order to meet the nation's ambitious targets for renewable energy by 2030 and beyond, it will be necessary to maintain policy coherence, expand financial inclusion, and enhance infrastructure.

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