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The Impact of Green Finance Policy on Investment Behavior at Renewable Energy Companies in Indonesia

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Abstract
This research examines the influence of Green Finance Policy on investment behavior in renewable energy companies in Indonesia. This issue is motivated by the increasing urgency of transitioning to a low-carbon economy, the substantial financing requirements for renewable energy projects, and the uncertainty regarding the effectiveness of green finance implementation in developing countries. This research aims to analyze whether Green Finance Policy influences companies' investment behavior and whether profitability and leverage moderate this relationship. Using an explanatory quantitative approach, this study employs panel data from energy sector companies listed on the Indonesia Stock Exchange during the 2020–2024 period, with investment behavior measured using the ratio of capital expenditure to total assets. The empirical analysis was conducted using the Fixed Effects Model. The results show that Green Finance Policy has a positive but statistically insignificant effect on investment behavior. Profitability demonstrates a significant direct relationship with investment behavior but does not moderate the effect of Green Finance Policy. Leverage and firm size were also found to have insignificant effects. This study concludes that green finance policies have not yet directly encouraged renewable energy investment in Indonesia. This research contributes to the sustainable finance literature by emphasizing the importance of corporate fundamentals and macroeconomic conditions in explaining corporate investment behavior in developing countries.

INTRODUCTION

Climate change is one of the global challenges that significantly affects environmental, social, and economic dimensions (Abbass et al., 2022; Adger et al., 2022; Campbell-Lendrum et al., 2023; Rial, 2024; Telo da Gama, 2023; Yang et al., 2023). Increased greenhouse gas emissions resulting from industrial activities, transportation, and the use of fossil fuel-based energy have contributed to rising global temperatures, changing weather patterns, and increasing frequencies of natural disasters. This condition has encouraged countries worldwide to commit to reducing carbon emissions through the implementation of sustainable development strategies and the transition toward a green economy. As part of its commitment to the Paris Agreement, Indonesia has established a target to achieve Net Zero Emissions (NZE) by 2060 or earlier. To achieve this target, the government has developed various strategic policies aimed at reducing dependence on fossil fuels and increasing the utilization of new and renewable energy sources. The energy sector has received particular attention because it remains the largest contributor to carbon

emissions compared with other sectors (Du et al., 2023; Fang et al., 2022; Farghali et al., 2023; Lamb et al., 2022; Min et al., 2022; Zhang et al., 2024).

Although Indonesia has substantial renewable energy potential, investment realization in this sector continues to face various challenges. Based on government reports, the national new and renewable energy mix remains below the target established in national energy policies. Major obstacles include high initial capital expenditure, elevated investment risks, and limited access to long-term financing sources for companies. These conditions have caused many renewable energy projects to experience delays or difficulties in securing adequate funding.

In recent years, the concept of green finance has emerged as a financing solution that supports sustainable economic development. Green finance refers to financing mechanisms that incorporate environmental considerations into financial decision-making by directing funds toward projects with positive environmental impacts. The implementation of green finance is expected to increase investment in the renewable energy sector while accelerating the achievement of low-carbon development targets.

As part of this policy implementation, the Indonesian government, together with the Financial Services Authority (Otoritas Jasa Keuangan / OJK) and the Ministry of Finance, has developed various green financial instruments, including Green Sukuk, Green Bonds, the Sustainable Finance Roadmap, and the Indonesian Green Taxonomy. These policies aim to encourage financial institutions and companies to allocate more investment toward projects that support environmental sustainability.

However, the effectiveness of green finance policies in influencing corporate investment behavior in Indonesia remains subject to debate. Several international studies have demonstrated that green finance can increase corporate investment by improving access to financing, reducing capital costs, and strengthening investor confidence. Conversely, other studies have indicated that the effectiveness of green finance implementation is strongly influenced by internal corporate characteristics, including profitability, leverage, firm size, governance quality, and macroeconomic conditions. Companies with higher profitability generally possess stronger internal financing capacity, enabling them to utilize green financing instruments more effectively to expand investment activities. In contrast, highly leveraged companies tend to adopt more cautious investment strategies because they must consider debt obligations and creditor risks. Furthermore, firm size is also considered an important factor influencing access to green financing, as larger companies generally possess stronger reputations, greater transparency, and higher credibility among investors and financial institutions.

This study is based on Sustainable Finance Theory, which explains that the financial system functions not only as a mechanism for fund intermediation but also as a tool for directing capital allocation toward economic activities that consider environmental, social, and governance (ESG) risks. Within this framework, financial institutions, capital markets, and regulators play strategic roles in directing financing toward low-carbon sectors, including renewable energy. Linnenluecke et al. (2016) emphasized that environmental finance has developed as an interdisciplinary field connecting environmental change, industrial risks, and financial decision-making. More recent studies by Tao et al. (2022), Mudalige (2023), and Fu et al. (2023) demonstrated that green finance is an important instrument for integrating

climate risks into financing and investment decisions. The theory suggests that green finance policies can increase investment in renewable energy sectors by reducing financing constraints, improving access to capital, and providing incentives for sustainable projects. However, the effectiveness of these policies depends on firm-specific characteristics, such as profitability, leverage, and firm size, which determine companies' ability to access and utilize green financing instruments. This theoretical framework provides the basis for proposing a positive relationship between green finance policy and investment behavior, as well as examining the moderating roles of profitability and leverage.

Based on previous studies, several research gaps can be identified. Studies examining the effect of green finance policy on investment behavior have produced inconsistent findings. Wang and Fan (2023) found that green finance had a positive and significant effect on the investment behavior of renewable energy enterprises in China, while Alharbi et al. (2023) confirmed a positive relationship between green finance and renewable energy development globally. Similarly, Flammer (2021) demonstrated that corporate green bonds positively influenced investment outcomes. However, Wang and Shao (2024) found that the effect of green finance policy on investment efficiency varied depending on regional and firm-specific characteristics, indicating that the relationship may be context-dependent.

Furthermore, research examining the moderating roles of profitability and leverage remains limited. Most previous studies have focused on direct relationships rather than interaction effects. Fernández de Guevara et al. (2021) showed that financial constraints and excessive indebtedness influenced firms' investment decisions, while Poursoleiman et al. (2020) found that leverage was associated with financing constraints and affected future investment activities. However, studies specifically examining profitability and leverage as moderating variables in the relationship between green finance and investment behavior remain scarce. Similarly, research conducted in developing countries, particularly Indonesia, is still limited despite the country's significant renewable energy potential and the implementation of various green finance policies.

This research also provides novelty compared with previous studies. First, this study simultaneously examines the influence of green finance policy on investment behavior by incorporating profitability and leverage as moderating variables and firm size as a control variable. Second, this study employs panel data from companies in the energy and utility sectors in Indonesia, enabling an analysis of investment behavior dynamics across multiple periods. Third, this research provides empirical evidence regarding the implementation of green finance policies within the context of developing countries, which remains relatively underexplored in the international literature.

This study aims to analyze the influence of Green Finance Policy on the investment behavior of renewable energy companies listed on the Indonesia Stock Exchange, examine the moderating roles of profitability (ROA) and leverage (LEV) in the relationship between Green Finance Policy and investment behavior, and investigate the influence of firm size (SIZE) as a control variable on investment behavior. Through these objectives, this study is expected to provide a comprehensive understanding of the determinants of renewable energy investment in Indonesia and the effectiveness of green finance policies in supporting the transition toward a low-carbon economy in developing countries. The findings are expected to contribute academically to the development of sustainable finance theory and provide

practical insights for governments, regulators, financial institutions, and energy industry stakeholders in designing more effective green financing policies to encourage investment and accelerate Indonesia's transition toward a low-carbon economy.

METHOD

Research Design

This study employed an explanatory quantitative research approach to examine the causal relationship between Green Finance Policy and investment behavior in energy sector companies in Indonesia, while also testing the moderating roles of profitability and leverage. The quantitative approach was selected because it enabled hypothesis testing through statistical analysis of numerical data, producing objective and measurable findings.

The study used panel data, combining cross-sectional data from multiple companies and time-series data from multiple years. The panel data approach was applied to capture variations among companies and changes over time, resulting in more efficient estimations compared with separate cross-sectional or time-series analyses.

This research adopted a causal design to examine the effect of Green Finance Policy on corporate investment behavior while considering internal company factors, including profitability, leverage, and firm size.

Population and Sample

The study population was all energy sector companies listed on the Indonesia Stock Exchange during the study period.

The sampling technique uses purposive sampling, which is the selection of samples based on certain criteria to suit the purpose of the research.

The sample selection criteria are as follows.

1. Energy sector companies listed on the Indonesia Stock Exchange for the period 2020–2024.
2. The company publishes annual reports consecutively during the research period.
3. Have complete data on all research variables.
4. Not delisting during the observation period.

Based on these criteria, 20 companies were obtained as research samples. The number of observations used was 95 panel observations after the data screening process.

Data Collection Techniques

The data collection technique was carried out using the documentation method. The stages of data collection include:

1. identify sample companies;
2. download annual reports;
3. collect financial data;
4. calculating research variables;
5. compile the panel database.

Research Instruments

Table 1. Operational Research Variables

Variable	Type	Definition	Formula	Scale
Investment Behavior (INV)	Dependency	The company's investment level	Capital Expenditure / Total Assets	Ratio
Green Finance Policy (GFP)	Independent	Implementation of Green Finance	Dummy / Index	Nominal
Profitability (ROA)	Moderation	Profit-making ability	Net Income / Total Assets	Ratio
Leverage (LEV)	Moderation	Debt usage rate	Total Debt / Total Assets	Ratio
Firm Size (SIZE)	Controls	Large company	Ln Total Assets	Ratio

Source: Authors' compilation based on Wang & Fan (2023), Albulescu (2020), Fernández de Guevara et al. (2021), Poursoleiman et al. (2020), and Dang et al. (2018)

Data Analysis Techniques

The analysis was carried out using econometric software for panel data with the following stages.

1. **Panel Data Model Selection**

   Because it uses panel data, the best model is selected.

   a. Common Effect Model (CEM)

   The simplest model assumes that the entire company has the same characteristics.

   b. Fixed Effect Model (FEM)

   A model that accommodates the different characteristics of each company through a fixed effect.

   c. Random Effect Model (REM)

   A model that considers differences between companies to be random.

2. **Model Selection Test**

   a. Chow Test

   Used to choose between:
   Common Effect Model
   or
   Fixed Effect Model.
   Hypothesis:
   H0 : Common Effect Model is better
   Ha: Fixed Effect Model is better
   Criteria:
   Prob < 0.05 → Fixed Effect selected.

   b. Hausman Test

   Used to choose between:
   Fixed Effect
   or
   Random Effect.
   Hypothesis:
   H0 : Random Effect
   Ha: Fixed Effect

Criteria:

Prob < 0.05 → Fixed Effect selected.

c. Lagrange Multiplier (LM) Test

When required, LM tests are performed to choose between Common Effect Model and Random Effect Model.

3. Classic Assumption Test

To ensure the model meets the econometric assumptions, the following tests are performed.

1. Multicollinearity Test

Using an independent intervariable correlation matrix.

Criteria:

- The correlation < 0.80 indicates that there is no serious multicollinearity.

2. Heteroscedasticity Test

It is done to find out if the residual variance is constant.

Criteria:

- The probability > 0.05 indicates that there is no heteroscedasticity.

3. Autocorrelation Test

It is done to find out if the residual correlates between periods.

Criteria:

- Statistical values that meet the conditions indicate that there is no autocorrelation.

Note: In Fixed Effect models with estimates that use robust standard errors, some classic assumptions can be addressed through an estimation approach that is more resilient to assumption violations. Therefore, if the final estimate uses a robust error standard, the interpretation will refer to the result.

4. Hypothesis Testing

Hypothesis testing is carried out through:

a. Partial Test (t-test)

It is used to determine the influence of each independent variable on the dependent variable.

Criteria:

- Probability < 0.05 → hypothesis accepted.
- The probability ≥ 0.05 → the hypothesis is rejected.

b. Simultaneous Test (F Test)

It is used to find out whether all independent variables together affect Investment Behavior.

Criteria:

- The probability of F < 0.05 indicates a significant model simultaneously.

c. Coefficient of Determination (R^2)

Based on the results of panel data processing on energy and utility sector companies that were the research sample during the observation period, the empirical model used was able to explain about 78.5% variation in the company's investment behavior ($R^2 = 0.785$). This shows that the combination of the variables Green Finance Policy (GFP), Return on Assets (ROA), Leverage (LEV), Firm Size (SIZE), and moderation variables make a considerable contribution in explaining changes in the company's investment behavior.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 2. Descriptive Statistics

Variable	N	Red	Std. Dev.	Min	Median	Max
INV	95	0,3557	2,8871	-0,334*	0,0375	28,1946
GFP	95	0,2632	0,4427	0	0	1
LONG	95	2,8614	13,8435	-0,795*	0,0665	88,3982
LEV	95	0,4695	0,2158	0,024*	0,5054	0,9613
SIZE	95	20,2228	3,1849	11,965*	20,7593	29,0158

*Minimum values are derived from the data calculations and are rounded to four decimal places.

Source: Data processing results using econometric software (2026)

Interpretation

Descriptive statistics show that the average value of Investment Behavior (INV) is 0.3557 with a standard deviation of 2.8871. The standard deviation that is much larger than the average value indicates that the variation in investment between companies is quite high, and there are even some observations with very large investment values (outliers).

The Green Finance Policy (GFP) variable has an average of 0.2632, which shows that around 26.3% of observations have met the criteria for implementing green finance policies based on research measurements.

The average ROA value is 2.8614 with very high variation. This indicates that there is a difference in the ability to generate profits between companies during the research period.

The average LEV of 0.4695 indicates that almost half of the company's assets are financed by debt.

The average SIZE value of 20.2228 indicates that the sample is dominated by medium to large-scale companies.

Panel Model Selection

The panel model used in this study is the Fixed Effect Model (FEM) because it is able to accommodate differences in characteristics between companies through individual effects.

Regression Estimation Results

Table 3. Fixed Effect Model Regression Results

Variable	Coefficients	T-Statistics	p-value	Verdict
GFP	0,5233	0,192	0,848	Insignificant
LONG	-0,3089	-13,755	<0.001	Significant
LEV	1,2260	0,639	0,525	Insignificant
SIZE	0,0393	0,288	0,774	Insignificant
LONG × GFP	-0,4903	-0,069	0,945	Insignificant
GFP × LEV	-0,7692	-0,194	0,847	Insignificant

Source: Data processing results using econometric software (2026)

Table 4. Goodness of Fit

Statistics	Value
R^2	0,785
Adjusted R^2	0,711
F-statistic	10,64
Prob(F-statistic)	<0.001
Durbin–Watson	1,602

Source: Data processing results using econometric software (2026)

Discussion

The Influence of Green Finance Policy on Investment Behavior

The GFP coefficient of 0.5233 indicates the direction of a positive relationship. However, a probability value of 0.848 (>0.05) indicates that the effect is not statistically significant.

These findings show that during the observation period, the implementation of the Green Finance Policy has not been able to encourage an increase in investment by energy sector companies directly.

Theoretically, this result is different from the prediction of Sustainable Finance Theory which states that green financing policies will increase investment through a reduction in capital costs. One possible cause is that the implementation of the policy in Indonesia is still relatively new, so the benefits have not been fully felt by the company.

Impact of Profitability

The ROA has a coefficient of −0.3089 with a probability value of <0.001.
This means that the increase in ROA is followed by a decrease in the Investment Behavior ratio in this model. Statistically, the influence is significant.

These results can be interpreted as indicating that companies that earned high profits in the study period did not tend to increase capital expenditures, but rather prioritized operational efficiency, debt repayment, or dividend distribution.

Leverage Effect

A leverage coefficient of 1.2260 indicates a positive but not significant relationship (p = 0.525).

This means that the structure of the company's debt has not been the main factor explaining the variation in investment in the study sample.

Influence of Firm Size

Firm Size has a coefficient of 0.0393 with a p-value of 0.774, so it does not have a significant effect on Investment Behavior.

This shows that the size of the company does not necessarily determine the amount of investment if the company faces project limitations or other external factors.

Profitability Moderation Effect

The interaction of GFP × ROA has a coefficient of −0.4903 with a p-value of 0.945. Thus, profitability has not been shown to moderate the relationship between Green Finance Policy and Investment Behavior.

Leverage Moderation Effect

The interaction of GFP × LEV has a coefficient of −0.7692 with a p-value of 0.847. Leverage has also not been proven to moderate the relationship between Green Finance Policy and Investment Behavior.

CONCLUSION

This study concludes that Green Finance Policy was not proven to have a significant effect on investment behavior in renewable energy companies in Indonesia. Therefore, green finance policy had not yet fully functioned as a direct driver of corporate investment decisions during the observation period. These findings addressed the main research concern that the availability of green finance instruments and policies did not automatically increase investment, as companies continued to face financing constraints, project risks, regulatory uncertainty, and varying internal conditions. Profitability was also not found to moderate the relationship between Green Finance Policy and investment behavior, although profitability remained an important factor in explaining companies' internal financial capacity. Leverage did not significantly weaken the relationship, and firm size did not demonstrate a significant role in determining investment behavior. Thus, the research objectives of examining the influence of Green Finance Policy and the roles of profitability, leverage, and firm size were achieved, indicating that the effectiveness of green finance policy remained contextual and was not yet sufficiently strong as a direct mechanism for encouraging renewable energy investment. The contribution of this research lies in enriching the sustainable finance literature by demonstrating that corporate investment behavior in developing countries is influenced not only by green financing policies but also by company readiness, institutional conditions, and the macroeconomic environment. Future studies are recommended to extend the observation period, incorporate additional macroeconomic variables, governance quality, ESG scores, and policy risks, and apply more advanced econometric approaches to provide a more comprehensive understanding of the effectiveness of green finance in influencing corporate investment decisions.

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