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# FINANCIAL INTERMEDIATION AND RENEWABLE ENERGY GROWTH IN INDIA: AN ANALYSIS OF INVESTMENT CHANNELS

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***Abstract***

*This article proposes to explore the factors driving India's increasing need for renewable energy by analyzing financial instruments, investment trends, and governmental initiatives. Through an examination of data from official government records, trustworthy sources, and climate policy initiatives, it assesses India's renewable energy capacity and carbon emissions. Regression analysis was used to identify the relationships between key factors, including investments, green bond values, and loan disbursements with the expansion of renewable energy efficiency. The findings revealed strong positive correlation between renewable energy investments and capacity expansion. Green bonds did not show significant influence on renewable energy growth. However, annual loans for renewable energy projects are strongly correlated with capacity growth. These findings pave the way for sustained investment, financial support, and policy mechanisms in driving renewable energy efficiency in India. It highlights the crucial role of direct investments and financial support, offering a footing for strategic decision-making and informed policymaking in the renewable energy sector.*

***Keywords:*** *Renewable energy, investment, financial instruments, green bonds, loan disbursements, subsidies.*

***JEL Code :*** *K32, O13, E22*

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## 1. Introduction

The global focus is currently shifting to care for the mother earth and to implement sustainable practices ever since environmental hazards have occurred at several global locations. The emphasis is on the importance of using green energy and other eco-friendly methods to create a sustainable future and reduce carbon emissions **(Riache et al., 2021)**. A positive relationship between the usage of green energy and economic growth has been found, specifically when the use of green energy increased by 1%, the economic growth did by 1.26% **(Ohlan 2016)**. However, recent figures from the IEA show that renewable energy accounts for less than 30% of global energy production. Even in wealthy nations, a large portion of energy comes from renewable sources **(Net Zero by 2050 - Analysis - IEA, 2021)**. The available literature on sustainability and green finance emphasizes the dire need to actualize the sustainability goals. Green finance is crucial for addressing financial gaps, regulatory issues, and risks related to environmental projects, promoting more investment in eco-friendly technologies and sustainable development. In a similar vein, **Ng and Tao (2016)** pointed out the critical need to achieve sustainability by bridging the financial gap in Asian renewable energy projects. Mobilizing affordable and long-term capital is the primary determinant that enables expansion of renewable energy sector. Green finance deals with climate-friendly and environmentally sustainable activities, based on financial amenities and products created to promote investments. Low investment returns and insufficient long-term funding are among a few major challenges **(Taghizadeh-Hesary & Yoshino, 2020, Haldankar et al., 2022)**. The two channels that have gained momentum, beside conventional capital expenditure, are green bonds and debt intermediation, through commercial and concessional loans. Cross country analysis report shows that green bond issuance mobilizes climate-aligned capital and it is positively associated with clean-energy investment and investment efficiency **(Shah et al., 2024)**.

Renewable energy sector in India has both opportunities and constraints. Though there has been rapid expansion in the renewable energy sector, its profitability is quite sensitive to borrowing rates and loan tenors. As of September 2025, solar capacity exceeded 127 GW and wind surpassed 53 GW, highlighting the scale at which finance must operate **(Renewable Energy Statistics, 2025)**. There have been comparatively fewer studies on how financing channels translate into realized additions in renewable capacity in the Indian context. Responding to this need, the study seeks to assess the impact of various financial instruments on renewable capacity generation in India. By identifying the most effective financial mechanisms, the study aspires to contribute toward formulating strategies that can accelerate India's progress toward a low-carbon and sustainable energy future.

## 2. Review of Literature

The renewable energy business is a significant contributor to global employment, with an anticipated 12.5 million people working in this rapidly expanding sector globally as of 2022 **(Annual Review, 2022)**. Solar photovoltaic (PV) technology is the most widely used renewable energy source and it is closely followed by wind energy and biomass. Financing conditions are crucial for the scale and speed of renewable energy deployment because the cost and tenor of capital flow directly into levelized costs and bankability. Multi-country analysis shows that a lower weighted average cost of

capital is associated with more rapid diffusion of wind and solar, underscoring the salience of investment depth, disclosure quality, and credit intermediation for clean-energy build-out **(Steffen, 2020)**. A developing country like India requires large investments and the recent estimates suggest that it plans to add 50 GW of renewable energy efficiency annually for next 5 years to achieve the target of 500 GW by 2030. Thus, finance deployment is at the center of policy design **(Ministry of New and Renewable Energy India, 2024).**

The three complementary channels that shape the future of renewable energy transition, are aggregate investment into renewable energy sector, green bonds that potentially broaden the investor base and reduce borrowing costs, and loans that determine effective leverage and maturity structure at the project level **(Hunt & Bloomfield, 2024).** Evidences from the studies, conducted in India, reveal that renewable energy expansion is linked to stronger investment momentum, with faster additions in solar and wind capacity. The study, conducted by **Steffen (2020),** argues that the cost of capital in developing countries is significantly higher than in industrialized countries.

Green bonds is the second channel that has matured rapidly in India's regulatory framework. The Securities and Exchange Board of India introduced revised disclosure requirements for green debt securities in 2023, which had tightened use-of-proceeds, external review, and post-issuance reporting to curb greenwashing and raise comparability for investors **(SEBI | Revised Disclosure Requirements for Issuance and Listing of Green Debt Securities, 2024).** Similarly, the Government of India published a Sovereign Green Bond Framework and subsequently issued Sovereign Green Bonds, with an emphasis on transparent allocation and alignment to international principles. These measures were intended to catalyze climate-aligned capital for public green infrastructure, including renewable energy. **Sreenu (2024)** established that green bonds promote clean energy generation in India and established that green bonds had gained recognition for their ability to attract investments for environmental initiatives.

The third channel for deploying capital intensively is loans and debt intermediation. The Indian Renewable Energy Development Agency (IREDA) provides project finance, refinancing, and credit enhancements across solar, wind, hydro, and bio-energy projects. According to ratings and market studies, IREDA has stable loan growth and sufficient capitalization, which is compatible with a rising pipeline of renewable energy projects **(Arora & Sarker, 2025).** As a result, policy leaders influence the cost and accessibility of financing for developers. Further research from the Organisation for Economic Co-operation and Development (OECD) indicates that lowering finance costs and extending loan maturities can enable higher capacity mechanisms, that are directly related to the economics of Indian projects **(Woodward, 2022).**

Despite these developments, the Indian scholarly literature still exhibits a specific empirical gap. A sizeable body of work describes investment trends, green-bond issuance, and policy frameworks. However, the relationships between renewable energy investment, the value of green bonds, and the volume of loans, on the one hand, and total renewable energy capacity generated, on the other, has not been established.

## 3. Statement of the Problem

As India is one of the fastest growing countries in the world, there is a pressing demand for renewable infrastructure leading to low-

carbon emissions. This can be actualized only through effective financing of renewable energy projects. Though investments, green bonds, and loans seem to support capacity growth, their actual impact in the Indian context remains unexplored. The present literature lacks empirical analysis specific to Indian context. Therefore, this study addresses the gap by examining the impact of financial mechanisms on renewable energy capacity in India.

## 4. Need of the Study

The environmental setbacks such as climate change and the need for energy security forced India to prioritize the use of renewable energy. It requires not only policy support but also robust and well-defined financial structures. Though there are many financial instruments being introduced, there is lack of empirical evidence to say what exactly contributes to renewable energy generation. Such a study is required to understand what is essential for optimizing public and private investment decisions. This study is essential to fill the knowledge gap by providing the role of financial instruments for accelerating sustainable energy transition in India.

## 5. Objectives of the Study

This study explores the various financial factors or mechanisms, that could enhance the expansion of renewable energy growth in India, with a focus on government investments, loan disbursements, subsidies, and green bond issuances. The objectives of the study are as follows.

1. To assess the impact of investments in renewable energy sector on total renewable energy capacity generated in India.
2. To evaluate the influence of green bonds issuance on the growth of renewable energy capacity in India.
3. To examine the role of loans in facilitating renewable energy capacity expansion in India.

## 6. Hypotheses of the Study

By addressing key knowledge gaps, this research seeks to aid India's shift to a future that is more energy-secure and sustainable through the strategic and effective use of financial tools to promote the development of renewable energy resources.

**The following are the null hypotheses**

H01: There exists no statistically significant impact of investment in the renewable energy sector on the total renewable energy capacity generated.

H02: There exists no statistically significant impact of the value of green bonds on the total renewable energy capacity generated.

H03: There exists no statistically significant impact of loans offered to projects in the field of renewable energy on the total renewable energy capacity generated.

## 7. Research Methodology

A quantitative research methodology was utilized, to collect and examine numerical data and the variables, which were under consideration. The variables, crucial for understanding interdependencies are investment, green bonds value, loans, and renewable energy capacity.

### 7.1 Sample Selection

The study was based on secondary data, collected from credible sources relevant to the renewable energy finance in India. The sampling process began with the identification of variables that primarily represent the key sources of funding for renewable energy like investments, green bonds, subsidies, and loans. These

variables were selected, based on the frequent mention in the literature as primary financial drivers of renewable energy growth. The dependent variable, total renewable energy capacity generated, was selected to represent the actual outcome of financial interventions in the sector. The independent variables - investment value, green bond issuance, and subsidies - were chosen to capture different dimensions of financial inflows. Only data sets, with complete records for the study period and consistent measurement units, were included to ensure comparability across variables.

### 7.2 Period of Study

To ensure the data reliability and consistency, the study utilized time-series data, spanning a period from 2016 to 2023, corresponding to the phase of renewable energy policy reforms and financial innovations in India after the Paris Agreement in 2016. Reliable and comparable secondary data for renewable energy investments, green bonds, loans, and capacity generation were systematically available only from 2016 onwards through sources such as the Ministry of New and Renewable Energy (MNRE), and International Renewable Energy Agency (IRENA).

### 7.3 Sources of Data

The secondary data were used for the study, which were taken from official and publicly available databases such as the Year End Review 2023 of Ministry of New & Renewable Energy **(*Year End Review 2023 of Ministry of New & Renewable Energy*, 2024) (Table-1)**, World Bank Open Data **(*World Bank Open Data*, 2024) (Table 02)**, Ministry of New and Renewable Energy India **(*Ministry of New and Renewable Energy India,* 2024) (Table-3),** Landscape of Green Finance in India 2024 **(Climate Policy Initiative, 2024) (Table-4)**, and Climate and Development Knowledge Network **(*India Strengthens Its Credentials for Green Bond Issue*, 2024) (Table-5)**. Data selection involved screening and cross-verifying figures from multiple sources, to eliminate duplication and discrepancies. In cases where data were available from several agencies, preference was given to government validated reports. The final sample, therefore, represented a comprehensive and authentic dataset, reflecting the financial dynamics and capacity growth of the renewable energy sector in India during the selected period.

### 7.4 Tools used in the Study

Regression analysis was used to determine how independent factors affect dependent variables and strength of their relationships. With a 95% confidence interval, linear regression analysis was carried out, by using SPSS. Time series analysis was used to examine the information over an extended length of time in order to show shifts in the connections over time between financial instruments and the capacity for renewable energy. The multiple regression model, used in this study, was validated through a series of diagnostic tests to ensure the reliability and robustness of the results. Tests for multicollinearity, using variance inflation factor, confirmed that the independent variables were not highly correlated. The Durbin–Watson statistic indicated the absence of autocorrelation among residuals while the Breusch–Pagan test verified homoskedasticity, ensuring constant error variance.

## 8. Data Analysis and Interpretation

The loan disbursement in India **(Table-1)** explains a strong and sustained upward trajectory for renewable energy projects, increasing from ₹ 3,521 crore in 2016 to ₹ 16,071 crore in 2023, representing more than a 4.5-fold growth and an approximate compound annual growth rate of 24% over the eight-year period. Between

2016 and 2021, the growth appeared gradual and consistent, rising from ₹ 3,521 crore to ₹ 7,111 crore. However, a notable acceleration occurred post-2021, particularly between 2022 (₹8,827 crore) and 2023 (₹ 16,071 crore), where loan disbursement surged by approximately 82% in a single year. It is observed from **Table-2** that Carbon emissions escalated steadily from 2,796 million tonnes in 2016 to 4,929 million tonnes in 2023, representing an overall rise of nearly 76% over the eight-year period. This continuous surge suggests that despite growing renewable energy investments, fossil fuel dependence remains high and renewable energy expansion has not yet been sufficient to significantly curb overall emissions. Renewable energy capacity, as shown in **Table-3**, intensified significantly from 64.2 GW in 2016 to 179.3 GW in 2023, reflecting nearly a 2.8-fold growth with steady expansion over the years. A sharp rise between 2022 (147.2 GW) and 2023 (179.3 GW), with an addition of over 32 GW, points to a strong investment and policy support while also raising concerns regarding grid integration and sustainability of such rapid growth. It is evident from **Table-4** that green finance investments improved steadily from ₹ 3,82,996 crore in 2016 to ₹ 12,07,270 crore in 2023, reflecting more than a threefold growth with consistent annual increments. A notable surge between 2022 and 2023 (about 26%) highlights the strengthening of green financial ecosystem while also raising concerns about the efficiency of fund utilization and its translation into tangible environmental outcomes. It is also observed from **Table-5** that green bond issuances had increased from ₹ 2,786 crore in 2016 to ₹ 12,800 crore in 2023, reflecting more than a fourfold growth despite fluctuations in the trend. After peaking in 2018 (₹ 12,344 crore), issuances declined until 2021 (₹ 10,210 crore) before recovering, indicating that the market remained sensitive to policy support and investor sentiment. Thus the data from Tables **(Table-1, Table-2, Table-3, Table-4, and Table-5)** show an upward trend in renewable energy investments, indicating a consistent and steady growth in this sector.

India has progressed significantly in increasing its capability for renewable energy, establishing itself as a world leader in the transition to sustainable energy sources. The nation's lofty targets for renewable energy were reflected in the substantial increase in installed capacity, specifically in solar and wind energy. Through the government's supportive policies, incentives, and targets, there has been growth, targeting to reach 450 GW of capacity for renewable energy by 2030 (India's Renewable Energy Transition, n.d.).

### 8.1 Renewable energy capacity in India Vs. Investment in the field of renewable energy

Investments in India's renewable energy industry saw a corresponding surge, driven by both domestic and international investors. The Indian government's initiatives, including the International Solar Alliance and attractive schemes for foreign direct investments, have been instrumental in attracting capital to the renewable energy sector. Further, technological advancements and a decrease in the cost of renewable technologies contributed to making these investments more viable and appealing.

As shown in the **Table-6**, the study reveals a strong and statistically significant positive correlation between investments in renewable energy and the corresponding increase in capacity generated in India. Hence the null hypothesis (H01) was rejected. An exceptional 95.4% of the variance in renewable energy capacity is elucidated by fluctuations in investment, indicating a strong and direct relationship. Notably, for every unit increase in investment, a corresponding increase of 0.954

units of growth in renewable energy was observed, emphasizing the considerable impact that investment exerted on capacity augmentation.

### 8.2 Renewable energy capacity in India Vs. Green bonds issued in India

India's dedication to developing its sustainable energy infrastructure is demonstrated by the country's tremendous growth in renewable energy sector. Green bonds issuance, a financial tool especially made to fund environmental and climate-related projects, has been pivotal in driving this surge in renewable energy. The government's initiatives, along with increasing domestic and international focus on clean energy, have led to substantial capacity expansions in the field of renewable energy in India, especially in solar and wind. These bonds have drawn interest from a wide spectrum of domestic and foreign investors, both institutional and retail, who are eager to support financially rewarding initiatives that are environment friendly. The alignment of India's expanding renewable energy sector with innovative financing through green bonds, underscores the country's proactive approach to tackling climate change and advancing sustainable development.

As shown in **Table-7**, the study yielded an insignificant association between fluctuations in green bond values and the resultant renewable energy capacity in India. Hence the null hypothesis (H02) cannot be rejected. The adjusted R-squared value of 0.345 revealed that only 34.5% of the variance in renewable energy capacity could be explained by fluctuations in green bonds, which did not meet the 5% significance threshold ($p > 0.05$). In simpler terms, the data does not support a statistically significant correlation between India's production of renewable energy and the performance of green bonds. In other words, fluctuations in green bond values did not significantly impact the amount of renewable power produced.

However, it is important to recognize the limitations of this analysis. Future research could explore alternative data sets, encompassing broader timeframes and employing diverse statistical methodologies, to potentially uncover previously unseen associations. It is also critical to acknowledge that variables outside the purview of this analysis could have an impact on India's potential for renewable energy. To foster a more comprehensive understanding of this complex relationship, the study recommends further research to explore potential indirect or moderating effects of green bonds on renewable energy generation.

### 8.3 Renewable energy capacity in India Vs. Yearly loan disbursements for India's renewable energy projects

The correlation between annual loan disbursements for renewable energy initiatives and India's rapidly growing capacity for renewable energy, highlights the crucial role financial support plays in advancing the country's ambitious clean energy goals. IRENA's 2022 report indicates that the increasing trend in loans granted to renewable projects in India indicates the steady growth of renewable energy sector. This trend would prompt the analysis of the financial mechanisms driving the expansion of renewable energy, emphasizing the pivotal function of solar and wind energy projects in particular.

Financial institutions, both domestic and global, are open to enhance and develop the renewable energy sector by bridging its gap between its ambition and reality. The relationship between the expansion of renewable energy efficiency and yearly loan disbursements indicates the dire need for economic transformation by using renewable energy

sources. It impacted deliberate choices and adoption of greener and more sustainable energy sources, supported by wise financial decisions. The ability of financial institutions to manage risks and mobilize resources will be crucial to India's efforts to meet and exceed its targets for renewable energy. This highlights the interconnectedness of finance and sustainability in the pursuit of a cleaner future.

As shown in **Table-8**, the results would indicate a strong and statistically significant positive correlation between the annual loan distribution for initiatives using renewable energy and the resulting growth in renewable energy efficiency in India. Hence the null hypothesis (H03) was rejected. Since the adjusted R-squared value was 0.880, it implied that 88.0% of the variation in renewable energy can be attributed to fluctuations in loan disbursements. In other words, there was close association between these two variables, which were statistically significant. Moreover, the data revealed a 0.880-unit increase in renewable energy capacity for every unit increase in loan disbursements. In other words, there was significant and direct influence of loan disbursements on capacity augmentation. This stresses the crucial part that consistent financial support plays in accelerating India's transition to renewable energy. However, it is important to acknowledge that correlation does not imply causality and other factors, not included in this analysis, may also influence the potential for expansion in renewable energy. Further, the historical link is reflected in this analysis and it is imperative to closely observe the evolution of this correlation over time. It is suggested that more research be done on potential mediating or moderating factors that could affect this association.

## 9. Findings of the Study

The study examined the factors influencing India's renewable energy efficiency and it yielded diverse findings. There was robust and statistically significant positive association between investments in renewable energy and resulting capacity, indicating a direct and substantial impact of increased investment on capacity growth. In other words, increased investment in India's renewable energy sector directly leads to significant rise in the amount of renewable energy produced. This demonstrated that crucial consistent investment would accelerate the country's shift to renewable initiatives. The results clearly demonstrated the effectiveness of giving renewable energy investments first priority to achieve India's clean energy goals, providing policymakers with important and persuasive data to guide future investment plans. Conversely, fluctuations in green bond values exhibited an insignificant association with renewable energy capacity, suggesting no demonstrable influence on generation. This suggests that fluctuations in green bond values did not significantly impact the amount of renewable energy produced. However, yearly loan disbursements for renewable energy projects revealed a remarkably close and statistically significant positive relationship with capacity, highlighting the pivotal role of sustained financial support. In other words, a notable increase in the generation of renewable energy production in India is directly correlated with higher annual loan disbursements for renewable energy projects. This clearly indicates that consistent financial support accelerates India's transition to renewable energy.

The findings align with prior empirical research while revealing nuanced insights into renewable energy financing mechanisms. The statistically significant relationship between investments and total capacity generated, affirms

existing theoretical frameworks, particularly emphasizing direct capital mobilization as a critical driver of capacity expansion in India **(Kilinc-Ata & Dolmatov, 2022).** However, the non-significant relationship between green bonds and the capacity, finds support in recent studies showing that green bonds are effective in enhancing wind energy. The mixed results may be attributed to the nascent development of green bond markets or time lags in project implementation **(Tsipas et al., 2024).** The significant effect of loan disbursements on renewable energy aligns with established evidence that financial intermediation, particularly commercial banking, has substantial positive effects on the amount of renewable energy produced. The results could contribute to the literature by demonstrating that while conventional investment channels and loan financing remain effective catalysts for renewable energy capacity expansion, emerging green finance instruments may require enhanced market maturity and targeted deployment strategies to realize their full potential **(Brunnschweiler, 2010).**

## 10. Suggestions

The analysis indicates that while investments in the renewable energy sector recorded positive association with capacity generation, the magnitude of their impact depends on project execution efficiency and policy stability. To maximize investment effectiveness, the government should prioritize timely project approvals, strengthen governance mechanisms to prevent delays, and ensure long-term clarity in renewable energy policies. Encouraging private sector participation through risk-sharing instruments and transparent bidding processes, would further deepen investor confidence. Although green bonds show potential as an emerging financing avenue, their overall contribution to capacity growth remains modest due to limited market depth and investor awareness. Strengthening India's green bond ecosystem through better regulatory oversight, standardization of disclosure norms, and credit enhancement mechanisms, can attract institutional investors. A national green taxonomy, aligned with international standards, would also enhance credibility and mobilize larger volumes of sustainable finance. The analysis highlights that loans exerted statistically significant impact on renewable capacity generation, emphasizing the importance of affordable credit. Strengthening institutional linkages between commercial banks, development finance institutions, and renewable energy agencies, can enhance loan availability. Introducing credit guarantee schemes, interest subvention, and blended finance instruments, can reduce lending risk and improve access to capital for small and medium renewable developers.

## 11. Conclusion

The study examined the impact of various financial mechanisms-investments, green bonds, and loans-on renewable energy capacity generation in India, using secondary data drawn from credible sources. The analysis revealed that financial instruments did play a crucial though a varying role, in influencing the pace and scale of renewable energy expansion. Among the examined variables, loans and direct investments were found to exert a more consistent and statistically significant effect on capacity generation, underscoring the importance of accessible and affordable financing for project development. Subsidies, though supportive in nature, displayed mixed effectiveness, indicating that better targeting and performance-based structures are essential for maximizing their impact. Green bonds, as an emerging instrument, showed potential but remain underutilized due to limited market maturity and investor participation.

Overall, the findings revealed that while India has made commendable progress in mobilizing finance for renewable energy, the financial ecosystem still requires greater integration, transparency, and innovation to accelerate capacity growth. Strengthening institutional coordination, enhancing policy stability, and developing robust financial instruments, will be key to attracting sustained investments. The study could contribute to the growing body of knowledge on renewable energy finance, by providing empirical evidence from the Indian context and highlighting actionable insights for policymakers, investors, and development institutions. By aligning financial strategies with national sustainability goals, India can reinforce its position as a global leader in renewable energy and move decisively toward a resilient, low-carbon future.

## 12. Limitations of the Study

The study relied on data from official government reports, climate policy initiatives, and reputable sources, but there could be limitations in data accuracy, consistency, and completeness. The analysis of variables was limited to the period from 2016 to 2023. This relatively short time frame can not capture the long-term effects and trends associated with green bond financing. The findings are specific to India and may not be directly applicable to other countries or regions with different economic, political, and environmental contexts.

## 13. Scope for Future Study

The study focused on specific financial mechanisms (investments, green bonds, loan disbursements) but did not account for other potentially influential factors such as technological advancements, market conditions, policy changes, and infrastructure development. The study identified correlations between financial mechanisms and renewable energy capacity but did not establish causality. Other unidentified variables could influence the observed relationships. By addressing these gaps for future research directions, researchers can gain a more comprehensive understanding of the financial dynamics, driving renewable energy growth and develop more effective strategies to hasten the shift to sustainable energy.

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**Table-1: Loans Disbursement in India for the past 8 years (2016-2023)**

| Year | Loans issued in India (INR Crore) |
|---|---|
| 2016 | 3,521 |
| 2017 | 4,210 |
| 2018 | 4,921 |
| 2019 | 5,632 |
| 2020 | 6,246 |
| 2021 | 7,111 |
| 2022 | 8,827 |
| 2023 | 16,071 |

**Source:** (Year End Review 2023 of Ministry of New & Renewable Energy, 2024)

**Table-2: Carbon Emissions in India for the past 8 years (2016-2023)**

| Year | CO2 Emissions (in million tonnes) |
|---|---|
| 2016 | 2,796 |
| 2017 | 3,036 |
| 2018 | 3,299 |
| 2019 | 3,592 |
| 2020 | 3,899 |
| 2021 | 4,223 |
| 2022 | 4,568 |
| 2023 | 4,929 |

**Source:** (World Bank Open Data, 2024)

**Table-3: Renewable Energy Capacity in India for the past 8 years (2016-2023)**

| Year | Renewable energy capacity (GW) |
|---|---|
| 2016 | 64.2 |
| 2017 | 74.6 |
| 2018 | 87 |
| 2019 | 99.7 |
| 2020 | 113.7 |
| 2021 | 129.1 |
| 2022 | 147.2 |
| 2023 | 179.3 |

**Source:** (Ministry of New and Renewable Energy India, 2024)

**Table-4: Green Finance Investments in India for the past 8 years (2016-2023)**

| Year | Investment (INR crore) |
|---|---|
| 2016 | 382996 |
| 2017 | 457930 |
| 2018 | 541190 |
| 2019 | 632776 |
| 2020 | 732688 |
| 2021 | 840926 |
| 2022 | 957490 |
| 2023 | 1207270 |

**Source:** (Climate Policy Initiative, 2024)

**Table-5: Green bonds in India for the past 8 years (2016-2023)**

| Year | Value of green bonds issued (INR crore) |
|---|---|
| 2016 | 2786 |
| 2017 | 6966 |
| 2018 | 12344 |
| 2019 | 11804 |
| 2020 | 10937 |
| 2021 | 10210 |
| 2022 | 11380 |
| 2023 | 12800 |

**Source:** (*India Strengthens Its Credentials for Green Bond Issue*, 2024)

**Table-6: Impact of investment in green finance on renewable energy capacity**

| Model | R | R Square | Adjusted R Square | Std. Error | R Square Change | F Change | df1 | df2 | Sig. F Change |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.980 | 0.960 | 0.954 | 8.2532 | 0.960 | 145.691 | 1 | 6 | <0.001 |

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 9923.692 | 1 | 9923.692 | 145.691 | <0.001 |
| | Residual | 408.688 | 6 | 68.115 | | |
| | Total | 10332.380 | 7 | | | |

| Model | | Unstandardized B | Coefficients Std. Error | Standardized Coefficients Beta | t | Sig. | 90% Confidence Interval for B | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Lower Bound | Upper Bound |
| 1 | Constant | 26.789 | 6.086 | | 4.402 | 0.005 | 14.963 | 38.614 |
| | Investment | 0.000 | 0.000 | 0.980 | 12.070 | <0.001 | 0.000 | 0.000 |

**Note:** Dependent variable: Renewable energy capacity (GW)

**Predictors:** (constant), Investment in green finance sector in India (in INR crore)

**Source:** Data computed using SPSS

**Table-7: Impact of value of green bonds on renewable energy capacity**

| Model | R | R Square | Adjusted R Square | Std. Error | R Square Change | F Change | df1 | df2 | Sig. F Change |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 0.662 | 0.439 | 0.345 | 31.0875 | 0.439 | 4.691 | 1 | 6 | 0.073 |

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 2 | Regression | 4533.769 | 1 | 4533.769 | 4.691 | 0.073 |
| | Residual | 5798.611 | 6 | 966.435 | | |
| | Total | 10332.380 | 7 | | | |

| Model | | Unstandardized B | Coefficients Std. Error | Standardized Coefficients Beta | t | Sig. | 90% Confidence Interval for B | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Lower Bound | Upper Bound |
| 2 | constant | 16.969 | 36.014 | | 0.471 | 0.654 | -53.012 | 86.950 |
| | Investment | 0.008 | 0.003 | 0.662 | 2.166 | 0.073 | 0.001 | 0.014 |

**Note:** Dependent variable: Renewable energy capacity (GW)
**Predictors:** (constant), Value of green bonds issued (in INR crore)
**Source:** Data computed using SPSS

**Table-8: Impact of loan disbursements on renewable energy capacity**

| Model | R | R Square | Adjusted R Square | Std. Error | R Square Change | F Change | df1 | df2 | Sig. F Change |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 0.947 | 0.897 | 0.880 | 13.3060 | 0.897 | 52.359 | 1 | 6 | <0.001 |

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 3 | Regression | 9270.083 | 1 | 9270.083 | 52.359 | <0.001 |
| | Residual | 1062.297 | 6 | 177.050 | | |
| | Total | 10332.380 | 7 | | | |

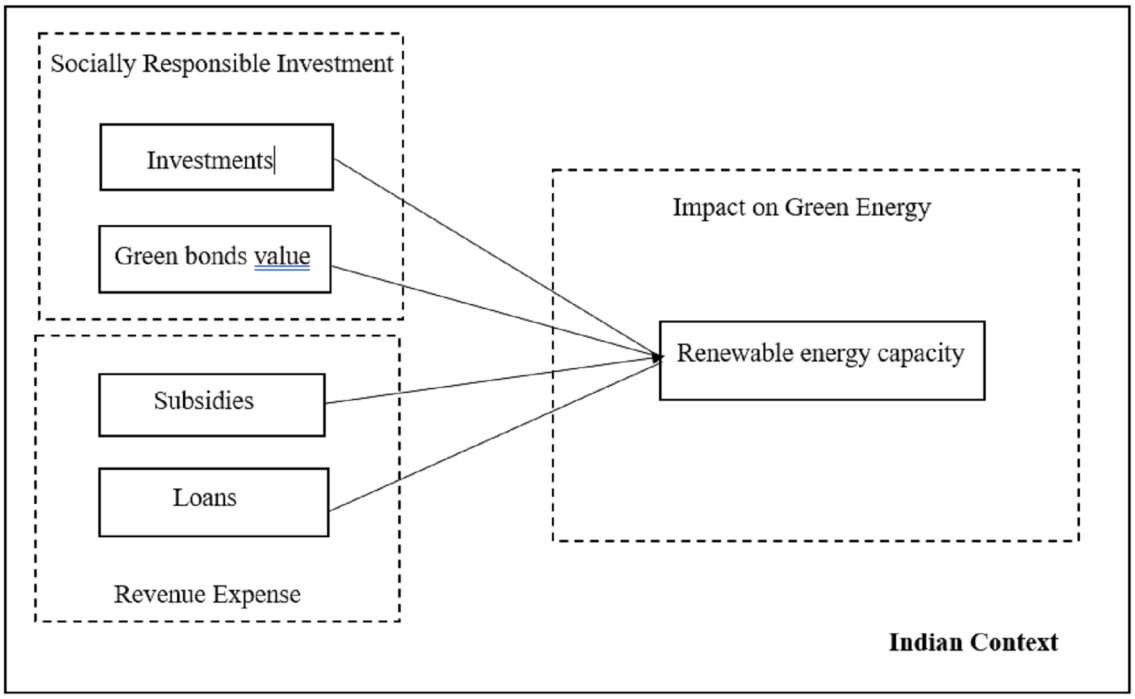
| | Model | Unstandardized B | Coefficients Std. Error | Standardized Coefficients Beta | t | Sig. | 90% Confidence Interval for B | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Lower Bound | Upper Bound |
| 3 | constant | 27.024 | 10.046 | | 2.690 | 0.036 | 7.503 | 46.544 |
| | Value of green bonds | 0.009 | 0.001 | 0.947 | 7.236 | <0.001 | 0.007 | 0.012 |

**Note:** Dependent variable: Renewable energy capacity (GW)

**Predictors:** (constant), Yearly loan disbursements for renewable energy projects (in INR crore)

**Source:** Data computed using SPSS

**Figure-1: Conceptual Framework**




**Source:** Framed by authors