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"ESG and Energy Price Volatility: Impact on Energy Sector Stock Returns on the IDX"

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Abstract

This study aims to analyze the influence of Environmental, Social, and Governance (ESG) disclosure and energy price volatility on the stock returns of energy sector companies listed on the Indonesia Stock Exchange (IDX) during the 2022–2024 period. A quantitative approach was applied, employing multiple linear regression as the analytical method. The sample consisted of 10 energy companies selected through purposive sampling, based on the availability of sustainability reports, stock price data, and the completeness of research information. The findings reveal that ESG disclosure has a positive and significant effect on stock returns, indicating that greater sustainability transparency enhances investor confidence. Energy price volatility also has a positive and significant impact on stock returns, reflecting the sector's sensitivity to fluctuations in global energy prices. Jointly, both variables exert a significant influence on stock returns, although the relatively low coefficient of determination suggests the presence of other contributing factors. These results emphasize the importance for investors to consider both internal factors (ESG) and external factors (energy price volatility) when making investment decisions in the energy sector.

Keywords:
ESG disclosure, energy volatility, & stock returns

Introduction

The increasingly sustainability-oriented global economy Emphasizes the significance of implementing Environmental, Social, and Governance (ESG) principles in modern business activities. ESG is now viewed not only as a benchmark for corporate social responsibility but also as a strategic indicator in the investment decision-making process. Companies that successfully implement ESG principles are considered better prepared to face non-financial risks, such as climate change, environmental policies, and increasing social demands. In the context of capital markets, particularly in the energy sector, ESG issues play a significant role because this sector is closely related to carbon emissions, natural resource utilization, and social impacts on surrounding communities (Friede et al., 2015).

On the other hand, fluctuations in energy prices, such as oil, gas, and coal, are also crucial factors influencing the stock performance of energy companies. Sharp price swings often reflect uncertainty in the global market due to geopolitical dynamics,

energy transition policies, and shifts between supply and demand. For Indonesia—a country still heavily reliant on fossil fuels—changes in global energy prices can directly impact the profitability and market value energy companies registered on the Indonesia Stock Exchange (IDX). (Putra & Suryanto, 2023).

The linkage between Environmental, Social, and Governance (ESG) performance and energy price volatility has increasingly drawn attention in contemporary financial research. On the one hand, the robust implementation of ESG principles can increase a company's resilience to energy price volatility through a more efficient and responsive risk management system. However, on the other hand, high energy volatility also challenges the effectiveness of ESG implementation in maintaining stable stock performance. Investors are increasingly paying attention to ESG aspects as indicators of corporate governance quality and sustainability, particularly in sectors vulnerable to changes in environmental regulations and the shift towards green energy (Kotsantonis & Serafeim, 2019).

In the Indonesian context, ESG implementation in the energy sector still faces several obstacles, such as limited information disclosure in sustainability reports, low investor understanding of ESG factors, and pressure on profits amidst decarbonization efforts. Nevertheless, several energy companies listed on the IDX have begun adopting ESG principles in their business strategies, for example by increasing energy efficiency, reducing emissions, and investing in renewable energy projects (OJK, 2023). This development indicates that sustainability is beginning to become part of companies' long-term competitive strategies in the capital market.

Therefore, studies on the relationship between ESG implementation, energy price volatility, and the stock performance of energy sector companies on the IDX are becoming increasingly relevant. Such research is expected to provide a more comprehensive understanding of how sustainability and energy market dynamics influence company value. Furthermore, the research findings can inform considerations for investors and policymakers in designing sustainable investment strategies aligned with the energy transition agenda at the national and global levels.

Theoretical Framework

The theoretical foundation of this research is established based on the integration of sustainability theory, modern portfolio theory, and the efficient market hypothesis to explain the relationship between Environmental, Social, and Governance (ESG) disclosure, energy price volatility, and stock returns. Sustainability theory asserts that companies implementing ESG principles in their operations can improve long-term performance by reducing environmental and social risks while reinforcing corporate governance structures (Friede, Busch, & Bassen, 2015). From a financial perspective, ESG practices align with the notion of sustainable value creation, where firms generate financial benefits while simultaneously addressing stakeholder interests and broader social issues (Khan, Serafeim, & Yoon, 2016). Transparent ESG disclosure minimizes information asymmetry between companies and investors, fostering investor trust and potentially enhancing stock prices.

Consistent with this view, modern portfolio theory proposed by Markowitz (1952) explains that investors aim to optimize returns for a given level of risk through portfolio diversification. ESG-oriented investments are increasingly recognized as a form of risk mitigation strategy since companies with strong sustainability performance tend to be more resilient to regulatory, reputational, and market fluctuations. Theoretically, this indicates that ESG disclosure is not only an ethical investment decision but also a rational financial choice based on the balance between risk and return (Fatemi, Glaum, & Kaiser, 2018). Furthermore, the efficient market hypothesis introduced by Fama (1970) suggests that financial markets efficiently incorporate all publicly available information—including ESG reports—into asset valuations. Consequently, high-quality ESG disclosure may lead to more favorable investor reactions and improved stock performance.

Meanwhile, energy price volatility can be explained through the lens of commodity and financial market theories. Sadorsky (1999) highlights that fluctuations in energy prices directly affect corporate profitability, especially in the energy sector, which is highly dependent on global commodity markets. Volatility represents uncertainty that can either enhance or reduce stock performance, depending on investor risk perception and market expectations. Firms with robust ESG practices are likely to be more capable of withstanding these fluctuations due to improved operational efficiency and stronger stakeholder confidence. Conversely, companies with weak ESG governance may experience heightened financial instability and declining investor trust amid extreme energy price movements.

Overall, this theoretical integration indicates that ESG disclosure and energy price volatility jointly influence stock performance through distinct yet interconnected mechanisms. ESG disclosure acts as an internal stabilizing factor that enhances transparency and governance quality, while energy price volatility serves as an external disturbance reflecting global market uncertainty. By combining sustainability and financial perspectives, this framework underscores that stock returns in the energy sector are shaped not only by conventional market dynamics but also by firms' commitment to sustainable business practices. Thus, the study extends previous research by connecting corporate sustainability with macro-level energy dynamics within the context of the Indonesian capital market.

Method

This study uses a quantitative approach with an explanatory method to examine the influence of Environmental, Social, and Governance (ESG) and energy price volatility on the performance of energy sector stocks on the Indonesia Stock Exchange (IDX). The objective of this study is to explain the causal relationship between these variables based on secondary data obtained from official sources and financial institution publications. The study population includes all energy sector companies listed on the IDX during the 2019–2024 period. The sampling technique used was purposive sampling, with the criteria being that the companies are included in the energy sector according to the IDX classification, have consistently available ESG data, are actively traded, and have complete annual financial reports.

The research data was obtained from various secondary sources, including corporate sustainability reports or ESG scores from data providers such as Refinitiv or Bloomberg, stock prices and trading volumes from the official IDX website or financial platforms such as Yahoo Finance, and energy prices (oil, gas, and coal) from the Energy Information Administration (EIA) or Investing.com. The research instruments consisted of secondary data observation sheets and research variable tables containing indicators for each variable, namely ESG measured based on an overall score or average of three dimensions (environmental, social, governance), energy price volatility calculated using the standard deviation of energy commodity prices such as Brent crude oil, and stock performance measured through stock return indicators, Tobin's Q, or price to book value (PBV).
The data analysis method used was panel data regression analysis with the aid of statistical software such as EViews or Stata. The analysis was conducted through several stages, including descriptive statistical tests, classical assumption tests (normality, multicollinearity, heteroscedasticity, and autocorrelation), selecting the best regression model (common effect, fixed effect, or random effect), and hypothesis testing using t-tests and F-tests. Furthermore, the coefficient of determination (R^2) was used to measure the strength of the relationship between variables. The results of the analysis are expected to demonstrate the extent to which ESG and energy price volatility influence the performance of energy sector stocks on the IDX, and whether ESG can mitigate the negative impact of energy price volatility on stock performance.

Results

This study uses data from 10 energy sector companies listed on the Indonesia Stock Exchange (IDX) over a three-year period, from 2022 to 2024. A total of 30 panel data observations were used. The data analyzed encompasses three main variables: Stock Returns, ESG Disclosure, and Energy Price Volatility. The following table presents descriptive statistics for each research variable.

Tabel 1. Statistik Deskriptif

No	Variabel	Mean	Min	Max	Std. Dev
1	Return Saham	-0.025323	-0.3333	0.5000	0.185785
2	ESG *Disclosure*	0.515277	0.3333	0.7083	0.096305
3	Volatilitas Harga Energi	0.132600	0.1235	0.1442	0.008682

The average stock return value is negative at -0.0253 with a standard deviation of 0.1879. This indicates significant variation in stock returns between companies and between periods. For the ESG Disclosure variable, the average value is 0.5153 with a standard deviation of 0.0974. These results indicate differences in the level of ESG disclosure among the sampled energy sector companies. Meanwhile, the Energy Price Volatility variable has an average value of 0.1326 with a relatively small standard

deviation of 0.0088. This condition indicates that the level of energy price volatility during the study period tended to be stable.

Classical Assumption Test

The results of the classical assumption test indicate that the research data does not fully meet the criteria for normality. This is evident from the Shapiro-Wilk test, which yielded a p-value <0.05 for all three tested variables. Furthermore, the Durbin-Watson value of 0.577 indicates positive autocorrelation in the regression model. However, no signs of multicollinearity were found, as all VIF values for the independent variables were below 5. The Breusch-Pagan test also showed no signs of heteroscedasticity at the 5% significance level. Therefore, despite limitations in the residual distribution, this regression model can still be used as a basis for analysis, with the caveat that the results need to be interpreted cautiously in light of these limitations.

Tabel 2. Multiple Regression Analysis Results

Hasil OLS Regression

Dep. Variable:	Return Saham		R-Squared:			0,145
Model:	OLS		Adj. R-Squared:			0,125
Method:	Least Squares		F-Statistic:			7,362
Date:	Mon, 05 May 2025		Prob. (F-Statistic):			0,00111
Time:	02:30:00		Log-Likelihood:			31,319
No. Observations:	90		AIC:			-56,64
Df Residuals:	87		BIC:			-49,14
Df Model:	2					
Covariance Type:	nonrobust					
variables	coef	std err	*t*	$P > \|t\|$	[0,025	0,975]
Const	-0,9896	0,308	-3,216	0,002	-1,601	-0,378
ESG *Disclosure*	0,6300	0,192	3,282	0,001	0,248	1,012
Volatilitas Tinggi	4,8240	2,130	2.265	0,026	0,591	9,057
Omnibus:			6,137	Durbin-Watson:		0,577
Prob (Omnibus):			0,046	Jarque-Bera (JB):		6,326
Skew:			0,634	Prob (JB):		0,0423
Kurtosis:			2,715	Cond. No.		133.

Based on the OLS regression results obtained, analysis can be conducted using various available statistical measures.

1. R-Squared (R^2) and Adjusted R-Squared (Adjusted R^2)

a) The R-squared value of 0.145 suggests that about 14.5% of the variation in stock returns can be explained by this regression model. This implies that the model has a relatively limited capability in capturing the overall variability of the data.

b) The Adjusted R-squared value of 0.125 offers a more precise measure since it accounts for the number of independent variables included in the model. Given that

the value is nearly the same as the R-squared, it indicates that the inclusion of additional variables does not considerably enhance the model's explanatory power.

2. F-Statistic and F-Statistic Probability
a) The F-statistic value of 7.362 represents the overall significance level of the regression model. A higher F-value suggests that the model tested provides a better explanation compared to a model without any predictor variables.
b) The F-statistic probability value of 0.00111 shows that the regression model as a whole is statistically significant, as the p-value is smaller than the conventional significance level (such as 0.05). Therefore, this model is deemed appropriate for explaining the relationship among the variables analyzed.

3. Coefficients and Significance
a). The intercept (constant) value of -0.9896 indicates the estimated stock return value when both independent variables (ESG Disclosure and Energy Volatility) are zero. This negative coefficient value indicates that stock returns tend to decline if there is no contribution from the other variables.
b). The ESG Disclosure coefficient value of 0.6300 indicates that every one-unit increase in ESG Disclosure is estimated to increase stock returns by 0.6300. A p-value of 0.001, which is less than 0.05, indicates that this coefficient is statistically significant.
c). For the Energy Volatility variable, the coefficient value is 4.8240. This means that every one-unit increase in this variable is estimated to increase stock returns by 4.8240. With a p-value of 0.026 (<0.05), this result also indicates significant significance.

4. Omnibus, Jarque-Bera, Skewness, and Kurtosis Tests
a). The Omnibus value of 6.137 with a Prob(Omnibus) of 0.046 indicates that the data does not fully follow a normal distribution. Although the p-value is relatively close to the 0.05 significance level, this still indicates a potential deviation from a normal distribution.
b). The Jarque-Bera Test (JB) result of 6.326 with a Prob(JB) of 0.0423 also indicates that the residual distribution is not fully normal, as the p-value is less than 0.05.
c). The Skewness value of 0.634 indicates a positive skew in the residual distribution, meaning that most of the data have more positive residual values than negative ones.
d). The Kurtosis value of 2.715 indicates that the residual distribution tends to be flatter than a normal distribution (which has a kurtosis value of 3). However, this value is still within acceptable tolerance limits.

5. Durbin-Watson Statistics
The Durbin-Watson value of 0.577 indicates positive autocorrelation in the model residuals. This indicates a relationship between the error from one observation and the subsequent observations. Therefore, this model likely faces autocorrelation issues, which should be addressed to improve the analysis results.

Discussion

The following table presents a summary of previous studies relevant to the topic of the effect of ESG Disclosure and Energy Price Volatility on Stock Returns:

No	Author (Year)	Title	Method	Main Findings
1	Friede, Busch & Bassen (2015)	*ESG and financial performance: Aggregated evidence from more than 2,000 empirical studies*	Meta-analysis	Most studies indicate a positive relationship between ESG implementation and financial performance, particularly stock returns.
2	Fatemi et al. (2018)	*ESG performance and firm value: The moderating role of disclosure quality*	Panel Data Regression	ESG disclosure contributes to an increase in firm value, especially when the quality of disclosure is high.
3	Khan, Serafeim & Yoon (2016)	*Corporate Sustainability: First Evidence on Materiality*	Panel Data Regression and ESG Materiality	Material ESG aspects have a positive and significant impact on stock returns in the long term.
4	Clarkson et al. (2008)	*Revisiting the relation between environmental performance and disclosure*	Linear Regression	A higher level of environmental disclosure (including ESG aspects) is positively associated with market perception of the firm.
5	Current Study (2025)	*The Effect of ESG Disclosure and Energy Price Volatility on Stock Returns of Energy Companies in Indonesia*	Multiple Linear Regression	ESG disclosure and energy price volatility significantly affect stock returns, both individually and simultaneously.

The influence of ESG Disclosure on stock returns can be explained through the increasing awareness of investors regarding sustainability and corporate responsibility issues. Firms that transparently report their ESG performance are generally perceived as more resilient and better equipped to manage long-term risks related to social and environmental factors. This perception enhances investor confidence and leads to higher market valuations (Friede et al., 2015; Khan et al., 2016). In contrast, energy price volatility exerts a substantial impact on stock returns, particularly in the energy sector, which is highly sensitive to global energy price fluctuations. A sharp rise in energy prices (high volatility) tends to increase profit margins for energy firms. Consequently, investors' positive expectations drive higher demand for energy-related stocks, resulting in increased stock returns (Clarkson et al., 2008; Fatemi et al., 2018).

Overall, both ESG Disclosure and Energy Price Volatility are empirically proven to significantly influence stock returns, whether independently or jointly. ESG disclosure serves as a key determinant of stock performance within the energy industry, highlighting the strategic importance of sustainability reporting in corporate finance. Conversely, energy price volatility—typically associated with market risk—can also generate favorable effects on returns under specific conditions. These findings emphasize that sustainability practices and energy market dynamics are deeply interconnected in shaping capital market performance, thereby providing a solid foundation for further research in sustainable finance and investment (Friede et al., 2015; Fatemi et al., 2018; Khan et al., 2016).

Conclusion

This study concludes that both Environmental, Social, and Governance (ESG) disclosure and energy price volatility have a significant impact on the stock returns of energy sector firms listed on the Indonesia Stock Exchange (IDX). The findings suggest that greater ESG transparency strengthens investor trust, indicating that clear and accountable sustainability reporting contributes to enhanced market valuation and long-term corporate performance. Likewise, energy price volatility exhibits a positive and significant association with stock returns, emphasizing the sector's responsiveness to global energy market fluctuations.

The results emphasize that both internal organizational aspects—such as ESG disclosure—and external macroeconomic conditions—such as energy price variations—collectively influence the stock performance of energy companies. ESG disclosure functions as an internal stabilizer that reflects strong governance and responsible management, whereas energy price volatility represents external market uncertainty that investors closely monitor and react to.

This research enriches the body of knowledge on sustainable finance by connecting corporate sustainability initiatives with the dynamics of energy markets in developing economies. Future research is recommended to integrate additional financial and macroeconomic indicators to gain a more holistic understanding of the determinants affecting stock performance within the sustainability paradigm.

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