SIMBA

7th SEMINAR INOVASI MANAJEMEN BISNIS DAN AKUNTANSI

CARBON EMISSION DISCLOSURE AND GREEN INVESTMENT IMPACT ON FIRM VALUE WITH FIRM SIZE MODERATION

Rahma Zaujatul Hafiqah[1)], Nik Amah[2)], Moh. Ubaidillah[3)]
[1]Accounting Departement, Faculty of Economics and Bussiness, University of PGRI Madiun
email: rahma_2103101084@mhs.unipma.ac.id
[2] Accounting Departement, Faculty of Economics and Bussiness, University of PGRI Madiun
email: nikamah@unipma.ac.id
[3] Accounting Departement, Faculty of Economics and Bussiness, University of PGRI Madiun
email: mohubaidillah@unipma.ac.id

Abstrak

Tujuan dari penelitian ini adalah untuk mengetahui bagaimana *carbon emission disclosure* dan investasi hijau berdampak pada nilai perusahaan di sektor energi yang terdaftar di Bursa Efek Indonesia dari tahun 2021 hingga 2024. Selain itu, penelitian ini juga menyelidiki bagaimana ukuran perusahaan berfungsi sebagai variabel moderasi dalam hubungan ini. Dengan 26 perusahaan dipilih sebagai sampel dari 76 perusahaan dalam populasi penelitian. Penelitian ini menggunakan pendekatan kuantitatif dengan menggunakan analisis regresi moderasi menggunakan program SPSS. Hasil penelitian menunjukkan bahwa *carbon emission disclosure* berpengaruh positif terhadap nilai perusahaan, sedangkan investasi hijau berpengaruh negatif. Ukuran perusahaan tidak berfungsi sebagai moderator dalam hubungan antara *carbon emission disclosure* dan investasi hijau terhadap nilai perusahaan.

Kata Kunci: nilai perusahaan, *carbon emission disclosure*, investasi hijau, ukuran perusahaan

Abstract

The purpose of this study is to examine how carbon emission disclosure and green investment affect firm value in the energy sector companies listed on the Indonesia Stock Exchange from 2021 to 2024. In addition, this research investigates the role of firm size as a moderating variable in this relationship. A total of 26 companies were selected as the sample out of 76 companies in the research population. This study employs a quantitative approach using moderation regression analysis with SPSS software. The results show that carbon emission disclosure has a positive effect on firm value, while green investment has a negative effect. Furthermore, firm size does not function as a moderator in the relationship between carbon emission disclosure, green investment, and firm value.

Keywords*:* firm value, carbon emission disclosure, green investment, firm size

A. INTRODUCTION

Firm value is an essential aspect for companies, particularly when it increases, as rising stock prices positively influence the company's future prospects and enhance investor

confidence in its performance (Ubaidillah *et al.,* 2024). In line with efforts to maintain and enhance firm value, one strategy that can be pursued is the implementation of sustainability practices and social responsibility, especially amid the growing environmental issue of climate change. The issue of climate change has become a serious global challenge, characterized by rising global temperatures resulting from the buildup of greenhouse gasses, particularly carbon dioxide generated from industrial, energy, and transportation activities. Emissions are among the largest contributors to air pollution, significantly affecting the surrounding environment. Based on the LTS-LCCR 2050 issued by the Ministry of Environment and Forestry, Indonesia is committed to achieving Net Zero Emissions by identifying the main emission-contributing sectors and formulating strategies to reduce emissions in each sector. A relevant case is reflected in the decline of PT RMK Energy's stock price, which fell from IDR 1.085 in August 2023 to IDR 575 in January 2024, triggered by sanctions from the Ministry of Environment and Forestry because of environmental issues (Prasetyo, 2023).

Companies are required to be transparent, particularly in disclosing broader information through annual or sustainability reports, including disclosures related to environmental aspects (Kurnia *et al.,* 2021). Companies that voluntarily disclose, present, and record the quantity of carbon emissions produced by their operations are said to be engaging in carbon emission disclosure (Damas *et al.*, 2021). According to studies by Fitriana *et al.* (2024) and Bahriansyah & Ginting (2022), firm value is positively impacted by carbon emission disclosure. Such disclosures serve as a positive signal to investors as they demonstrate transparency regarding environmental uncertainties and risks, while also providing insights into how companies manage and address them in the future. Conversely, research by Hadiwibowo *et al.* (2023) and Pradnyawati & Werastuti (2024) discovered that firm value is adversely impacted by carbon emission disclosure. Companies that fail to be transparent in disclosing emissions, or those that disclose but cannot effectively reduce emissions and mitigate environmental impacts, risk losing both customers and investors,

ultimately leading to a decline in stock prices. Meanwhile, studies by Dila & Aryati (2023) and Ticoalu & Agoes (2023) revealed that carbon emission disclosure has no significant effect on firm value, as investors have not yet considered carbon emission disclosure as a key factor in their investment decision-making.

Green investment represents a form of corporate social responsibility through a sustainable investment approach aimed at supporting long-term economic and social sustainability (Triyani & Rusmanto, 2022). Previous studies by Oktavia & Murtanto (2024) and Wijayanti & Budi (2024) found that green investment positively influences firm value. Environmentally friendly practices improve the company's brand, draw in investors that care about sustainability, and promote energy efficiency and waste reduction, which in turn lower operational costs. In contrast, research by Larasati *et al.* (2024) and Yusnia *et al.* (2024) reported that green investment does not positively affect firm value, as public awareness and concern for environmental issues in Indonesia remain relatively low, leading investors to prioritize financial performance over environmental considerations when making investment decisions. Furthermore, studies by Triyani & Rusmanto (2022) and Indriani & Purwasih (2025) concluded that green investment has no significant impact on firm value, mainly due to the limited implementation of green investment practices in Indonesia.

The novelty of this study compared to previous research lies in the use of firm size. Larger companies generally have greater capacity to manage and disclose sustainability information to stakeholders. In addition, they are more vulnerable to public pressure, which encourages them to demonstrate stronger commitment to environmentally friendly practices.

1. Theorical Review and Hypotesis Development

Stakeholder Theory

Stakeholder theory posits that a company should not focus solely on profits but also bear responsibility toward all parties involved, such as creditors, shareholders, consumers, auditors, communities, and the government (Dila & Aryati, 2024). This theory is closely

related to practices such as carbon emission disclosure and green investment strategies (Rachmawati, 2021). Stakeholder theory emphasizes that companies must provide information to stakeholders who are concerned about environmental impacts. It plays a crucial role in enhancing firm value, as positive and mutually beneficial relationships between a company and its stakeholders can lead to an increase in firm value.

Legitimacy Theory

Legitimacy theory explains that companies are responsible for conducting business activities in accordance with the norms prevailing in society, and that these activities are acceptable to external parties or gain societal legitimacy (Kusumawardani & Riduwan, 2017). One approach through which companies achieve legitimacy is by disclosing social and environmental responsibility regarding the impacts of their operations (Soetardjo & Nurmawati, 2024). Carbon emission disclosure is carried out by management as an effort to gain legitimacy from society, aiming to demonstrate the company's commitment to reducing greenhouse gas effects (Soetardjo & Nurmawati, 2024). Green investment aligns with the principles of legitimacy theory, through which companies are expected to act in accordance with the values, norms, and social expectations of their surrounding environment (Widarwati *et al.*, 2024). Legitimacy theory asserts that the greater the alignment between a company's actions and societal expectations, the higher the firm value will be.

Firm Value

Firm value is a key concept that investors must consider, as it reflects how the market evaluates a company as a whole (Amah, 2024). High stock prices contribute to an overall increase in firm value, which in turn enhances investor welfare. Therefore, companies must also have the capability to generate profits for their shareholders as a form of accountability for the trust they have received.

Carbon Emission Disclosure

One kind of corporate reporting that aims to provide information about how a company's operations affect the environment is carbon emission disclosure (Oktavia & Murtanto, 2024). In response to the negative effects of climate change caused by carbon emissions, companies have a responsibility to enhance environmental transparency. Companies that reveal data on carbon emissions have the potential to receive positive evaluations from investors, which can, in turn, increase firm value. These findings are supported by studies from Sun *et al.* (2022) and Oktavia & Murtanto (2024), which indicate that carbon emission disclosure positively affects firm value. In light of this, the following hypothesis is put forth:

H_1: Carbon emission disclosure has a positive effect on firm value.

Green Investment

Socially conscious investments that prioritize environmental principles in their execution are referred to as green investments (Zhang & Berhe, 2022). Through green investment, companies demonstrate their commitment to long-term sustainability instead of concentrating on solely on short-term profits. Companies have the opportunity to gain advantages by minimizing the negative impacts of their operational activities on the environment through green investment. Firms that allocate investments to environmentally friendly practices generally achieve better reputations among consumers and investors. These findings are supported by studies from Mentari & Dewi (2023) and Widarwati *et al.* (2024), which indicate that green investment positively affects firm value. In light of this, the following hypothesis is put forth:

H_2: Green investment has a positive effect on firm value.

Firm Size

When prospective investors are making investment selections, firm size—an measure of a company's size based on its total assets is a crucial factor to account for (Amaliyah & Herwiyanti, 2020). The inclusion of firm size as a moderating factor between carbon

emission disclosure and firm value is based on the assumption that not every business can adequately address calls for environmental transparency. Larger companies typically possess more adequate resources and are subject to stricter oversight, enabling them to disclose environmental information, including carbon emissions, more transparently and credibly, which ultimately has a significant impact on enhancing firm value. In light of this, the following hypothesis is put forth:

H_3: Firm size has a moderating effect on the relationship between carbon emission disclosure and firm value

Large companies generally possess more adequate financial resources, technology, and managerial capacity to invest effectively in green projects. This makes it possible for green investment to improve a company's standing with investors and the general public in addition to helping to preserve the environment, which eventually raises the business value.

H_4: Firm size has a moderating effect on the relationship between green investment and firm value

B. METHOD

In order to examine the relationship between two or more variables, this study uses a quantitative research design. The information and data came from the sustainability and annual reports of energy businesses that are listed on the Indonesia Stock Exchange (IDX). The research population comprises 76 energy companies. Purposive sampling was used to choose 26 companies were selected as the research sample, observed over a four-year period. This procedure yielded 104 firm-year observations. Following the normality test, 15 outlier data points were excluded, resulting in a final dataset of 89 observations for analysis.

Measurement of Variables

Tabel 1. Measurement of Variables

Variable	Measurement	Reference
Carbon Emission Disclosure (X1)	$CDP = \frac{Jumlah\ Skor}{Jumlah\ Total\ maksimal\ Skor}$	(Fitriana *et al.*, 2024)
Green Investment (X2)	$Green\ Investment = \frac{Biaya\ Investasi\ Hijau}{Total\ Aset}$	(Chen & Ma, 2021)
Firm Value (Y)	$Tobin'sQ = \frac{Total\ Market\ Value\ Equity + Total\ Liabilities}{Total\ Assets}$	(Fitriana *et al.*, 2024)
Firm Size (Z)	$Size = Ln\ (Total\ Aset)$	(Fitriana *et al.*, 2024)

C. RESULTS AND DISCUSSIONS

1. Descriptive Statistic

Tabel 2. Deksriptive Statistic

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Carbon Emission Disclosure	104	0,11	0,89	0,4621	0,16394
Investasi Hijau	104	0,00	0,10	0,0080	0,01924
Nilai Perusahaan	104	0,18	18,10	2,2141	3,89457
Ukuran Perusahaan	104	27,87	32,77	30,2839	1,28190
Valid N (listwise)	104				

Source: data processed, 2025

PT Transcoal Pacific Tbk. achieved the lowest value of 0,11 for the carbon emission disclosure variable, while PT Bukit Asam Tbk. recorded the highest value of 0,89. This variable's mean value, 0,4621, is more than its standard deviation, which is 0,16394. This criterion suggests that energy firms' disclosure policies regarding carbon emissions are relatively similar.

According to PT Transcoal Pacific Tbk, the green investment variable has a minimum value of 0,00, while PT Adaro Energy Indonesia Tbk has a maximum value of 0,10. This variable has a mean of 0,0080 and a standard deviation of 0,01924. The fact

that the standard deviation is higher than the mean suggests that the study's data on green investments are relatively diverse.

As shown in PT Energi Mega Persada Tbk., the firm value has a minimum value of 0,18, while PT Transcoal Pacific Tbk. has a maximum value of 18,10. This variable has a mean of 2,2141, and a standard deviation of 3,89457. The company valuation data in this research are comparatively different, as shown by the standard deviation being higher than the mean.

According to PT Radiant Utama Interinsco Tbk., firm size variable has a minimum value of 27,87, while PT Adaro Energy Indonesia Tbk. has a maximum value of 32,77. This variable's mean value, 30,2839, is more than its standard deviation, 1,28190. This suggests that there is little variation in the data, indicating that the firm size statistics in this research are relatively similar.

2. Hypothesis Testing Result

The results indicate no evidence of multicollinearity, heteroskedasticity, or autocorrelation, and and this study findings satisfied the normalcy test's standards. Subsequently, the analysis proceeded with hypothesis testing.

Partial Tets (t-Test)

Table 3. T-Test

Coefficients[a]			
Model		t	Sig.
1	(Constant)	3,752	0,000
	Carbon Emission Disclosure	2,496	0,014
	Green Investment	-3,520	0,001

Source: data processed, 2025

The variable carbon emission disclosure (X1) has a positive effect on firm value (Y), with a significance value of 0,014 < 0,05 and a t-value (2,496) greater than the t-table (1,987). Thus, H1 is accepted. Companies that actively disclose carbon emissions are considered to demonstrate a commitment to environmental responsibility, which ultimately enhances

market trust. According to stakeholder theory, transparent and accurate carbon emission disclosure can be perceived as the company's effort to fulfill its responsibilities to stakeholders. This is also consistent with legitimacy theory, which asserts that firms proactively disclosing environmental-related information are regarded as more credible and committed to sustainable business practices. These results are consistent with earlier research by Sun *et al.* (2022) and Nisa (2023), which showed that firm value is positively impacted by carbon emission disclosure.

The variable green investment (X2) has a negative effect on firm value (Y), with a significance value of 0,001 < 0,05 and a t-value (3,520) < t-table (1,987). Thus, H2 is rejected. The absence of a positive influence of green investment on firm value is partly attributable to the limited implementation of such investments in Indonesia and the relatively low public awareness of environmental issues, leading investors to place greater emphasis on the company's financial performance when making investment decisions. According to legitimacy theory, green investment may not be immediately converted into economic value. These findings are consistent with studies by Yusnia *et al.* (2024) and Larasati *et al.* (2024), which demonstrated that green investment does not exert a positive effect on firm value.

Coefficient of Determination (R^2)

Table 4. Coefficient Destermination (R^2) Test

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,541[a]	0,292	0,267	0,20550

Source: data processed, 2025

The results of the coefficient of determination test (R^2) presented in table 4 show an adjusted R^2 value of 0,267, indicating that carbon emission disclosure, green investment, and firm size collectively explain 26,7% of the variability in firm value, while Other factors not included in this research account for the remaining 73.3%.

Moderated Regression Analysis Test (MRA)

Table 5. MRA Test Equation II

Coefficients[a]				
Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	-0,094	0,027	
	Carbon Emission Disclosure	0,137	0,039	0,335
	Green Investment	-0,202	0,052	-0,358
	Firm Size	0,112	0,031	0,347

Source: data processed, 2025

Y= α + β1X1 + β2X2 + β3Z + ε

Y= -0,094 + 0,137X1 – 0,202X2 + 0,112Z + ε

From the regression equation above, the following conclusions the constant of the regression equation is -0,094, meaning that the dependent variable, firm value (Y), will be 0,094 if the independent variables carbon emission disclosure (X1), green investment (X2), and company size (Z), are equal to 0.

With a coefficient of 0,137, the carbon emission disclosure variable (X1) shows that a 1% increase in carbon emission disclosure results in a 0.137 rise in firm value.

With a coefficient of -0,202, the green investment variable (X2) shows that a 1% increase in green investment results in a 0,202 drop in firm value.

With a coefficient of 0.112 for the firm size variable (Z), a 1% increase in firm size results in a 0.112 rise in firm value.

Table 6. MRA Test Equation III

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-0,115	0,030		-3,870	0,000
	Carbon Emission Disclosure	0,106	0,044	0,258	2,406	0,018
	Investasi Hijau	-0,219	0,053	-0,388	-4,154	0,000
	Firm Size	0,079	0,041	0,245	1,913	0,059
	*Carbon Emission Disclosure**Firm Size	0,084	0,058	0,155	1,451	0,151
	Green Investment*Firm Size	-0,040	0,073	-0,063	-0,545	0,587

Source: data processed, 2025

$$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3Z + \beta 4X1*Z + \beta 5X2*Z + \varepsilon$$

$$Y = -0{,}115 + 0{,}106X1 - 0{,}219X2 + 0{,}079Z + 0{,}084X1*Z - 0{,}040X2*Z + \varepsilon$$

The following interpretation is based on the MRA test findings in table 6:

The t-value of 1,451 < t-table of 1,987 and the significance value of 0,151 > 0,05 for the interaction variable carbon emission disclosure*firm size (X1*Z) suggest that there is no significant relationship between the carbon emission disclosure*firm size (X1*Z) and firm value (Y). This means that the effect of carbon emission disclosure (X1) on firm value (Y) is not moderated by firm size; therefore, H3 is rejected. In other words, carbon emission disclosure, whether in large or small firms, neither weakens nor strengthens its influence on firm value.

The interaction variable green investment*firm size *(X2*Z)* has a significance value of 0.587 > 0.05 and a t-value of -0.545 < t-table of 1.987, indicating that green investment*firm size *(X2*Z)* does not have a significant effect on firm value (Y). This implies that the effect of green investment (X2) on firm value (Y) is not moderated by firm size; therefore, H4 is rejected. Even large firms may not be able to optimize the potential of green investment if it is not supported by the right strategies, transparent reporting systems, and sufficient market awareness of the importance of environmental investment.

D. CONCLUSIONS

The purpose of this study was to evaluate the hypotheses put out in response to the occurrence of stock price fluctuations that might have an impact on the energy industry. The study's findings show that although the green investment variable has a negative impact on firm value, the carbon emission disclosure variable has a favorable one. Moreover, the link between carbon emission disclosure and green investment on firm value is not moderated by firm size. The fact that this research only used two independent variables carbon emission disclosure and green investment is one of its limitations.

E. SUGGESTIONS

Based on the findings of this study, future researchers are encouraged to explore additional factors that might affect a firm value, including environmental cost and corporate social responsibility. The addition of these variables might give a more thorough knowledge of the factors determining business value. Furthermore, future studies may also consider employing different research objects, such as the mining sector, to examine whether similar results can be observed in different contexts.

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