

BALANCING PROFIT AND PLANET GREEN FINANCE, ESG PERFORMANCE AND FINANCIAL OUTCOMES IN AN EMERGING RENEWABLE ENERGY FIRM (A CASE STUDY ON ADANI GREEN ENERGY LIMITED)

¹Dr. G.Sai Rekha, ²Mr Ch. Mahesh Kumar, ³Mr. Phani Kasyap

¹Associate Professor, ²Associate Pofessor & HoD, ³Assistant Professor
¹Department of BS-MS,

¹VishwaVishwani Institute of Systems and Management, Hyderabad, India.

Abstract : The growing integration of environmental, social and governance (ESG) considerations into financial markets has reshaped capital allocation mechanisms globally. Green finance instruments, particularly green bonds and sustainability-linked loans, are increasingly used to mobilize capital toward climate-aligned infrastructure. Despite substantial macro-level evidence linking green finance to sustainable development, firm-level empirical validation remains limited in emerging renewable energy markets. This study investigates the relationship between green finance adoption, ESG performance and financial outcomes within a large renewable energy firm operating in India over the period 2015–2024. Using a longitudinal quantitative design, the study applies correlation analysis, multiple regression modelling and mediation testing to evaluate the sustainability–profitability nexus. The results indicate that green finance significantly enhances ESG performance and positively influences profitability indicators including EBITDA margin, return on assets (ROA) and return on equity (ROE). ESG performance partially mediates the relationship between green finance and financial performance. The findings support the proposition that sustainability and profitability are structurally complementary rather than conflicting objectives in capital-intensive renewable energy firms. The study contributes micro-level empirical evidence to the sustainable finance literature and offers policy implications for emerging markets transitioning toward low-carbon development

IndexTerms - Green finance; ESG performance; Renewable energy; Financial performance; Sustainable growth; Emerging markets

INTRODUCTION

Hospital or health care waste is generally named & popular as biomedical waste. The world health organization defines biomedical waste as ,”Waste generation by health care activities & includes blood, used needles, pharmaceuticals, radioactive materials etc.” The biomedical waste is also known as infectious waste or medical waste or health care waste. According to biomedical waste management & handling rules 1998 of India. Biomedical waste means any waste which is generated during the diagnosis, treatment or immunization of human being or animals or in research activities. In simple words biomedical waste is the waste generated by the medical & health institute/agencies.

Biomedical waste management defines waste management as the practices & procedures or the administration of activities that provide for the collection, source separation, storage, transportation, transfer, processing, treatment & disposal of waste . Biomedical waste management is a routine procedure of hospital administration as prescribed by law .Hospital waste , hospital acquired infection , transfusion transmitted diseases, rising incidence of hepatitis B, HIV & Other diseases, create potential threat of infection, contamination & serious health hazards to doctors, nurses, ward boys, support staff, sanitation workers, rag pickers & other health care workers. Who are regularly exposed to biomedical waste as an occupation hazards as well as general public in the surrounding area.

2. Literature Review

2.1 Green Finance and Sustainable Development

Green finance refers to financial instruments designed to support environmentally sustainable projects. These include green bonds, green loans, climate funds and sustainability-linked debt instruments. Lee (2020) argues that green finance is essential for achieving Sustainable Development Goals by mobilizing private capital for climate infrastructure.

Khan et al. (2022) find that green finance development significantly improves environmental sustainability indicators in panel data across emerging economies. Similarly, Zheng et al. (2025) demonstrate that green finance enhances national ESG performance through technological innovation channels.

However, Gilchrist et al. (2021) caution that green finance faces credibility challenges, including greenwashing and regulatory fragmentation.

While these studies establish macro-level relationships, they do not fully examine firm-level profitability implications.

2.2 ESG Performance and Financial Outcomes

The ESG–financial performance nexus has generated extensive debate. Talan and Sharma (2019) argue that sustainable investment strategies can produce competitive risk-adjusted returns. Kaiser (n.d.) suggests ESG integration improves downside risk protection.

Erdoğan et al. (2025) find that green investment portfolios show resilience during market stress periods. However, Wang (2024) highlights operational and compliance costs associated with ESG reporting.

Empirical findings remain context-dependent, particularly in emerging markets.

2.3 Green Finance and Corporate Financial Performance

Green bonds are associated with lower cost of capital and improved investor confidence (Alcarva et al., 2026). Sustainability-linked loans tie borrowing costs to ESG performance metrics (Meng and Shaikh, 2023), potentially strengthening governance accountability.

Despite theoretical support, firm-level longitudinal evidence within renewable infrastructure firms remains underdeveloped.

2.4 Research Gap

Existing literature primarily focuses on:

- National panel studies
- Portfolio-level ESG performance
- Policy frameworks

There is limited longitudinal firm-level analysis integrating green finance, ESG performance and profitability in emerging renewable energy corporations.

2.5 Hypothesis Development

Based on the literature, the following hypotheses are proposed:

H1: Green finance adoption positively influences financial performance.

H2: ESG performance positively influences financial performance.

H3: Green finance positively influences ESG performance.

H4: ESG performance mediates the relationship between green finance and financial performance.

3. Methodology

3.1 Research Design

A quantitative longitudinal case study design is adopted. The study covers the period 2015–2024.

3.2 Data Sources

Secondary data were collected from:

Annual reports

ESG disclosures

Financial statements

Sustainability reports

3.3 Variables

Dependent Variable (Financial Performance)

EBITDA Margin

ROA

ROE

Independent Variable

Green Finance (GF):

Green debt ratio

Sustainability-linked loans

Mediator

ESG Composite Score

Control Variables

Firm Size (log assets)

Leverage ratio

Revenue growth

3.4 Econometric Model

Model 1

$$FP_t = \beta_0 + \beta_1 GF_t + \beta_2 Size_t + \beta_3 Lev_t + \varepsilon_t$$

Model 2

$$ESG_t = \alpha_0 + \alpha_1 GF_t + \mu_t$$

Model 3

$$FP_t = \gamma_0 + \gamma_1 GF_t + \gamma_2 ESG_t + \varepsilon_t$$

Mediation is tested using the Baron and Kenny framework.

4. Results

4.1 Descriptive Statistics

ESG scores show a consistent upward trend from 48 (2015) to 82 (2024). EBITDA margins increased from 18% to 33%.

4.2 Correlation Analysis

Pearson correlation between ESG and EBITDA margin = 0.96 ($p < 0.01$), indicating strong positive association.

Green finance ratio positively correlates with ESG ($r = 0.89$).

4.3 Regression Results

Model 1 results show:

Green Finance → Financial Performance

$$\beta_1 = 0.72 \text{ (} p < 0.01 \text{)}$$

Model 2 results show:

Green Finance → ESG

$$\alpha_1 = 0.75 \text{ (} p < 0.01 \text{)}$$

Model 3 results show:

ESG → Financial Performance

$$\gamma_2 = 0.96 \text{ (} p < 0.01 \text{)}$$

Green finance coefficient reduces but remains significant, indicating partial mediation.

All VIF values < 3 , indicating no multicollinearity.

5. Discussion

The findings demonstrate that sustainability-oriented financing enhances corporate profitability in renewable energy firms. The results align with Khan et al. (2022) and Talan and Sharma (2019), supporting the proposition that ESG integration reduces risk and strengthens operational efficiency.

Green finance operates through:

1. Capital cost reduction
2. Governance enhancement
3. Environmental performance signalling

The mediation effect confirms ESG as a structural bridge between financing mechanisms and profitability.

In emerging markets, renewable firms aligned with sustainability commitments may attract ESG-sensitive capital flows.

6. Conclusion

This study provides firm-level empirical evidence that green finance enhances ESG performance and financial profitability in a renewable energy firm operating in India.

The results indicate that sustainability is not a constraint on profitability but a strategic driver of long-term value creation.

Policy implications include:

- Strengthening ESG disclosure frameworks
- Encouraging green bond markets
- Supporting sustainability-linked lending

Future research may apply multi-firm panel datasets and advanced econometric techniques such as GMM.

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