

Do Investors Value Environmental Responsibility? Evidence from Green Accounting, Carbon Emission Disclosure and Leverage in Indonesia's Energy Sector

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ABSTRACT

A company's value serves as a key indicator of investor confidence and signals how the market views its prospects. To uphold this value, businesses need to find a middle ground that considers economic, social, and environmental factors. This study explores the influence of green accounting, carbon emission disclosure, and leverage on firm value among Indonesian energy firms, using profitability and company size as control variables. A total of 41 IDX-listed companies were selected throughout the 2020-2024 period using purposive sampling. The research relies on secondary data drawn from financial statements and annual reports, and employs panel data regression analysis using the Fixed Effects Model (FEM) as the optimal model selected. The model demonstrates strong explanatory power, as evidenced by an R-squared value of 94%, suggesting that the included independent variables largely capture changes in firm value. The novelty of this study lies in the specificity of the energy sector as the context for Indonesia's carbon regulatory transition, as well as the comprehensiveness of the control variables used to analyze market responses in greater depth. The adoption of green accounting unexpectedly exerts a negative influence on firm value. It appears that the market still views environmental allocations as operational burdens that erode financial efficiency, rather than as strategic long-term investments. Meanwhile, carbon emission disclosures and leverage levels have proven not to be primary indicators for investors when assessing a firm's worth. This suggests that market participants in Indonesia remain pragmatic, having not yet fully integrated environmental issues into their core investment strategies. Consequently, management must be more strategic in budgeting for environmental costs to ensure these policies do not inadvertently undermine the company's public valuation.

Keywords: *Carbon Emission Disclosure; Energy Sector; Firm Value; Green Accounting; Leverage.*

INTRODUCTION

In the current international business landscape, companies are expected to go beyond pursuing their own interests and begin adopting sustainability and environmental responsibility. This change is motivated by a increasing shared recognition of the ecological disruptions we currently face (Yuliana & Prijanto, 2022). Corporate success is no longer measured solely by net profits; environmental responsibility now plays a central role in building trust among investors and the public (Yuliandhari et al., 2023). The value of a company acts as a barometer of market confidence and is directly reflected in stock performance. Maintaining this value requires a careful balance between economic, social, and ecological interests (Rahayu & Kurniawati, 2024). Businesses must align economic goals with social and environmental obligations to remain competitive. Assessing



a company today involves a deeper examination of how it handles environmental challenges such as pollution, waste management, deforestation, and climate change (Ilyas Nur Imam et al., 2024).

As per the Ministry of Environment and Forestry, the energy sector's role as a primary source of carbon emissions often reveals a disparity in corporate sustainability commitments and real-world applications on the ground (KLHK, 2024). Alleged environmental violations by PT RMK Energi Tbk in 2023 illustrate the serious consequences of energy operations for both the public and the environment. This situation led to a crisis of investor confidence, causing Tobin's Q ratio to plunge from 0.96 in 2022 to 0.29 in 2023. When a company's value is considered too low (undervalued), it is usually due to declining demand and stock sales (Putra & Arief, 2023). Ultimately, strategic reporting is essential to communicate recovery efforts, restore market trust, and stabilize company value.

Companies are increasingly adopting green accounting and carbon emission disclosures to meet modern environmental standards and enhance their appeal to investors. Green accounting practices serve as a measure of a company's commitment to ecological protection and social welfare (Delvia & Helmy, 2024). In addition to increasing revenue, companies also need to take responsibility for environmental damage (Bellamy et al., 2023). Transparency about carbon emissions allows companies to explain how their operations affect the environment and the specific measures they take to reduce that impact. (Anggita et al., 2022). A company's value is also shaped by financial indicators like leverage, which reflects the balance of capital and the extent to which debt-based financing is used by the organization (Novita et al., 2022). Higher leverage indicates greater risk but also the potential for higher investment returns (Agustiningasih & Septiani, 2022).

Findings on how environmental and financial factors affect a firm value have yielded inconsistent results. In terms of green accounting, Anggita et al. (2022) found a positive impact, while Gantino et al. (2023) observed a negative impact. Meanwhile, Fina et al. (2024), Hutabarat (2024), and Hapsari et al. (2024) agreed that the implementation of green accounting has yet to produce a significant effect, which Hapsari et al. attribute to a lack of uniform perception among investors, even as its adoption increases. Similar inconsistencies are seen with carbon emission disclosure: Hardiyansah et al. (2021) observed a positive impact on firm value, but Fina et al., (2024), Kurnia et al. (2021), and Anggita et al. (2022) found no significant effect. The same holds true for leverage, Hutabarat (2024) and Jihadi et al. (2021) identified a significant impact, yet Anita et al. (2023) and Hapsari et al. (2024) indicated that leverage does not have a direct or significant influence. Previous studies have identified a significant research gap. From a theoretical perspective, prior research has not specifically applied signaling theory to the energy sector. Methodologically, limitations are evident in the use of only two independent variables, a short observation period, and a research scope limited to specific indices such as the LQ45 or companies receiving the ISRA award, thereby limiting the generalizability of the findings. From a practical perspective, the majority of previous studies were conducted in different sectors, such as manufacturing, consumer goods, and automotive and even involved cross-country comparisons; consequently, their relevance to Indonesia's energy sector which is currently facing the pressures of energy transition and evolving carbon regulations remains insufficient. These conflicting findings across studies underscore the need for further research. This study addresses this gap by using recent data from 2020 to 2024, offering a clearer and more accurate understanding current state of the industry. Investors often interpret green accounting, carbon emission disclosure, and leverage as indicators of corporate health, a process explained through signaling theory, which serves as the theoretical framework for this research. The main focus of this paper is to investigate how these three factors shape firm value. Accordingly, the study analyzes the determinants of green accounting, carbon emission disclosure, and leverage on overall firm value.

LITERATURE REVIEW

A Synthesis of Previous Research.

There are several fundamental differences that distinguish this study from prior studies. A comprehensive overview of these points of differentiation is presented in the summary table below.

Table 1: Prior Research



No.	Author (Year)	Title	Research Gap
1.	Fina et al., (2024)	<i>The Effect of Green Accounting, Carbon Emission Disclosure and Profitability on Company Value</i>	This study employs legitimacy theory and signaling theory as its theoretical framework. The object of study covers the mining sector over the period 2021–2023. The research variable used differs in that it incorporates profitability as the key variable.
2.	Anggita et al. (2022)	<i>Carbon Emission Disclosure and Green Accounting Practices On The Firm Value</i>	This study focuses on 16 consumer goods companies in Indonesia, observed over a two-year period spanning 2019 to 2020, examining only two variables within the framework of legitimacy theory.
3.	Hardiyansah et al., (2021)	<i>The Effect of Carbon Emission Disclosure on Firm Value: Environmental Performance and Industrial Type</i>	This study uses companies that received the Indonesian Sustainability Reporting Award (ISRA) and are listed on the Indonesia Stock Exchange (IDX) during the period 2014–2018 as its research object. The theoretical framework applied consists of legitimacy theory and signaling theory. This study employs only carbon emission disclosure as the independent variable.
4.	Hutabarat (2024)	<i>Effect of Green Accounting, Leverage, Firm Size on Firm Value with Profitability as Intervening Variable</i>	The object of study in this research consists of companies listed on the Jakarta Islamic Index (JII) over the period 2019–2022. The theoretical framework applied in this study is stakeholder theory. This study also incorporates profitability as an intervening variable.
5.	Jihadi et al., (2021)	<i>The Effect of Liquidity, Leverage, and Profitability on Firm Value: Empirical Evidence from Indonesia</i>	The purposive sampling criteria in this study were applied to companies included in the LQ45 index and listed on the Indonesia Stock Exchange (IDX) during the period 2014–2019. The two variables examined differ from prior studies, namely liquidity and profitability.
6.	Anita et al. (2023)	<i>Leverage on Firm Value: The Role of Financial Performance Mechanisms</i>	The object of study comprises 687 companies listed on the Indonesia Stock Exchange (IDX) during the 2021 period.

No.	Author (Year)	Title	Research Gap
			This study employs only leverage as the independent variable, grounded in three theoretical frameworks, namely agency theory, signaling theory, and trade-off theory.
7.	Hapsari et al. (2024)	<i>Green Accounting, Leverage, and Cash Holding: Key Factors in Determining Firm Value</i>	This study applies purposive sampling to energy sector companies over the period 2019 to 2023. The distinguishing independent variable used in this study is cash holding.
8.	Gantino et al. (2023)	<i>Green Accounting And Intellectual Capital Effect On Firm Value Moderated By Business Strategy</i>	The objects of study are consumer goods companies and automotive and components companies in Indonesia, observed over a five-year period from 2016 to 2021. This study examines only two variables with the addition of a moderating variable.
9.	Kurnia et al. (2021)	<i>Carbon Emission Disclosure and Firm Value: A Study of Manufacturing Firms in Indonesia and Australia</i>	The objects of study are manufacturing companies in Indonesia and Australia over the observation period of 2015 to 2016. This study employs only carbon emission disclosure as the independent variable.

Source: Processed data by the author (2026)

Theoretical Framework

Signaling Theory, as introduced by Spence (1975), provides the theoretical foundation for this research. It explains how companies use environmental and financial data as positive signals to bridge information gaps with external parties. Access to a range of information is therefore essential for both sides. Companies that openly share this type of information, it reflects their transparency and sense of responsibility, boosting stakeholders' trust. This critical information is made available to investors through the company's official website (Hutabarat, 2024). The adoption of green accounting, carbon emission disclosure, and leverage functions as an exchange of information that directly shapes how investors perceive a company's standing. Market participants who receive these positive signals are generally more inclined to place their trust in the company, ultimately resulting in better stock performance and higher firm value (Fina et al., 2024).

Firm value

Firm value represents the amount a prospective buyer is able and willing to pay, reflecting both current performance and future growth potential (Anggita et al., 2022). A rising stock price serves as a strong indicator of growing investor confidence, driven by expectations of higher future returns (Jihadi et al., 2021). In this research, the value of a firm is assessed through the Tobin's Q ratio, which compares the market value of capitalization and liabilities to its total assets. When Tobin's Q is greater than one, it suggests that the firm is considered overvalued, signaling a favorable market assessment; conversely, a ratio below one points to an undervalued condition, reflecting a less favorable market evaluation (Hapsari et al., 2024).

Green accounting

Green accounting involves the process of reporting and integrating environmental expenses into a company's financial system, reflecting an entity's responsibility for its ecological footprint (Fina et al., 2024). More than just a bookkeeping practice, this approach serves as a strategic method for evaluating how effectively a company manages conservation efforts. By openly disclosing environmental impacts, green accounting helps bridge communication gaps between companies and the public about the effects of their operations on nature (Sapulette & Limba, 2021). Thus, companies should optimize green accounting to manage environmental impacts and support long-term sustainability (Gantino et al., 2023).

Carbon Emission Disclosure

As an element of environmental accountability, carbon emission disclosure includes data on a company's emissions and proactive measures taken to minimize its environmental footprint (Fina et al., 2024). While some disclosures are mandatory, certain companies choose to provide them voluntarily (Kurnia et al., 2021). Reporting frameworks can be divided into three categories: adequate disclosure for minimum compliance, reasonable disclosure for relevant additional information, and full disclosure, which provides complete data in line with professional accounting standards (Hardiyansah et al., 2021).

Leverage

As a measure of financial structure, leverage shows how much a company relies on debt financing to operate and boost its profit potential (Hapsari et al., 2024). Jihadi et al. (2021) highlight that this ratio is crucial for determining what portion of a company's assets is funded through borrowed capital. Researchers often use the Debt to Equity Ratio (DER) as a way to evaluate this particular aspect by comparing the total amount of debt to the equity. This ratio effectively illustrates the level of financial risk and the leverage strategies used by management.

Profitability

Profitability refers to how well a company can earn money from the core operations compared to the costs it incurs. According to Jihadi et al. (2021), this metric reflects how efficiently management uses company assets to drive financial growth. Specifically, Return on Assets (ROA) functions to illustrate how well a firm can produce profits from its total assets, offering a clear picture of the company's operational effectiveness.

Firm size

Firm size refers to the scale and volume of an organization's operations (Jihadi et al., 2021). This scale is important when assessing income-generating capacity, as companies with larger asset bases are generally better equipped to maximize resources and achieve higher profits. Typically, firm size is often assessed through the natural logarithm of total assets, market capitalization, or sales volume.

According to the introduction, the literature review, and the discussion, the study model and the connections between the variables are depicted in Figure 1.

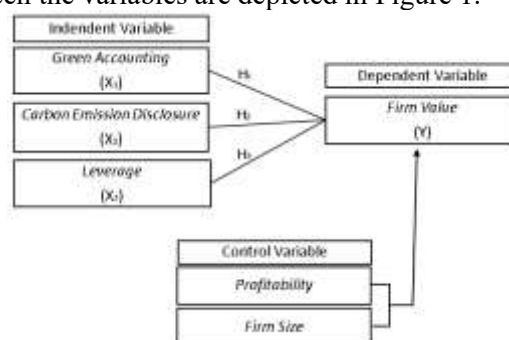


Figure 1. Framework of Thinking

The Effect of Green Accounting on Firm Value

The role of green accounting reflects a firm's genuine responsibility toward nature conservation through the recognition of environmental costs within financial statements Anggita et al. (2022). This practice serves as an instrument to send positive signals to stakeholders regarding corporate dedication to social responsibility. Systematically integrating environmental accountability enhances the firm's credibility among investors and the general public. A strong commitment to these environmental aspects ultimately strengthens the company's bargaining position in achieving long-term business sustainability. However, the implementation of green accounting does not always elicit a positive market response. The market may interpret environmental cost disclosures as an additional financial burden that erodes net income, leading short-term-oriented investors to perceive such expenditures as inefficiencies. This negative signal ultimately undermines investor confidence and diminishes firm value, a view consistent with the findings of Gantino et al. (2023).

H₁: Green accounting has a negative effect on firm value.

The Effect of Carbon Emission Disclosure on Firm Value

The provision of ecological information enables investors to assess an entity's sustainability level, thereby increasing the likelihood of investment decisions (Fina et al., 2024). Signaling theory suggests that carbon emission disclosures represent a firm's commitment to environmental preservation and social responsibility toward both investors and the public. This information indicates an entity's success in implementing efficient operational policies that deliver sustained benefits.

H₂: Carbon emission disclosure has a positive effect on firm value.

The Effect of Leverage on Firm Value

Businesses use leverage to expand their operational reach and increase earnings by borrowing capital. Managing these funds optimally is essential for increasing profitability, especially given that debt financing involves significant risks like potential insolvency (Hapsari et al., 2024). Profit growth serves as a favorable signal to investors about a firm's ability to deliver consistent returns, as explained by signaling theory. This improved market trust in future earnings leads to a steady rise in the company's total valuation.

H₃: Leverage has a positive effect on firm value.

METHODS

Quantitative methods were used in this study to identify patterns or relationships among variables, using a sample drawn from the existing population. The research focuses on energy sector companies listed on the IDX from 2020 to 2024. Secondary data was gathered by examining financial statements and annual reports obtained from official sources. The sample was chosen using purposive sampling, adhering to specific criteria: (1) companies in the energy sector that have been listed continuously on the IDX from 2020 to 2024; and (2) companies that reported financial statements and annual reports for the years 2020–2024. According to these criteria, 41 companies were selected for the period from 2020 to 2024, which led to a total of 205 observations.

This study uses secondary data, which is information obtained indirectly from the research subjects through officially published sources. The data was collected using a documentary approach, specifically by gathering and analyzing financial statements and annual reports from companies within the energy sector covering the years 2020 to 2024. The data analysis procedures employed in this study are as follows. First, descriptive statistics are used to systematically describe the characteristics of the collected data in a manner that is easily interpretable. Second, panel data regression model estimation is conducted to determine the most appropriate model among the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) through a series of tests, including the Chow test, Hausman test, and Lagrange Multiplier test. The model selection process also serves to mitigate the potential issue of endogeneity arising from unobserved firm-specific characteristics (unobserved heterogeneity). Third, classical assumption

tests are performed to evaluate whether the selected model satisfies the fundamental assumptions of regression, encompassing the normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test. Fourth, panel data regression analysis is carried out to examine the effect of the independent variables on the dependent variable, both partially and simultaneously. All analytical procedures are performed using EViews 13 as the analytical software.

The dependent variable, firm value, which represents firm value, was represented by Tobin's Q ratio. This ratio compares a company's market value to its book value (Hardiyansah et al., 2021). In this study, green accounting was identified as the independent variable and was assessed using a dummy variable. This assessment involved analyzing the environmental cost components listed in the companies' annual reports. If a report discloses any expenditure related to environmental matters, the company is given a score of 1. Conversely, if the company does not reveal any information about such expenses, a score of 0 is assigned. The independent variable, carbon emission disclosure, was represented based on a carbon emission index score comprising five categories with a total of 18 disclosure items. The assessment involves giving a score of 1 for each item that is disclosed, while undisclosed items are assigned a score of 0. To calculate the carbon emission disclosure index, you divide the number of disclosed items by the total number of items.

Table 2: Carbon Emission Index

Category	Item	Description
Climate Change: Risks and Opportunity	CC-1	Assessment or description of risk (specific or general rules or regulations) related to climate change and actions taken to manage those risks.
	CC-2	Present (and future) assessments related to the implications of finance, business, and opportunity on climate change.
Greenhouse Gas Emission (GHG)	GHG-1	Present (and future) assessments related to the implications of finance, business, and opportunity on climate change.
	GHG-2	The existence of external verification to calculate the GHG emission quantities, by whom and on what basis.
	GHG-3	The existence of external verification to calculate the GHG emission quantities, by whom and on what basis.
	GHG-4	Scope of disclosure 1 and 2, or direct GHG emission 3.
	GHG-5	GHG emission disclosure based on its origin or source.
	GHG-6	Disclosure of GHG emissions by facility or segment level.
	GHG-7	Comparison of GHG emissions in the previous years.
Energy Consumption (EC)	EC-1	Amount of energy consumed (such as impression-joules).
	EC-2	Calculation of energy used from the renewable resources.
	EC-3	Disclosure by type, facility, or segment.
Reduction and Cost (RC)	RC-1	Details of plans or strategies to reduce GHG emissions.
	RC-2	Details of the current GHG emission reduction target levels and emission reduction targets.

Category	Item	Description
Accountability of Emission Carbon (AEC)	RC-3	Reduction of emissions and costs or savings currently achieved as the result of reduction plan.
	RC-4	Reduction of emissions and costs or savings currently achieved as the result of reduction plan.
	AEC-1	Indication that the board (or other executive body) is responsible for the climate change- related actions.
	AEC-2	A description of the mechanism by which the board (or other executive body) reviews the development of the related company.

Source: (Hardiyansah et al., 2021)

The independent variable leverage was represented by Debt to Equity Ratio (DER), reflects the proportion of a company's total liabilities to its shareholders' equity. This ratio indicates the level of financial risk the company assumes in its efforts to enhance firm value. The profitability control variable is proxied by Return on Assets (ROA) ratio shows how much profit a company can produce relative to its assets. Firm size greatly influences a company's ability to generate profits (Jihadi et al., 2021). Firm size is assessed based on the natural logarithm of the company's total assets (Hardiyansah et al., 2021).

RESULT

Descriptive Statistics

Table 3. Statistic Descriptive

	Firm Value	Green Accounting	Carbon Emission Disclosure	Leverage	Profitability	Firm Size
Mean	0.89189	0.65366	0.23415	0.94499	8.57574	2.63715
Median	0.58829	1.00000	0.16667	0.61000	5.00000	2.60687
Max	9.17619	1.00000	0.94444	71.00000	61.70000	3.09228
Min	0.08766	0.00000	0.00000	-39.32496	-14.47000	2.17033
Std. Dev	1.10592	0.47697	0.21200	6.18682	12.95935	0.20672
Skewness	5.41229	-0.64589	1.68001	5.24886	1.82777	0.36132
Kurtosis	36.95167	1.41718	5.75252	92.62964	7.21659	3.16705

Source: Processed by the author using EViews (2026).

The average firm value was 0.89189, while the median stood at 0.58829, suggesting that the data distribution tends to be negative. The minimum value is -0.08766, and the maximum value is 9.17619, there is a fairly wide range of data. The mean value of the green accounting variable is 0.65366, while the median is 1.00000. The data range is evident from the maximum value of 1.00000 and the minimum of 0.00000. The standard deviation of 0.47697 suggests that the variation is not particularly large. Carbon emission disclosure shows a mean value of 0.23415 and a median of 0.16667 the data ranges from a minimum of 0.00000 to a maximum of 0.94444, suggesting a fairly tight distribution. A standard deviation of 0.211200 indicates relatively small data. Leverage shows a mean of 0.94499 with a median of 0.61000. The maximum value is very high at 71.0000, and the minimum is -39.32496, with a fairly large standard deviation of 6.18682. The mean profitability is 8.57574, which is higher than the median of 5.00000, with a maximum value of 61.7000 and a minimum value of -14.47000. The standard deviation of 12.95935 indicates the level of variability in the data. The mean firm size is 3.62714, and the median is 2.60687, indicating a

balanced data distribution; the maximum value of 3.09228 and the minimum value of 2.17330 indicate a narrow data range. The standard deviation of 0.206720 points to a low level of variability in this data.

Classical Assumption Tests

This assessment is carried out to check if the model satisfies the fundamental assumptions of regression, which will be explained below.

Normality Test

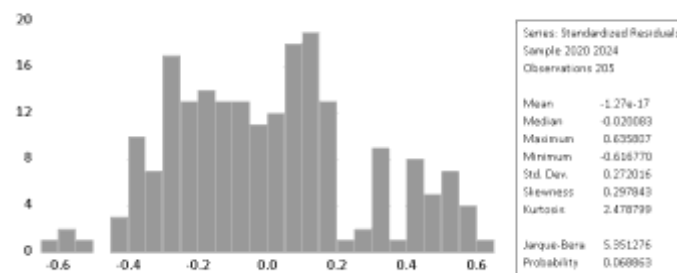


Figure 2. Normality Test

In this research, the Jarque-Bera test was utilised to assess normality. A probability value greater than 5% indicates that the data can be considered normally distributed. Based on the results displayed in Figure 2, the Jarque-Bera statistic is 5.35127, and the corresponding p-value is 0.06889, which is greater than 0.05. This suggests that we can classify the data as normally distributed.

Multicollinearity Test

Table 4. Multicollinearity Test

	Green Accounting	Carbon Emission Disclosure	Leverage	Profitability	Firm Size
Green Accounting	1.00000	0.38309	0.11547	0.09811	-0.01885
Carbon Emission Disclosure	0.38309	1.00000	0.08538	0.15366	-0.12892
Leverage	0.11547	0.08538	1.00000	-0.05402	0.00972
Profitability	0.09811	0.15366	-0.05402	1.00000	-0.06032
Firm Size	-0.01885	-0.12892	0.00972	-0.06032	1.00000

Source: Processed by the author using EViews (2026).

The multicollinearity values presented in Table 4 indicate that the correlation coefficients among the independent variables are higher than 80%. This suggests that there is no issue with multicollinearity in the data.

Heteroscedasticity Test

Table 5. Heteroscedasticity Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.85284	0.64277	2.88257	0.00450
Green Accounting	-0.01189	0.03817	-0.31143	0.75590
Carbon Emission Disclosure	0.16055	0.11682	1.37435	0.17130
Leverage	0.00023	0.00226	0.10371	0.91750

Profitability	-0.00432	0.00138	-3.12527	0.00210
Firm Size	-0.62790	0.24490	-2.56396	0.01130

Source: Processed by the author using EViews (2026).

This study also conducted a Glejser test to determine whether there were signs of heteroscedasticity. As shown in Table 5, the independent variables include green accounting, carbon emission disclosure, and leverage, all of which had significance levels of >0.05 , indicating that no heteroscedasticity was detected.

Autocorrelation Test

This test employs the Durbin-Watson method, a commonly used method for detecting autocorrelation, which states that the DW statistic (d) is based on the first-order autocorrelation coefficient (ρ) according to the equation: $d \approx 2(1 - \rho)$.

Table 6. Autocorrelation Test

Durbin-Watson stat	1.927134
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Source: Processed by the author using EViews (2026).

The findings of the autocorrelation test are illustrated by the DW value presented in Table 6, which is 1.92713, a value close to 2. The resulting ρ value (correlation among residuals) is only 0.036 (close to zero), which proves that the degree of correlation between the errors in one observation and those in another is very weak. As a result, it can be concluded that there is no autocorrelation issue in this regression model.

Panel Data Selection

Table 7. Result of Panel Data Model Selection

Test Type	Effect Test	Probability	Selected Model
Chow Test	Cross-section F	0.00	FEM
Hausman Test	Cross-section random	0.03	FEM
Lagrange-Multiplier Test		-	-

Source: Processed by the author using EViews (2026).

According to the test results shown in Table 7, the p-value of the Chow test $< 5\%$, indicating that the fixed effects model is the appropriate choice. Similarly, the Hausman test yielded a probability value 0.03, less than 5%, confirming that the fixed effects model is suitable. The results of the Chow and Hausman tests support the use of the fixed effects model; therefore, the Lagrange multiplier test doesn't need to be executed, as the LM test compares the random-effects and common-effects models.

Panel Data Regression Analysis

Panel data regression analysis is a statistical approach used to examine the association between independent and dependent variables, considering variations over time as well as differences across various subjects.

Table 8. Result of Panel Data Regression Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.133681	0.501966	-4.250650	0.000000
Green Accounting	-0.096321	0.021094	-4.566203	0.000000
Carbon Emission Disclosure	-0.066818	0.090231	-0.740519	0.460100
Leverage	-0.000273	0.000645	-0.423659	0.672400

Profitability	0.003300	0.001265	2.607842	0.010000
Firm Size	0.668824	0.189940	3.521242	0.000600
R-squared	0.942092	Mean dependent var	-1.354661	
Adjusted R-squared	0.925703	S.D. dependent var	2.029243	
S.E. of regression	0.308113	Sum squared resid	15.094480	
F-statistic	57.482800	Durbin-Watson stat	1.927134	
Prob(F-statistic)	0.000000			

Source: Processed by the author using EViews (2026).

According to Table 8, the findings from the panel data regression test are presented, with the coefficient values used as the basis for the equation since they already include the residual or error component (e). The panel data regression equation is formulated as follows:

$$FV = -2.133681 - 0.096321*GA - 0.066818*CED - 0.000273*LVRG + 0.003300*PRFT + 0.668824*FS + e.$$

The regression equation suggests that the constant term (α) of -2.133681 represents the firm value when all independent variables are zero or have no effect. The coefficient for green accounting suggests that an increase of one unit in green accounting reduces firm value by 0.096321. This indicates a negative relationship. The coefficient for carbon emission disclosure suggests that each additional unit leads to a decrease in firm value by -0.066818; this relationship is also negative. Leverage has a coefficient of -0.000273. This value indicates that a one-unit increase reduces firm value by -0.000273. Its effect is nearly zero compared to other variables. Profitability has a coefficient of 0.003300, which means that for every one-unit increase in profitability, the firm's value rises by 0.003300. The relationship between these variables is positive. Firm size has a coefficient of 0.668824. This coefficient indicates that a one-unit increase in firm size leads to an increase in firm value by 0.668824. This relationship is also positive.

Hypothesis Testing

The findings of the hypothesis testing phase, which includes partial tests, F-tests, and R-squared using a fixed-effects model, are presented in Table 8. It can be seen that a partial test was carried out to explore the connection between the variables that determine the outcome of the hypothesis; if the significance probability is less than 0.05, then the independent variable has an impact on the dependent variable. Green accounting has a significance level of $0.00000 < 0.05$ with a negative t-statistic of -4.56620, which shows that green accounting has a negative effect on firm value; as a result, H_1 is accepted. Carbon emission disclosure has a significance value of $0.460100 > 0.05$ with a t-statistic of -0.740519. This indicates that carbon emission disclosure does not influence firm value; as a result, H_2 is not accepted. Leverage has a p-value of $0.672400 > 0.05$ with a negative t-statistic of -0.423659. This indicates that leverage does not influence the firm value; therefore, hypothesis H_3 is rejected. Profitability, as a control variable, has a significance level of $0.01000 < 0.05$ with a positive t-statistic of 2.60784. This indicates that profitability has an impact on firm value. Firm size has a significance value of $0.00060 < 0.05$ with a positive t-statistic of 3.52124. This indicates that firm size has an impact on firm value. The findings of the F-test show that a p-value of $0.0000 < 0.05$ indicates that the independent variables simultaneously have a significant impact on the dependent variable. The R-squared value is 0.94209, which is nearly 100%, indicating that the independent variables account for changes in the dependent variable; the remaining 5.8% is attributed to the influence of other variables not involved in the research model.

DISCUSSION

The Effect of Green Accounting on Firm Value

The findings show a significant probability of $0.0000 < 0.05$ and a t-statistic of -4.56620, as presented in Table 8. This evidence suggests that green accounting negatively impacts a firm value. Therefore, hypothesis H_1 is accepted, which implies that the more a company adopts green

accounting, the more its firm value tends to decline. This suggests that the market views such expenditures more as operational burdens that eat into short-term efficiency rather than as forward-looking strategic investments. This is due to the fact that the mean firm value of energy sector companies is below 1 (< 1), indicating that companies in this sector are currently undervalued, meaning the market values their assets lower than the cost of replacement. This condition may signal that the company is currently unable to manage its finances optimally, leading investors to view the company's policy of allocating resources to environmental costs as a burden. Investors may also view green accounting as a negative signal because it is seen as a sign of inefficient spending. Consequently, when companies increase environmental management costs at a time when their market performance has yet to reach its optimal level, this sends a negative signal regarding the company's capacity to balance ecological responsibility with profitability stability. It is this decline in profitability that subsequently undermines investor confidence, ultimately placing the company's future firm value at risk of deterioration. Similarly, a study conducted by Gantino et al. (2023) in companies in the automotive, components, and consumer goods sectors from 2016 to 2021. Also found that green accounting has a negative impact. However, goes against the results of a study carried out by Anggita et al. (2022) on customer goods companies in Indonesia, which concluded that green accounting has a positive impact on firm value.

The Effect of Carbon Emission Disclosure on Firm Value

Meanwhile, in Table 8, the carbon emission disclosure shows that a significance probability of $0,4601 < 0,05$ and a t-statistic of -0.74051 , it has no significant effect on firm value. Therefore, hypothesis H_1 is rejected, affirming that the level of corporate transparency in disclosing carbon emissions has yet to meaningfully alter investor perception or assessment of firm value within the energy sector. In an undervalued market, investors tend to take a defensive stance, prioritising tangible financial metrics over voluntary, administrative, and non-financial disclosures. Similarly to green accounting, this finding is also influenced by the average Tobin's Q proxied for firm value, which indicates that the firm is undervalued. Energy sector companies currently focus more on financial performance and asset recovery rather than sustainability reports. Signal theory states that signals provided by companies can influence the decisions of investors as signal recipients through the information conveyed. This indicates that carbon emission disclosure is not yet considered information that influences investor decisions. This insignificance reflects the fact that the majority of investors in Indonesia's capital market remain oriented toward conventional financial performance metrics, such as earnings and dividend distribution. Carbon emission disclosure is often regarded merely as the fulfillment of administrative obligations that do not necessarily reflect the company's actual environmental performance in depth. Furthermore, carbon emission disclosure in Indonesia remains voluntary in nature with varying levels of standardization, leading investors to prioritize corporate financial stability in their investment decision-making. As a result, disclosing carbon emissions does not impact the increase in firm value within the energy sector. This finding aligns with the research conducted by Anggita et al. (2022) and Fina et al. (2024), which also found no impact of carbon emission disclosure on firm value. This stands in contrast to the study by Hardiyansah et al. (2021) Hardiyansah et al. (2021) on companies that received the ISRA award from 2014 to 2018, revealing that carbon emission disclosure does indeed have a significant effect on firm value.

The Effect of Leverage on Firm Value

Research on leverage has a significant probability of $0,6724 < 0,05$ and a t-statistic of -0.42365 , which also indicates that it has no effect on firm value. Investors appear to be focusing more on the quality of cash flow management than on mere debt ratios. This indicates that leverage does not serve as an indicator of the direct impact on firm value, as proxied by Tobin's Q. Energy sector companies are currently undervalued, so debt levels are not viewed as enhancing profitability or providing tax benefits and do not add value in the eyes of investors. Based on signaling theory, debt can serve as a form of management financing to enhance profits from future prospects. However, a positive response is required; investors must perceive that the use of debt will improve

operational efficiency and profitability. Yet, in an undervalued market, leverage tends to emit conflicting signals. On one hand, effective debt management has the potential to generate substantial returns, rendering leverage a positive signal. On the other hand, a company's inability to manage its debt levels may trigger financial distress risks and potential default, which is consequently perceived as a negative signal. These two opposing signals effectively cancel each other out, resulting in debt fluctuations having no meaningful impact on firm value. As a result, investor confidence has declined, leading to a decrease in firm value. Companies can improve the efficiency of resource allocation by avoiding investment priorities in areas that do not contribute significantly to increasing corporate value. The results of this study also show that credibility in the eyes of stakeholders depends heavily on transparent environmental disclosure, which is a tangible demonstration of an entity's fulfillment of its social accountability. These findings were also confirmed by Anita et al. (2023) and Hapsari et al. (2024), who found that leverage does not affect firm value.

The Effect of Control Variable on Firm Value

The control variables in this study, profitability (sig. 0.01) and firm size (sig. 0.0006) showed a significant positive effect on firm value. This reinforces the idea that when a market is undervalued, investors lean more heavily on fundamental financial signals. Large asset scales and consistent earnings are viewed as benchmarks for investment security and operational efficiency. Consequently, these two factors become the dominant drivers in boosting market valuation for companies within the energy sector.

CONCLUSIONS

Companies in the energy sector are closely tied to the environment, and are therefore required to address and take responsibility for sustainability issues and their environmental impact. This commitment may take the form of environmental costs and sustainability reporting. However, these factors can lead to higher operating costs and increased debt levels. An analysis of 41 energy companies between 2020 and 2024 reveals that a company's commitment to sustainability, particularly through environmental costs and emission reporting, does not consistently lead to a positive effect on its firm value. The results support the first hypothesis (H_1), proving that green accounting has a significant negative impact on firm value. In contrast, the second hypothesis (H_2) was not supported, as carbon emission disclosure does not significantly affect a firm's value. A similar outcome was observed for the third hypothesis (H_3), which was also rejected; leverage levels were found to have no influence on firm value. This defensive market stance is further emphasized by the control variables, where profitability and firm size were shown to have a significant positive impact, serving as the fundamental signals investors rely on most. While there are limitations regarding the scope of variables and existing literature, this research highlights a critical takeaway: a company's long-term credibility still depends on management's ability to balance social accountability with the pursuit of corporate value.

This research reinforces signaling theory, which states that firm value decreases when a company implements green accounting under undervalued conditions. However, unlike green accounting, carbon emission disclosure and leverage show no effect on firm value at all, which is inconsistent with signaling theory. Companies are advised to evaluate the effectiveness of environmental cost allocation so that it generates efficiency and financial value rather than merely adding to operational burden. The quality of carbon emission disclosure should also be improved through more strategic and transparent reporting to build market trust. In addition, capital structure should be managed at an optimal level to maintain cash flow stability, even though fluctuations in debt are not always directly reflected in market value. Future researchers are advised to broaden the scope of the research object by not limiting it to the energy sector alone, but also including other sectors so that the findings can be generalized more broadly. In addition, future researchers may incorporate other relevant variables to obtain more in-depth results.

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