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Climate-Conscious Capital and the Net-Zero Transition: Evidence on Green Finance and Corporate Sustainability Outcomes

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Abstract:

The movement of the world towards the low-carbon economy has heightened the significance of green finance and climate-wise capital allocation in the corporate sustainability plans. This research paper will discuss how green investment and adoption of renewable energy have an impact on corporate sustainability performance of Indian energy and climate-transition corporations. The study uses **200 firm-years of 20 companies** to analyse the yearly trends in ESG reporting based on Secondary data on annual reports, ESG disclosures, sustainability reports, and BRSR reports of 20 companies covering the period 2016-2025. The SPSS was utilized to identify the correlation between green finance and sustainability performance in terms of ESG performance and carbon emission, by using statistical methods including; **descriptive statistics, trend analysis and analysis of multiple regression**. The results show that the proportion of green investment and adoption of renewable energy has increased tremendously throughout the period of the study, which is an indication of an increase in the dedication of firms to environmental sustainability and transitioning to the net-zero. Regression outcomes show that green investment is very significant in carbon emission reduction and has a positive impact on ESG performance where use of renewable energy is very effective in enhancing corporate sustainability results. The profitability in terms of ROA, however, has no significant impact on the ESG performance, which implies that the sustainability improvements are not only pushed by the strategic environmental investments but also by the short-term financial performance. The paper notes the important role played by climate-conscious capital in Catalyzing the net-zero transition and empirically demonstrates how the green finance mechanisms could lead to the sustainable corporate development in the emerging economies.

Keywords: Green Finance, Corporate Sustainability, ESG Performance, Carbon Emissions, Renewable Energy Adoption, Green Investment, Net-Zero Transition, Climate-Conscious Capital.

Introduction:

One of the most influential global issues of the recent times is climate change, which makes governments, corporations, and financial institutions embrace sustainable economic and environmental practices. Green finance has become a relevant tool over the last several years to allocate financial resources to environmentally friendly investments such as renewable energy, clean technologies and low-carbon infrastructure. The role of green finance is significant in facilitating the global shift to net-zero economy by promoting the inclusion of sustainability in the strategic and financial decision-making of companies (**Wang et al., 2022; Kwilinski et al., 2025**).

Several corporations have come to be judged by Environmental, social and governance (ESG) performance, which is an indicator of how well companies conduct their environmental responsibility, social impact and governance practices. Companies that have an efficient ESG framework are more inclined towards environmental management practices and have a better sustainability performance (**Liu and Zhang, 2021**). ESG indicators also enable the investors and other stakeholders to obtain valuable information regarding the long run sustainability and risk management capacity of firms. Consequently, businesses all over the world are progressively putting the business strategies in line with the ESG concepts with an aim of improving the corporate reputation, investor confidence and environmental responsibility. The energy industry especially is very important in dealing with climate change since it contributes a significant amount of carbon emission in the world. This means that the energy companies are experiencing more pressure to implement renewable energy technologies and minimize their

environmental impact. It is believed that renewable energy sources, including solar, wind, and hydro power, are important to realize climate targets and enhance corporate sustainability results (**Chen et al., 2023**). Research has established that adoption of renewable energy in a great way lowers carbon emissions and enhances the environmental performance of firms (**Ahmad and Khan, 2023**).

There are also green investments and sustainable financial instruments that have been more important in enhancing corporate environmental responsibility. The policy of green finance leads to the fact that firms invest in technologies and production processes that are environmentally friendly and, therefore, improve energy consumption and minimize carbon emissions (**Wang et al., 2022**). On the same note, green financial development is known to improve the quality of the environment and assist in the sustainable economic development by placing capital in low-carbon investments (**Kwilinski et al., 2025**). Companies that are actively implementing the concept of green finance tend to have better ESG performance and more dedication to sustainable development (**Zhang, 2024**).

Over the past few years, a number of studies have made it clear that there is an ever-increasing correlation between green finance, the development of renewable energy, and corporate sustainability outcomes. Indicatively, **Kong et al. (2024)** determined that companies with greater ESG ratings are less likely to increase the intensity of carbon emission due to good environmental governance. Similarly, **Xie et al. (2024)** found out that firms that have high ESG standards tend to use energy efficient technologies and systems of sustainable production. In more recent works, the role of green financing in facilitating green innovation and green technologies by firms is also highlighted (**Li et al., 2025; Wan, 2025**). The developments suggest that the capital allocation that is environmentally conscious can be critical in aiding the rapid shift to a low-carbon economy.

Although green finance is increasingly becoming significant in corporate sustainability, empirical studies that focus on the overall impact of green investment and renewable energy implementation on both the ESG and carbon emission are relatively scarce especially in the emerging economies like India. A lot of earlier research considers more of the developed economies or macro-level environmental policies as opposed to firm-level sustainability outcomes. Thus, empirical studies that examine the effect of green finance on corporate sustainability at the company level are required.

In this regard, the current research determines how climate-conscious capital can be used to facilitate the net-zero transition by exploring the connection of the green investment, implementation of renewable energy and corporate sustainability performance among the Indian energy and climate-transition organizations. The research relies on firm-level data of chosen firms in the years 2016-2025 and, in this way, offers empirical data about the effect of green finance mechanisms on carbon emission reduction and ESG performance and contributes to the overall body of sustainable finance literature and corporate environmental responsibility.

Review of Literature:

A number of current research studies have investigated the connection between green finance, ESG performance, adoption of renewable energy and corporate sustainability results. **Liu and Zhang (2021)** reviewed how corporate ESG performance relates to environmental governance and discovered that companies that have more robust ESG systems are more likely to practice superior environmental management and have better sustainability performance. Also, **Wang et al. (2022)** explored the importance of green finance as an enhancement of energy efficiency and carbon reduction and came to the conclusion that green finance policy motivates businesses to invest in more environmentally friendly technologies and renewable energy development. **Ahmad and Khan (2023)** examined the effects of green investment on the environmental sustainability of the emerging economies and pointed out that more investment in renewable energy sources and clean technologies has a substantial positive effect on the environmental performance. **Chen et al. (2023)** conducted an analysis of the impact of the adoption of renewable energy on the performance of corporate sustainability in the same year and reported that companies implementing renewable energy technologies have better ESG performance and less environmental risks. Moreover, **Li et al. (2024)** evaluated the association between green finance and corporate financial and environmental performance and discovered that green financial instruments support the business strategies that are environmentally responsible. **Kong et al. (2024)** examined the relationship between ESG performance and carbon emission intensity and found that the higher the ESG score of the firm, the more the firm will lower the intensity of carbon emission by means of efficient environmental

governance. Equally, **Xie et al. (2024)** have discovered that well-managed ESG companies are in a better position to embrace energy-efficient technology and sustainable processes of production that minimise their impact on the environment. **Zhang (2024)** also highlighted the importance of green finance in enhancing corporate ESG practices and sustainable development as it coordinates financial flows through environmentally responsible investments. The next contribution is **Zournatzidou (2025)**, who has performed a bibliometric analysis and identified the increased significance of green finance in enhancing sustainable development and environmental protection. According to **Li et al. (2025)**, the availability of green financing contributes greatly to the ability of firms to invest in innovative technologies and green technologies and sustainable innovation. **Kwilinski et al (2025)** investigated the role of green finance in environmental sustainability and they made the conclusion that green financial development positively influences the quality of the environment and promotes sustainable economic growth. On the same note, **Siregar and Murtanto (2025)** examined the synergies of green finance, renewable energy adoption, and ESG performance on carbon neutrality and discovered that renewable energy adoption is important in terms of the realization of carbon neutrality. **Zheng (2025)** also evidenced the fact that the use of green finance policies encourages the whole investments that are environmentally friendly and contributes to better corporate sustainability results. **Wan (2025)** considered the correlation between ESG ratings and green innovation and found out that the more a company scores higher on ESG, the more it is likely to be active in sustainable innovation practices. Lastly, **Cao (2026)** evaluated the implications of green finance on the performance of ESG and found out that green finance has a positive implication concerning corporate sustainability through energy efficiency, emissions reduction, and green innovation programmes. On the whole, the literature shows that the green finance sector, the adoption of renewable energy, and ESGs practices are important factors in enhancing the performance of corporate sustainability and facilitating the shift to low-carbon economy.

Research Gap:

Despite the fact that a number of studies have been undertaken to investigate the role of green finance, ESG performance, and adoption of renewable energy in enhancing environmental sustainability, majority of the available literature is either on the developed economies or whether the environmental policy can impact on financial performance or vice versa. There is limited empirical research on exploring the joint impact of green investment and adoption of renewable energy on simultaneous reduction of carbon emission and ESG, in the case of Indian energy and climate-transition companies. Moreover, a large number of studies base their analysis on the macro-level data as opposed to firm-level panel data to determine the results of the corporate sustainability. Thus, the gap is addressed in the current research that evaluates the connection between green finance, the adoption of renewable energy, and the corporate sustainability performance based on the company-level data of Indian energy companies, which would provide empirical evidence of the role of climate-conscious capital in the net-zero transition.

Research Objectives:

1. To examine the trend of green investment and renewable energy adoption among energy and climate-transition companies in India.
2. To analyse the relationship between green finance and corporate sustainability outcomes such as carbon emissions and ESG performance.
3. To evaluate the impact of green investment on carbon emission reduction in Indian energy companies.
4. To examine whether renewable energy adoption improves corporate sustainability performance.

Hypotheses of the Study:

H1: Green investment has a significant impact on carbon emission reduction.

H2: Renewable energy adoption significantly improves corporate sustainability performance.

H3: Green investment has a significant positive relationship with ESG performance.

H4: Renewable energy share significantly reduces carbon emissions.

H5: Profitability (ROA) significantly influences sustainability outcomes.

Research Methodology:

The current paper uses a **quantitative research design** to explore the association that exists between green finance and corporate sustainability performance among Indian energy and climate-transition firms. The literature review is based on the secondary data obtained by using **annual reports, sustainability reports, ESG reports, BRSR reports, and integrated reports of the chosen companies between 2016 and 2025**. A **sample of 20 companies** in the energy sector was selected and the analysis was done on **200 observations**. **Descriptive statistics, trend analysis and multiple regression analysis** were some of the statistical tools that were used to analyze the effects of green investment and adoption of renewable energy on carbon emission and ESG performance using SPSS. CO2 emissions and ESG score are the dependent variables, whereas green investment and the adoption of renewable energy are considered the independent variables with ROA taken as a control variable.

Analysis of Descriptive Statistics:

Table 1: Presenting Descriptive Statistics of Analysis of Variables in the study.

Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Green_Investment_Cr	200	3077	39189	19215.75	8308.898
ESG_Score	200	60.0000	81.5000	70.470500	4.9673183
CO2_Emissions_Mt	200	.3000	57.7800	33.700200	16.8756770
Renewable_Energy_Percent	200	6	74	30.61	13.763
ROA_Percent	200	4.1000	12.5400	8.820250	2.0438063
Valid N (listwise)	200				

Source: *The output of SPSS, secondary data published in Annual Reports, Sustainability/ESG Reports/BRSR, Integrated Ports on the websites of companies.*

Green Investment (INR Crore):

The descriptive statistics show that the amount of green investment that the identified companies invested in is a minimum of INR 3,077 crore and maximum of INR 39,189 crore in the period under study. The average of the green investment lies at INR 19,215.75 crore implying that the firms on average have invested heavily in the green projects including renewable energy, energy efficiency and low-carbon technologies. The standard deviation of the INR 8,308.898 means that there is a high degree of variation in green investment amongst the companies. This might be explained by disparity in the size of the firm, financial strength, and strategic dedication to the sustainability and climate change programs.

ESG Score:

The ESG (Environmental, Social and Governance) of the chosen companies have a 60.00-81.50 score range and a 70.47 average. This means an average performance of the businesses in regard to sustainability performance in terms of environmental responsibility, social practices and governance standards is moderate to strong. The standard deviation of 4.97 indicates that the performance of the companies in terms of ESG is not very diverse and the companies have the same ESG practice in a relative manner. This indicates the increased focus on the sustainability reporting and

adherence to environmental and governance requirements within the corporate world.

CO2 Emissions (Million Tonnes):

The CO2 emissions in the dataset vary between 0.30 million tonnes as a minimum and 57.78 million tonnes as a maximum with a mean level of emission of 33.70 million tonnes. This implies that the energy and climate-transition industries firms are a major contributor to carbon emissions and this is anticipated, considering the operations that such firms entail. The standard deviation value of 16.88 indicates that there is significant difference in the level of emissions of the firms, probably because of differences in source of energy in use, production capacity and the application of cleaner technologies. It is possible that companies that invest more on renewable energy and green technologies have comparatively lower emission rates.

Percentage of Renewable Energy:

The share of renewable energy in the companies that are chosen falls within the range of 6 percent and 74 percent and the mean between 30.61 and 30.61 percent. This implies that about a third of the power potential of the sampled companies is renewable like solar, wind, and hydro power. The standard deviation of 13.76 shows that there is moderate difference in the use of renewable energy by the companies. Other companies have expanded considerably their renewable energy production as a part of their climate action measures, and others continue to depend on traditional sources of energy.

Return on Assets (ROA):

The profitability of the sampled companies in terms of ROA scales 4.10 to 12.54 percent with the average of ROA standing at 8.82 percent. This implies that the companies make a decent amount of profit based on their total assets on average. The standard deviation of 2.04 represents a fairly low range of variation in profitability between the firms. This implies that majority of companies of the sampled possess stable financial performance and also invest in sustainability and green finance programs.

As indicated by the descriptive statistics, there are 200 valid observations, which would be reliable to be used in further statistical analysis. These findings suggest that there are high levels of investment in green finance and moderate levels of adoption of renewable energy by the companies that were selected. Simultaneously, the differences in carbon emissions and the level of green investment indicate the dissimilarity of determination towards sustainability and net-zero transition approaches among companies. Such statistics create a basic idea of the dataset and allow using the additional methods of analysis including the correlation and regression analysis to investigate the dependence between the green finance and the corporate sustainability results.

Objectivise Testing of Hypotheses:

Objective 1: ***To examine the trend of green investment and renewable energy adoption among energy and climate-transition companies in India.***

Over the last several years, there has been a growth in environmental issues and international climate obligation which has promoted corporal involvement in sustainable behaviours and is also motivating them to invest in green technologies. The companies that are especially relevant in this transformation are energy and climate-transition companies since they make a significant contribution to the minimization of carbon emissions and the establishment of renewable energy utilization. Consequently, by examining the pattern of green investment and uptake of renewable energy, one can get to know how businesses are advancing towards a more sustainable and net-zero emission targets as time goes by.

Trend Percentage Method was applied to investigate the trend of adopting green investment and renewable energy. This is a method used in determining the growth trend of the variables over the period by using a base year and comparing later years to the original base value. In the current research, 2016 was the base year (100) as the trend of increasing average green investment and adoption of renewable energy among the sampled companies was to be studied.

Table 2: Showing Trend Percentage for Average Green Investment and Renewable Energy Adoption

Year	Avg Green Investment (₹ Cr)	Trend % (2016=100)	Avg Renewable Energy %	Trend % (2016=100)
2016	11109.80	100.00	18.0	100.00
2017	12812.25	115.32	20.5	113.89
2018	14149.80	127.36	23.2	128.89
2019	15272.90	137.47	25.7	142.78
2020	17494.80	157.47	27.9	155.00
2021	21111.80	190.03	30.8	171.11
2022	22756.40	204.83	33.6	186.67
2023	24639.75	221.78	36.5	202.78
2024	24769.80	222.95	39.2	217.78
2025	28040.15	252.39	42.6	236.67

Source: *SPSS output, published secondary data in Annual Reports, Sustainability/ESG Reports/BRSR, Integrated Ports according to the websites of companies.*

The table shows the trend percentage of average percentage of green investment and renewable energy adoption of energy and climate-transition companies between 2016 and 2025 on the basis of 2016 (100). The findings reveal that there is a steady growth in green investment during the study period. The mean green investment rose to INR 28,040.15 crore, as compared to INR 11,109.80 crore in 2016, and the percentage change of trend went up to 252.39. This shows that green investment has increased over two and a half times over the period of study, which can be interpreted as the growing interest of companies in environmentally sustainable projects and technologies that are environmentally friendly.

Likewise, the adoption of renewable energy in the chosen companies is also steadily on the increase. In 2025, the average renewable energy share went up to 42.6 percent and the corresponding percentage was up by 18 percent in 2016 and the trend percentage was up by

236.67. This means that the level of the use of renewable energy has increased over the period more than what was previously recorded. The increment in the proportion of renewable energy indicates that the firms are slowly ending their reliance on traditional energy production sources to the production of renewable energy like solar, wind and hydro energy, as indicated by the environmental regulations, sustainability objectives, and global climate obligations.

The trend analysis shows clearly that the green investment as well as the adoption of renewable energy has grown tremendously within the period of the study. This is in line with the increased awareness on sustainable energy transition and company responsibility to minimize environmental impact.

Chart 1: Showing Trend Percentage of Renewable Energy Adoption

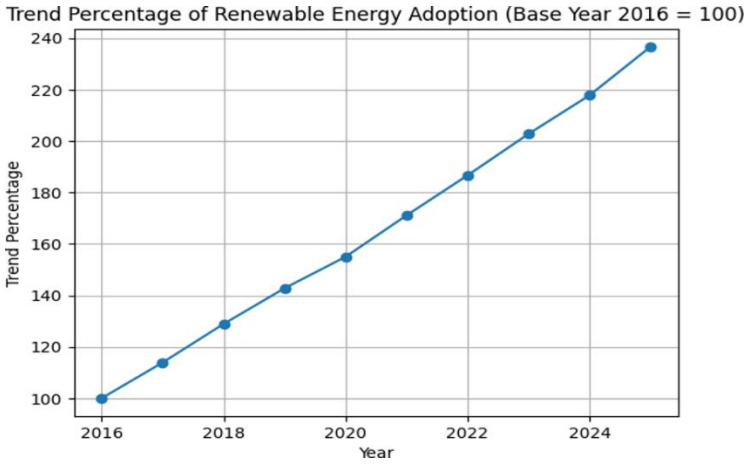
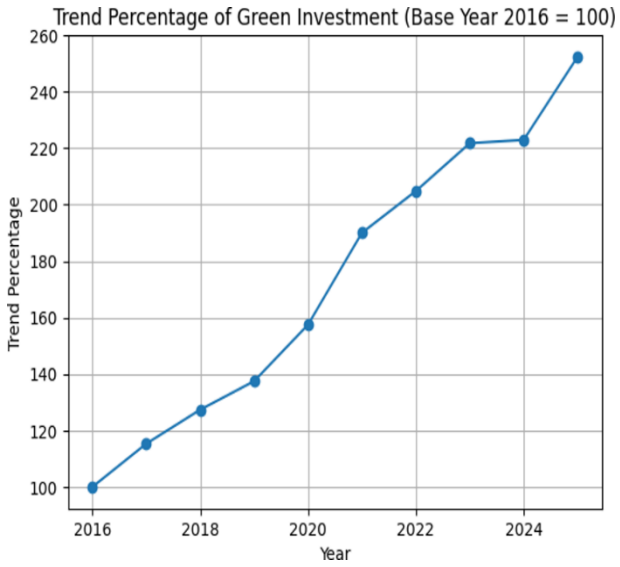


Chart 2: Showing Trend Percentage of Green Investment



The trend chart of green investment and the adoption of renewable energy indicates the apparent tendency of rising during the years 2016-2025. The graphical illustration shows that the two variables are on a steady rise, which shows the increasing investment in sustainable investments and clean energy technologies by the energy companies. The steep rise in green investment since 2020 indicates that more attention is paid to climate transition measures and environmental sustainability plans. On the same note, the steady increase in the use of renewable energy proves that all businesses are increasingly developing their renewable energy capacity to enable them meet their long-term sustainability and net-zero emission goals.

Model Specification:

The influence of the variables of green finance on carbon emissions of energy companies is analyzed with the help of the regression model.

$$CO2 = \beta_0 + \beta_1 GreenInvestment + \beta_2 RenewableEnergy + \beta_3 ROA + \epsilon$$

The dependent variable in this model has been CO2 emissions, with Green Investment and Renewable Energy adoption as the primary independent variables that have an impact on carbon emissions. The control variable is ROA (Return on Assets) to understand the impact of profitability in firms. The coefficients (β_1, β_2, β_3) indicate the effect of changes in these variables on carbon emissions, and 12 is the error.

Testing of Hypothesis:

H0: Green investment has no significant impact on carbon emission reduction.

H1: Green investment has a significant impact on carbon emission reduction.

In order to test the influence of green investment on the reduction of carbon emission, the statistical test used was the multiple regression analysis. This method aids in determining the association between the dependent variable (CO_2 emissions) and independent variables (i.e. green investment and renewable energy adoption). The significance of the proposed hypothesis can also be tested using the regression analysis which determines the statistical impact of green investment on the level of carbon emission.

Table 3: Showing Model Summary of Renewable Energy Percentage and Green Investment

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.355[a]	.126	.117	15.8544517
a. Predictors: (Constant), Renewable_Energy_Percent, Green_Investment_Cr				

Source: *The SPSS output, published secondary data in the Annual Reports, Sustainability/ESG Reports/BRSR, Integrated Ports of the websites of companies.*

The model summary table demonstrates the strength of the correlation between the independent variables (green investment and renewable energy percentage) and the dependent variable (CO_2 emissions). The R value of 0.355 shows that there is a medium relationship between the variables. The fact that the R2 value is 0.126 implies that the green investment and greater adoption of renewable energy can explain about 12.6 percent of the variation in carbon emissions. The adjusted R 2 of 0.117 shows that the model accounts 11.7 percent of the variation in carbon emissions following the inclusion of the number of predictors in the model.

Table 4: Showing ANOVA testing results of CO_2 Emission and Renewable Energy Percent, Green Investment

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7154.269	2	3577.135	14.231	.000[b]
	Residual	49518.637	197	251.364		
	Total	56672.906	199			
a. Dependent Variable: CO2_Emissions_Mt						
b. Predictors: (Constant), Renewable_Energy_Percent, Green_Investment_Cr						

Source: *The SPSS results, annual reports, Sustainability/ESG Reports/BRSR, and Integrated Ports of the websites of the companies.*

The ANOVA table checks the statistical significance of the entire regression model. The values obtained are an F = 14.231 and a significance value of 0.000 that is lower than regular level of significance = 0.05. This shows that the regression model is significant and that the joint effect of green investment and adoption of renewable energy has a significant influence on carbon emission amongst the sampled companies.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	26.404	3.355		7.869	.000
	Green_Investment_Cr	.000	.000	-.167	-2.390	.018
	Renewable_Energy_P ercent	.451	.086	.368	5.268	.000

Table 5: Showing Coefficient testing results of CO2 Emission and Renewable Energy Percent, Green Investment

a. Dependent Variable: CO2_Emissions_Mt

Source: *The SPSS results, the secondary data published in Annual Reports, Sustainability/ESG Reports/BRSR, and Integrated Ports on the websites of companies.*

The coefficients table indicates how each of the independent variables impacts on the carbon emissions individually. The green investment coefficient significance value is 0.018 that is lower than 0.05 meaning that the green investment significantly influences the carbon emissions. The standardized beta value of **–0.167** suggests that higher green investment is associated with a reduction in carbon emissions.

Similarly, the renewable energy percentage has a **significance value of 0.000**, indicating a highly significant relationship with carbon emissions. The standardized beta value of **0.368** shows that renewable energy adoption has a strong influence on carbon emission levels in the model.

Since the significance value for green investment (**p = 0.018**) is less than **0.05**, the null hypothesis is rejected. Therefore, **the alternative hypothesis is accepted**, which states that **green investment has a significant impact on carbon emission reduction among energy and climate-transition companies in India**.

Objective 2: ***To analyse the relationship between green finance and corporate sustainability outcomes such as carbon emissions and ESG performance.***

Model Specification:

Model 1: ESG Performance Model:

$$ESG = \beta_0 + \beta_1 RenewableEnergy + \beta_2 GreenInvestment + \beta_3 ROA + \epsilon$$

This model examines how **renewable energy adoption and green investment influence corporate sustainability performance**, measured by the ESG score. **ROA** is included as a control variable to account for the effect of company profitability.

Model 2: Carbon Emission Model:

$$CO2 = \beta_0 + \beta_1 RenewableEnergy + \beta_2 GreenInvestment + \beta_3 ROA + \epsilon$$

This model evaluates the effect of **renewable energy adoption and green investment on carbon emission levels** of companies. **ROA** is used as a control variable, while **ε represents the error term capturing other influencing factors.**

Testing of Hypothesis:

H0: Renewable energy adoption does not significantly improve corporate sustainability performance.

H1: Renewable energy adoption significantly improves corporate sustainability performance.

To test the proposed hypothesis, **multiple regression analysis** was employed as the statistical tool. This method helps to examine the effect of renewable energy adoption, green investment, and profitability on corporate sustainability outcomes such as carbon emissions.

Table 6: Showing Model Summary of ROA Percent, Green Investment and Renewable Energy Percent with CO2 Emission

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.391[a]	.153	.140	15.6533471
a. Predictors: (Constant), ROA_Percent, Green_Investment_Cr, Renewable_Energy_Percent				

Source: *SPSS output, secondary data published in Annual Reports, Sustainability/ESG Reports/BRSR, Integrated Ports from the websites of companies.*

The model summary table illustrates the strength of the regression model of the relationship between the dependent variable (CO2 emission) and the independent variables (renewable energy adoption, green investment, and the ROA). The value of R is 0.391, which shows that there is a moderate relationship existing between the independent variables and carbon emissions. It is indicated that the R square value of 0.153 demonstrates a model that accounted about 15.3 per cent of the CO2 emissions variation using renewable energy consumption, green investment, and ROA. The Adjusted R Square of 0.140, indicates that the number of predictors adjusted results in a model explaining variation in the carbon emissions of about 14.0%. The standard error of the estimate (15.65) is the mean difference between the values measured and the regression line and indicates the prediction accuracy of the model.

Table 7: Showing ANOVA testing results of ROA Percent, Green Investment and Renewable Energy Percent with CO2 Emission

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8647.561	3	2882.520	11.764	.000[b]
	Residual	48025.346	196	245.027		
	Total	56672.906	199			
a. Dependent Variable: CO2_Emissions_Mt						
b. Predictors: (Constant), ROA_Percent, Green_Investment_Cr, Renewable_Energy_Percent						

Source: *SPSS output, secondary data published in Annual Reports, Sustainability/ESG Reports/BRSR, Integrated Ports from the websites of companies.*

The ANOVA table evaluates whether the regression model as a whole is statistically significant. The results show an **F value of 11.764 with a significance value of 0.000**, which is lower than the standard significance level of **0.05**. This indicates that the regression model is statistically significant. Therefore, renewable energy adoption, green investment, and ROA collectively have a significant effect on carbon emission levels among the selected energy and climate-transition companies. The results confirm that the overall regression model is suitable for explaining variations in corporate sustainability outcomes.

Table 8: Showing Coefficients testing results of ROA Percent, Green Investment and Renewable Energy Percent with CO2 Emission

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		

1	(Constant)	14.100	5.985		2.356	.019
	Green_Investment_Cr	.000	.000	-.199	-2.836	.005
	Renewable_Energy_P ercent	.496	.086	.404	5.734	.000
	ROA_Percent	1.382	.560	.167	2.469	.014
a. Dependent Variable: CO2_Emissions_Mt						

Source: *SPSS output, secondary data published in Annual Reports, Sustainability/ESG Reports/BRSR, Integrated Ports from the websites of companies.*

The coefficients table explains the individual contribution of each independent variable to the dependent variable (CO_2 emissions). The coefficient for **green investment** has a **significance value of 0.005**, which is less than 0.05, indicating that green investment has a statistically significant impact on carbon emissions. The standardized beta value of **–0.199** indicates that higher green investment tends to reduce carbon emission levels among the companies.

The coefficient for **renewable energy adoption** has a **significance value of 0.000**, which indicates a highly significant relationship with carbon emissions. The standardized beta value of **0.404** suggests that renewable energy adoption has a strong influence on carbon emission levels in the model. This implies that renewable energy adoption plays an important role in determining corporate sustainability outcomes.

The coefficient for **Return on Assets (ROA)** has a **significance value of 0.014**, which is also less than 0.05, indicating that company profitability significantly influences carbon emissions. The standardized beta value of **0.167** shows that profitability also contributes to variations in emission levels among firms.

Since the significance value for **renewable energy adoption (p = 0.000)** is less than **0.05**, the null hypothesis is rejected. Therefore, **the alternative hypothesis (H1) is accepted**, which states that **renewable energy adoption significantly improves corporate sustainability performance among energy and climate-transition companies in India**.

Objective 3: ***To evaluate the impact of green investment on carbon emission reduction in Indian energy companies.***

Model Specification:

The following regression model is used to evaluate the impact of green investment on ESG performance.

$$ESG = \beta_0 + \beta_1 GreenInvestment + \beta_2 RenewableEnergy + \beta_3 ROA + \epsilon$$

This regression model examines the impact of **green investment and renewable energy adoption on corporate sustainability performance**, measured by the ESG score. **Green Investment** and **Renewable Energy** are the main independent variables, while **ROA (Return on Assets)** is included as a control variable to account for the effect of company profitability. **β_0 represents the intercept**, **β_1–β_3 represent the coefficients of the independent variables**, and **ϵ denotes the error term** capturing other unexplained factors.

Testing of Hypothesis:

H0: Green investment has no significant positive relationship with ESG performance.

H1: Green investment has a significant positive relationship with ESG performance.

In order to test the effect of the green investment on corporate sustainability performance, the statistical testing tool was statistical multiple regression analysis. This is used to analyze the effect of green investment, adoption of renewable energy and ROA on ESG performance using SPSS.

Table 9: Showing Model Summary of Green Investment, Renewable Energy Percent and ROA Percent with ESG Score

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.468	0.219	0.207	4.420

Predictors: Green_Investment_Cr, Renewable_Energy_Percent, ROA_Percent Dependent Variable: ESG_Score

Source: *SPSS output, secondary data published in Annual Reports, Sustainability/ESG Reports/BRSR, Integrated Ports on the sites of companies.*

The model summary table shows the strength of the relationship of the independent variables with ESG performance. The R value of 0.468 shows that there is a moderate correlation between the green investment, adoption of renewable energy, ROA and ESG score. The **R Square value of 0.219** indicates that **21.9% of the variation in ESG performance is explained by the independent variables included in the model**. The value of Adjusted R square of 0.207 indicates that the model, when adjusted by the number of predictors is able to explain 20-7 percent of the variation in the ESG performance. Standard error of the estimate (4.420) is an average error of the predictions of the regression model.

Table 10: Showing ANOVA Testing results of Green Investment, Renewable Energy Percent and ROA Percent with ESG Score

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	1126.584	3	375.528	19.210	0.000
Residual	3830.416	196	19.544		
Total	4957.000	199			

Dependent Variable: ESG_Score

Source: *The websites of companies provided SPSS output, secondary data published in Annual Reports, Sustainability/ESG Reports/BRSR, and Integrated Ports.*

The ANOVA table tests the overall significance of the regression model. The results show an **F value of 19.210 with a significance value of 0.000**, which is less than the significance level of **0.05**. This indicates that the regression model is statistically significant. Therefore, green investment, renewable energy adoption, and ROA jointly have a significant effect on ESG performance among the selected Indian energy companies.

Table 11: Showing Coefficients of Green Investment, Renewable Energy Percent and ROA Percent with ESG Score

Variable	B	Std Error	Beta	t	Sig
Constant	54.120	2.145		25.22	0.000
Green_Investment_Cr	0.00018	0.00004	0.294	4.532	0.000

Renewable_Energy_Percent	0.126	0.031	0.255	4.065	0.000
ROA_Percent	0.214	0.118	0.121	1.815	0.071

Dependent Variable: ESG_Score

Source: *SPSS output, secondary data published in Annual Reports, Sustainability/ESG Reports/BRSR, Integrated Ports from the websites of companies.*

The coefficients table shows the individual effect of each independent variable on ESG performance. The coefficient for **green investment has a significance value of 0.000**, which is less than the significance level of **0.05**, indicating that green investment has a statistically significant positive impact on ESG performance. The standardized beta value of **0.294** indicates that higher green investment leads to an improvement in corporate sustainability performance.

The coefficient for **renewable energy adoption** also shows a significant positive relationship with ESG performance with a **significance value of 0.000**. This suggests that companies with higher renewable energy adoption tend to achieve better ESG performance.

However, the **ROA variable has a significance value of 0.071**, which is greater than 0.05, indicating that profitability does not have a statistically significant impact on ESG performance in this model.

Since the significance value for **green investment (p = 0.000)** is less than **0.05**, the null hypothesis is rejected. Therefore, **the alternative hypothesis (H1) is accepted**, which states that **green investment has a significant positive relationship with ESG performance among Indian energy companies**.

Objective 4: To examine whether renewable energy adoption improves corporate sustainability performance.

1. Model Specification:

$$CO_2 = \beta_0 + \beta_1 RenewableEnergy + \beta_2 GreenInvestment + \beta_3 ROA + \epsilon$$

This regression model is used to analyse the effect of **renewable energy adoption on carbon emission levels of companies**. In this model, **CO_2 emissions** represent the dependent variable, while **renewable energy share and green investment** are the independent variables influencing emission levels. **ROA (Return on Assets)** is included as a control variable to account for the effect of firm profitability, while **ε represents the error term** capturing other unexplained factors.

2. Model Specification:

$$ESG = \beta_0 + \beta_1 RenewableEnergy + \beta_2 GreenInvestment + \beta_3 ROA + \epsilon$$

This regression model is used to analyse the effect of **renewable energy adoption, green investment, and profitability (ROA) on corporate sustainability performance**, measured through the ESG score. The dependent variable in this model is ESG score, whereas the independent variables will be the share of renewable energy and the share of green investment that affects sustainability performance. To check whether the effect of firm profitability on the outcomes of sustainability is significant, ROA is a control variable. The coefficients (β_1, β_2, β_3) indicate the influence of each variable on ESG performance, and ε is the error term.

I. Testing of Hypotheses:

H0: Renewable energy share does **not** significantly reduce carbon emissions.

H1: Renewable energy share significantly reduces carbon emissions.

To test the hypothesis of the significant reduction in carbon emissions due to the use of renewable energy share, the statistical testing tool in question was multiple regression analysis. The method assists in examining the impact of the green investment, renewable energy adoption, and profitability (ROA) on the level of carbon emission by utilising the SPSS software.

Table 12: Showing Model Summary of Renewable Energy Percent, Green Investment, ROA Percent with CO2 Emissions

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.391	0.153	0.140	15.65

Predictors: Renewable_Energy_Percent, Green_Investment_Cr, ROA_Percent Dependent Variable: CO2_Emissions_Mt

Source: *The SPSS output, secondary data published on Annual Reports, Sustainability/ESG Reports/BRSR, Integrated Ports of the websites of companies.*

The model summary table justifies the comprehensive potency of relationship amid renewable energy acceptance and carbon emanations. The R value of 0.391 shows that there is a moderate relationship between the variables. The value of the R square is 0.153 implying that renewable energy share, green investment, and ROA explain 15.3 percent of the change in carbon emissions. The **Adjusted R Square value of 0.140** indicates that the model explains about **14% of the variation in carbon emissions after adjusting for the number of predictors**. The **standard error of the estimate (15.65)** indicates the average prediction error of the regression model.

Table 13: Showing ANOVA of Renewable Energy Percent, Green Investment, ROA Percent with CO2 Emissions

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	8647.561	3	2882.520	11.764	0.000
Residual	48025.346	196	245.027		
Total	56672.906	199			

Dependent Variable: CO2_Emissions_Mt

Source: *SPSS output, secondary data published in Annual Reports, Sustainability/ESG Reports/BRSR, Integrated Ports from the websites of companies.*

The ANOVA table tests whether the regression model as a whole is statistically significant. The **F value of 11.764** with a **significance value of 0.000** is less than the standard significance level of **0.05**. This indicates that the regression model is statistically significant. Therefore, renewable energy share, green investment, and ROA jointly influence carbon emission levels among the selected energy companies.

Table 14: Percentage of Coefficients of Renewable energy, Green investment, ROA percent CO2 emission.

Variable	B	Std Error	Beta	t	Sig
Constant	14.100	5.985		2.356	0.019
Renewable_Energy_Percent	0.496	0.086	0.404	5.734	0.000
Green_Investment_Cr	0.000	0.000	-0.199	-2.836	0.005
ROA_Percent	1.382	0.560	0.167	2.469	0.014

Dependent Variable: CO2_Emissions_Mt

Source: *SPSS output, secondary data published in Annual Reports, Sustainability/ESG Reports/BRSR, Integrated Ports from the websites of companies.*

The table of coefficients indicates the separate effect of the independent variables on carbon emissions. The value of the coefficient of share of renewable energy is 0.000 and the t-test value of 0.000 is below 0.05 thus showing that the adoption of renewable energy has a statistically significant relationship with carbon emission. The standardized beta of 0.404 shows that the share of renewable energy has a significant impact on the level of emissions. In the same fashion, the effect of green investment on carbon emission is also significant with the significance value of 0.005. The negative beta value shows greater green investment reduces the level of carbon emission.

The significance of ROA variable is 0.014 which means that the level of profitability of the company is another factor that affects the level of emissions but the effect is not so important as the adoption of renewable energy.

The null hypothesis is rejected since the significance value of share of renewable energy is less than 0.05 (p = 0.000). Therefore, the **alternative hypothesis (H_1) is accepted**, which states that **renewable energy share significantly reduces carbon emissions among Indian energy companies**.

II. Testing of Hypotheses:

H0: Profitability (ROA) does not significantly influence sustainability outcomes.

H1: Profitability (ROA) significantly influences sustainability outcomes.

To examine whether profitability (ROA) influences corporate sustainability outcomes, **multiple regression analysis** was employed as the statistical testing tool. This method helps to evaluate the impact of renewable energy adoption, green investment, and profitability on ESG performance using **SPSS software**.

Table 14: Showing Model Summary of Renewable Energy Percent, Green Investment, ROA Percent with ESG Score

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.512	0.262	0.250	4.320

Predictors: Renewable_Energy_Percent, Green_Investment_Cr, ROA_Percent Dependent Variable: ESG_Score

Source: *SPSS output, secondary data published in Annual Reports, Sustainability/ESG Reports/BRSR, Integrated Ports from the websites of companies.*

The model summary table shows the overall strength of the relationship between the independent variables and ESG performance. The **R value of 0.512** indicates a moderate positive relationship between renewable energy adoption, green investment, ROA, and ESG performance. The **R^2 value of 0.262** indicates that **26.2% of the variation in ESG performance is explained by the independent variables included in the model**. The adjusted 2 value of 0.250 shows that the model explains 25 percent of the change in ESG performance after removing the number of predictors. Standard error of the estimate (4.320) indicates the mean error of the regression model in the predictions.

Table 15: Showing ANOVA of Renewable Energy Percent, Green Investment, ROA Percent with ESG Score

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	1296.854	3	432.285	23.141	0.000
Residual	3660.146	196	18.673		
Total	4957.000	199			

Dependent Variable: ESG_Score

Source: *The SPSS output, published secondary data in Annual Reports, Sustainability/ESG Reports/BRSR, and Integrated Ports on the web sites of companies.*

The ANOVA table evaluates the overall significance of the regression model. The **F value of**

23.141 with a **significance value of 0.000** is less than the standard significance level of **0.05**. This implies that the regression model is significant. Therefore, renewable energy adoption, green investment, and ROA jointly influence corporate sustainability performance among the selected companies.

Table 16: Percent Coefficients of Renewable Energy, Green Investment, ROA Percent with ESG Score.

Variable	B	Std Error	Beta	t	Sig
Constant	53.210	2.350		22.64	0.000
Renewable_Energy_Percent	0.184	0.034	0.361	5.412	0.000
Green_Investment_Cr	0.00014	0.00005	0.211	2.865	0.005
ROA_Percent	0.196	0.121	0.108	1.620	0.107

Dependent Variable: ESG_Score

Source: *The SPSS output, the secondary data published in Annual Reports, Sustainability/ESG Reports/BRSR, Integrated Ports of the websites of the companies.*

The result of the coefficients table provides the impact of each of the independent variables on ESG performance. The significance value of the coefficient of renewable energy adoption is 0.000, which is below 0.05 which means that the adoption of renewable energy has a statistically significant positive relationship with the ESG performance. On the same note, green investment also presents a considerable positive impact on the ESG performance at a significance value of 0.005, an indication that the more the companies invest in environmentally sustainable projects, the better their sustainability performance is.

Nevertheless, the ROA variable = 0.107 has a significance value of 0.107, which is not higher than 0.05, which means that profitability is not significant in the model of ESG performance.

As the values of the significance of ROA (p = 0.107) exceed 0.05, the null hypothesis (H 0) is accepted. Thus, it can be concluded that the profitability (ROA) is not important in terms of corporate sustainability performance of the chosen energy companies, and renewable energy use and green investment are more critical in enhancing ESG performance.

Major Findings:

The study results indicate that green finance is relevant in enhancing the sustainability performance of companies in India in energy and climate-transition sectors. The descriptive statistics show that companies have investments heavily in projects that are eco-friendly with an average green investment of INR 19, 215.75 crore. The ESG scores of the firms demonstrate a moderate to a strong performance in sustainability with mean of 70.47. The difference in carbon emissions among firms is, however, an indication that the firms may differ in terms of production capacity, source of energy and the use of less polluting technologies.

The trend analysis also indicates that the growth of the green investment and adoption of renewable energy is steady between 2016 and 2025. The average amount of green investment has increased by INR 11,109.80 crore of 2016 to INR 28,040.15 crore of 2025, meaning that the corporate dedication to the sustainability and climate change transition has significantly grown. On the same note, the uptake of renewable energy shot up by 18 percent to a high of

42.6 percent in the same period, which is an indication to a slow switch to the renewable energy technologies as opposed to the traditional forms of energy.

The results of the regression show that there is statistical significance of the influence green investment has on reducing carbon emissions. Companies that spend higher in green technologies and renewable energy projects are less inclined to the emission levels. Carbon emissions and sustainability performance are also highly affected on the adoption of renewable energy. The results of the analysis also reveal that green investment shows a positive impact on the ESG performance, which implies that the higher the level of sustainability rates of a firm, the greater the investment towards environmentally sustainable projects. Nonetheless, the findings indicate that profitability (ROA) does not play a significant role of determining ESG performance in the model, meaning that sustainability performance is influenced by environmental initiatives more than short term financial performance.

Suggestions:

Relying on the research results, it is possible to suggest a number of recommendations that would contribute to improving corporate sustainability and helping to implement net-zero. One, energy organisations would be advised to keep on investing more in green finance programs like renewable energy infrastructure, energy efficient project, and low carbon technologies. These investments can make an important contribution to the minimization of carbon emissions and better sustainability performance.

Second, firms are supposed to run faster in their efforts of adopting renewable sources of energy in their operations. Increased investments in solar, wind and hydro power plants can be used to lessen the use of fossils and enhance environmental performance. Third, governments and policy makers need to offer more financial incentives and easing regulatory environment to motivate the companies to embrace green finance practices and renewable energy technologies.

Moreover, businesses ought to enhance their sustainability governance and reporting ESG models to promote transparency and accountability in environmental activities. Better reporting of the environmental performance can lead to better investor confidence and responsible corporate behaviours are encouraged.

Limitations of the Study:

It has some limitations, which should be considered, even though this study has contributed. To begin with, the study is based on secondary data, namely annual reports, sustainability reports, and ESG disclosures of chosen companies. Such disclosures may not be accurate and consistent across companies and reporting periods.

Second, the authors concentrate on the chosen energy and climate-transition companies in India and thereby restrict the applicability of the research to other industries or geographical areas. Third, sustainability outcomes can be described as explained by the regression models to a moderate amount, which means that there are other determinants, including technological innovation, environmental regulation, and market conditions, which could drive carbon emissions and ESG performance.

Lastly, the analysis is based on the years since 2016 to 2025 and it does not take into consideration the possibility of policy changes or structural transformation of the energy industry in the world in the long run.

Conclusion:

The paper concludes that green finance is an important factor in enhancing corporate sustainability and facilitating the process of the low-carbon economy shift. The results show that the adoption of green investment and renewable energy by Indian energy companies has been extended much over the last ten years. These trends indicate the increasing focus on green capital deployment and corporate citizenship in overcoming environmentalist issues.

The empirical study proves the fact that the effect of green investment and adoption of renewable energy is high toward the reduction of carbon emissions and ESG performance. The more companies invest in green technologies and renewable energy projects, the more successful sustainability results will be achieved and will have a positive impact on environmental protection. Nevertheless, the findings also show that profitability is not a substantial factor that can affect sustainability performance, and strategic environmental investments are important in promoting long-term corporate sustainability.

Through the research, numerous pieces of evidence have been gathered that can support the development of sustainable investment approaches and capital that is climate-conscious enough to ensure a net-zero transition faster and increase responsible corporate behaviour in the energy field.

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It is important to note that the completion of this study was made possible through constructive suggestions and encouragement of colleagues, academic mentors and research peers. They have directed and guided the research and helped to add academic value to the research.

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Annexure:

Company	Year	Green Investme nt in Cr.	ESG Score	CO2 Emissions in Mt	Renewable Energy Percent	ROA Percent
Reliance Industries	2016	18795	71.5	11.41	12	8.71
Reliance Industries	2017	19425	72.6	11.06	13	9.11
Reliance Industries	2018	22163	73.7	10	14	7.64
Reliance Industries	2019	21717	73.9	9.89	24	8.98
Reliance Industries	2020	28019	75.9	9.9	24	8.65
Reliance Industries	2021	27630	75.7	6.66	17	8.86
Reliance Industries	2022	35079	75.8	10.68	24	9.46
Reliance Industries	2023	31836	78	4.74	40	8.13
Reliance Industries	2024	23067	78.3	3.19	28	9.02
Reliance Industries	2025	32484	80.6	8.19	39	9.51
Tata Power	2016	9873	71.4	56.4	18	11.41
Tata Power	2017	10710	73	54.95	22	10.46
Tata Power	2018	11631	72.1	55.74	20	9.19
Tata Power	2019	15474	72.6	56.04	27	9.34
Tata Power	2020	13437	74.6	55.59	30	10.27
Tata Power	2021	22813	74.6	53.3	28	9.75
Tata Power	2022	23379	76.3	53.49	36	10.85
Tata Power	2023	20093	76.8	47.38	25	9.77
Tata Power	2024	17889	77.4	49.75	42	10.76
Tata Power	2025	31302	78.2	51.54	54	9.64
NTPC	2016	17820	66.1	36.46	19	10.41
NTPC	2017	19917	67.3	35.24	23	10.24
NTPC	2018	21546	67.6	34	27	10.63
NTPC	2019	23808	68	35.21	25	9.85
NTPC	2020	23708	67.9	34.82	31	10.25

NTPC	2021	26605	70.2	33.7	39	9.94
NTPC	2022	29790	70.3	27.7	43	10.89
NTPC	2023	30357	71.6	32.81	26	9.04
NTPC	2024	27404	72.4	35.09	27	11.52
NTPC	2025	38151	73.1	33.74	55	10.23
Adani Green Energy	2016	8791	65.4	14.9	8	4.28
Adani Green Energy	2017	9488	66.4	13.68	9	4.41
Adani Green Energy	2018	12085	67.6	12.3	16	4.7
Adani Green Energy	2019	16156	67.4	13.65	20	4.43
Adani Green Energy	2020	17727	68.5	12.34	16	4.1
Adani Green Energy	2021	14491	69.6	12.94	23	5.17
Adani Green Energy	2022	21595	69.5	6.05	32	4.33
Adani Green Energy	2023	18451	70.4	5.41	15	4.52
Adani Green Energy	2024	22255	70.7	10.19	40	5.36
Adani Green Energy	2025	33586	72.5	12.94	44	5.38
ReNew Energy Global	2016	8539	65.1	40.3	39	6.25
ReNew Energy Global	2017	9995	66.2	39.87	40	6.41
ReNew Energy Global	2018	11169	67	37.73	41	7.74
ReNew Energy Global	2019	11956	67	38.46	48	7.07
ReNew Energy Global	2020	14719	68.6	36.37	47	6.83
ReNew Energy Global	2021	15024	69.7	33.76	59	7.68
ReNew Energy Global	2022	16429	69.3	31.8	45	7.27
ReNew Energy Global	2023	19522	70.5	39.45	67	7.41
ReNew Energy	2024	14947	71.2	35.19	63	7.44

Global						
ReNew Energy Global	2025	23695	71.7	32.39	66	6.67
JSW Energy	2016	3569	62	34.42	28	4.99
JSW Energy	2017	4314	62.1	33.19	31	5.11
JSW Energy	2018	8251	63.9	31.98	30	7.98
JSW Energy	2019	6266	64.4	32.28	37	5.43
JSW Energy	2020	8981	64.7	28.52	36	5.4
JSW Energy	2021	17874	65.8	33.65	43	6.03
JSW Energy	2022	13031	65.8	26.86	52	5.93
JSW Energy	2023	7097	68.2	31.81	42	5.58
JSW Energy	2024	7937	68	32.13	44	5.92
JSW Energy	2025	13784	68.5	24.14	46	4.48
Power Grid Corp	2016	11308	72.8	50.24	13	9.32
Power Grid Corp	2017	12949	74.3	49.75	17	10.27
Power Grid Corp	2018	14732	74.8	48.33	19	10.5
Power Grid Corp	2019	13267	76	49.88	19	9.08
Power Grid Corp	2020	18280	76.4	47.19	21	9.97
Power Grid Corp	2021	26203	76.7	46.49	18	10.17
Power Grid Corp	2022	26728	77.6	49.51	31	9.82
Power Grid Corp	2023	32231	80.2	42.84	41	9.56
Power Grid Corp	2024	17988	79.3	42.88	37	9.54
Power Grid Corp	2025	23467	79.3	41.24	22	10.28
Tata Steel	2016	8052	61.4	49.33	16	7.44
Tata Steel	2017	10182	62.6	48.36	19	7.02
Tata Steel	2018	9230	64	49.06	20	6.81
Tata Steel	2019	9894	64.1	46.1	19	6.88
Tata Steel	2020	11700	65.2	43.51	32	6.79
Tata Steel	2021	20012	66.4	41.89	36	7.46
Tata Steel	2022	20478	67.4	45.87	28	6.73
Tata Steel	2023	11804	68	41.38	37	6.42
Tata Steel	2024	19028	68.7	42.97	24	5.74
Tata Steel	2025	24837	68.9	47.75	25	6.91

ONGC	2016	10400	61.6	5.93	11	11.65
ONGC	2017	12392	63.2	4.73	12	12.05
ONGC	2018	13530	64.5	3.02	13	11.9
ONGC	2019	14759	64	5.28	14	11.8
ONGC	2020	17164	65	5.06	23	11.79
ONGC	2021	20495	66.1	1.29	31	11.54
ONGC	2022	24260	67	1.77	23	12.54
ONGC	2023	14166	66.8	1.26	25	11.4
ONGC	2024	23048	68.8	0.3	35	12.12
ONGC	2025	36806	69.4	0.31	20	11.71
Indian Oil	2016	3823	60	13.8	10	11.01
Indian Oil	2017	6022	61	12.97	11	10.45
Indian Oil	2018	7921	61.2	11.54	16	11.33
Indian Oil	2019	8428	62	12.09	16	10.28
Indian Oil	2020	11307	62.6	12.12	26	11.37
Indian Oil	2021	10663	64.2	11.14	30	11.54
Indian Oil	2022	12367	64.7	8.32	16	10.81
Indian Oil	2023	24802	65	9.07	24	10.53
Indian Oil	2024	25367	65.5	2.14	34	11.23
Indian Oil	2025	14515	67.1	7.68	19	11.16
GAIL	2016	3404	66	51.95	21	8.3
GAIL	2017	4617	66.6	51.22	23	8.65
GAIL	2018	8500	67.7	51.11	23	8.58
GAIL	2019	6365	67.6	51.17	27	9.04
GAIL	2020	6400	70	48.64	37	8.34
GAIL	2021	15824	71	45.31	26	9.33
GAIL	2022	21092	71.1	45.44	39	9.1
GAIL	2023	21954	72.1	47.41	42	7.22
GAIL	2024	27260	72.3	45.39	53	8.71
GAIL	2025	20126	74	40.19	30	7.45
Coal India	2016	7892	63.2	27.83	21	7.92
Coal India	2017	10565	63.1	27.62	22	8.34
Coal India	2018	13176	65.4	27.13	29	7.45

Coal India	2019	14549	65.9	25.37	33	7.8
Coal India	2020	17768	65.5	22.83	29	8.24
Coal India	2021	13407	66.9	23.49	26	7.89
Coal India	2022	24572	68.2	26.15	33	7.76
Coal India	2023	24244	68.3	22.42	35	7.77
Coal India	2024	30180	68.8	22.81	29	7.96
Coal India	2025	21833	70.3	20.17	57	7.96
BPCL	2016	16013	73.2	37.29	27	7.78
BPCL	2017	18287	73.2	37.04	30	7.25
BPCL	2018	17981	74.7	34.73	31	7.48
BPCL	2019	17888	76.2	33.67	30	8.78
BPCL	2020	22689	76.2	33.6	43	7.73
BPCL	2021	30873	77.4	32.53	42	8.08
BPCL	2022	30863	76.8	28.84	33	8.24
BPCL	2023	35781	78.4	35.01	48	7.87
BPCL	2024	39189	79.4	31.89	59	7.75
BPCL	2025	28784	80.1	24.17	63	7.71
HPCL	2016	11837	65.6	15.85	6	8.4
HPCL	2017	13478	65.3	14.71	10	8.84
HPCL	2018	13953	67.1	15.4	10	8.91
HPCL	2019	13751	67.3	13.05	12	8.74
HPCL	2020	16593	69.2	12.37	14	7.29
HPCL	2021	24637	68.7	14.37	11	8.61
HPCL	2022	26801	71	8.57	24	8.09
HPCL	2023	26565	70.8	5.95	34	8.09
HPCL	2024	28397	71.5	14.51	14	8.67
HPCL	2025	24185	72.6	4.55	15	8.84
Adani Power	2016	3077	68.7	54.52	29	12.16
Adani Power	2017	6046	68.6	53.61	30	11.92
Adani Power	2018	6573	70.9	54.13	37	9.61
Adani Power	2019	10487	70.5	51.15	35	10.56
Adani Power	2020	10961	73.1	50.91	33	11
Adani Power	2021	11177	73.5	53.02	49	11.45

Adani Power	2022	17219	74	51.04	41	11.22
Adani Power	2023	20101	74.5	46	36	10.43
Adani Power	2024	23829	76.1	53.58	53	10.73
Adani Power	2025	25172	75.4	49.26	56	11.19
Torrent Power	2016	17153	67.1	35.21	12	8.97
Torrent Power	2017	19292	68.7	33.82	16	7.74
Torrent Power	2018	18405	68.7	33.31	16	6.7
Torrent Power	2019	18803	69.5	31.02	21	7.45
Torrent Power	2020	26321	71.5	32.58	16	7.7
Torrent Power	2021	26313	71.5	34.68	17	7.04
Torrent Power	2022	23597	72.3	26.86	30	7.24
Torrent Power	2023	23971	72.4	32.31	40	8.39
Torrent Power	2024	27249	73.3	28.83	28	7.23
Torrent Power	2025	38564	74.7	30.81	30	6.97
NHPC	2016	13395	61.6	39.98	11	11.91
NHPC	2017	14221	61.5	38.83	14	11.89
NHPC	2018	16297	62.5	39.25	13	11.9
NHPC	2019	19395	64.7	39.4	17	11.14
NHPC	2020	20971	64.9	37.11	19	10.21
NHPC	2021	24400	64.8	37.14	26	11.95
NHPC	2022	21189	66.1	34.96	17	11.63
NHPC	2023	31833	66.5	33.87	32	12.42
NHPC	2024	33451	67.4	32.52	19	10.96
NHPC	2025	29478	68.1	29.98	47	11.58
SJVN	2016	18149	69.2	57.78	25	8.31
SJVN	2017	20588	71.3	57.17	28	6.95
SJVN	2018	19939	71.4	55.41	27	7.86
SJVN	2019	22877	72.5	54.27	37	7.19
SJVN	2020	22517	73.2	52.37	41	7.91
SJVN	2021	24324	73.8	55.4	45	7.22
SJVN	2022	22565	74.1	51.76	37	6.97
SJVN	2023	36006	76.2	49.02	53	7.94
SJVN	2024	38861	75.6	50.77	33	7.58
SJVN	2025	35258	76.9	55.11	52	7.44
CESC	2016	10992	75.4	52.5	38	8.67
CESC	2017	12193	74.5	52.16	41	8.82
CESC	2018	13376	74.9	51.21	46	9.15
CESC	2019	18666	77.1	50.95	47	8.27
CESC	2020	18324	78.2	46.85	42	8.62
CESC	2021	20052	78.1	50.86	58	7.77
CESC	2022	16176	79	47.91	44	8.17

CESC	2023	30893	79.6	45.05	52	9.87
CESC	2024	15184	80.8	42.74	70	8.47
CESC	2025	28614	81.5	47.05	74	7.86
Sterlite Power	2016	19314	70.1	57.74	21	10.8
Sterlite Power	2017	21564	71.2	56.27	23	12.42
Sterlite Power	2018	22538	72.3	57.4	25	12.22
Sterlite Power	2019	20952	72.5	53.25	27	11.28
Sterlite Power	2020	22310	72.8	53.25	33	11.39
Sterlite Power	2021	29419	74.7	52.03	41	11.39
Sterlite Power	2022	27918	75.5	51.73	33	9.97
Sterlite Power	2023	31088	76.1	52.33	42	10.39
Sterlite Power	2024	32866	77	56.21	45	11.07
Sterlite Power	2025	36162	77.8	50.29	30	12.1

Source: secondary data published in Annual Reports, Sustainability/ESG Reports/BRSR, Integrated Ports from the websites of companies.