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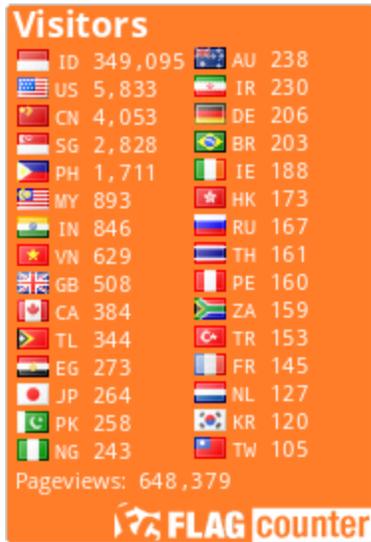




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# The Effect of Carbon Emissions Disclosure, Earnings Management, Information Asymmetry, and Leverage on the Cost of Equity

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## ABSTRACT

The cost of equity is a key factor in corporate financing, particularly in Indonesia's energy sector, where environmental and financial transparency face challenges due to market inefficiencies and regulatory pressures. The purpose of this study is to investigate how the cost of equity is impacted by disclosure of carbon emissions, earnings management, information asymmetry, leverage, profitability, and firm size. The study employs a quantitative methodology, using panel data regression with the Fixed Effect Model in Stata 19.5, to evaluate 111 observations from 37 energy sector companies listed on the Indonesia Stock Exchange between 2021 and 2023. The results demonstrate that profitability, as determined by return on assets, and leverage, as determined by the debt-to-asset ratio, have a major impact on the cost of equity. At the same time, carbon emission disclosure, earnings management, information asymmetry, and company size have insignificant effects. These results, with profitability and company size as control variables, suggest that financial structure and performance strongly shape investor risk perceptions. The study concludes that energy companies should optimize debt and profitability to reduce financing costs and improve environmental disclosure quality to meet investor expectations, contributing to sustainable financing strategies in Indonesia's energy sector.

**Keywords:** Carbon Emission Disclosure, Cost of Equity, Earnings Management, Energy Sector, Information Asymmetry, Investor Risk Perceptions, Leverage.

## ABSTRAK

Biaya ekuitas merupakan faktor kunci dalam pembiayaan perusahaan, terutama di sektor energi Indonesia, di mana transparansi lingkungan dan keuangan menghadapi tantangan karena inefisiensi pasar dan tekanan regulasi. Tujuan dari penelitian ini adalah untuk melihat bagaimana pengaruh pengungkapan emisi karbon, manajemen laba, asimetri informasi, leverage, profitabilitas, dan ukuran perusahaan terhadap biaya ekuitas. Studi ini menggunakan pendekatan kuantitatif dan menganalisis 111 observasi dari 37 perusahaan energi yang terdaftar di Bursa Efek Indonesia dari tahun 2021 hingga 2023. Untuk melakukan ini, regresi data panel digunakan dengan Fixed Effect Model di Stata 19.5. Hasil menunjukkan bahwa biaya ekuitas secara signifikan dipengaruhi oleh leverage, yang diukur dengan Rasio Utang terhadap Aset, dan profitabilitas, yang diukur dengan Pengembalian Aset. Di sisi lain, pengungkapan emisi karbon, manajemen laba, asimetri informasi, dan ukuran perusahaan memiliki pengaruh yang relatif kecil. Hasil ini, dengan profitabilitas dan ukuran perusahaan sebagai variabel kontrol, menunjukkan bahwa struktur dan

*kinerja keuangan sangat membentuk persepsi risiko investor. Studi ini menyimpulkan bahwa perusahaan energi harus mengoptimalkan utang dan profitabilitas untuk mengurangi biaya pembiayaan dan meningkatkan kualitas pengungkapan lingkungan untuk memenuhi harapan investor, berkontribusi pada strategi pembiayaan berkelanjutan di sektor energi Indonesia.*

**Kata Kunci:** *Pengungkapan Emisi Karbon, Biaya Ekuitas, Manajemen Laba, Sektor Energi, Asimetri Informasi, Persepsi Risiko Investor, Leverage.*

## INTRODUCTION

The cost of equity is an important metric for evaluating the risk and effectiveness of business financing in a global economic environment that places a growing emphasis on sustainability and transparency. It stands for the lowest rate of return that investors anticipate in order to offset the risks involved in making an investment in a business. For corporate management, understanding the cost of equity is essential for crafting investment strategies, making financing decisions, and creating long-term value for shareholders (Gallagher, 2022; Arhinful et al., 2024; Maulana et al., 2025). However, determining the cost of equity in developing countries like Indonesia faces challenges such as macroeconomic instability, capital market fluctuations, and limited transparency in financial reporting (Dara & Barokah, 2022). These challenges are particularly evident in the energy sector, where high carbon emissions and regulatory pressures amplify investor scrutiny over environmental and financial performance (intellinews, 2025).

Carbon Emission Disclosure (CED) is one important factor affecting the pricing of stock and investors' perceptions of risk. As environmental, social, and governance (ESG) factors get more attention, investors assess businesses according to their capacity to mitigate environmental effects. Transparent disclosure of carbon emissions can reduce risk perception and boost investor confidence, thereby lowering the cost of equity (Bui et al., 2020; Gerged et al., 2021). However, in Indonesia, the level of CED remains inconsistent, with many energy companies providing limited or incomplete sustainability reports, which increases information ambiguity and elevates the investment risk premium (Ahadiat et al., 2024; Juliana et al., 2024; Majidah et al., 2025). This issue is particularly relevant in the energy sector, where environmental performance is under global scrutiny.

Earnings management is another factor that impacts the cost of equity. This practice involves management manipulating financial information, which reduces the credibility of financial statements (Indarti & Widiatmoko, 2021). Such actions create uncertainty, prompting investors to demand higher risk premiums (Fasihah et al., 2023). Similarly, information asymmetry, the gap in information between management and investors, poses a significant risk in investment decision-making (Naveed et al., 2020; Muslim & Setiawan, 2021; Khan et al., 2025). In Indonesia's relatively inefficient capital market, high information asymmetry hinders investors' ability to assess risks objectively, further elevating the cost of equity (Setiany & Suhardjanto, 2021).

Leverage, or the use of debt in a company's capital structure, also plays a crucial role. A high debt-to-asset ratio increases the risk of bankruptcy, leading investors to demand higher returns to offset the financial risk (Clark et al., 2023). Additionally, profitability (measured by Return on Assets) and company size (measured by total assets) influence investor perceptions, as more profitable and larger firms are often seen as less risky, potentially lowering the cost of equity (Andriani et al., 2021; Bon & Hartoko, 2022; Nuraini & Cahyadi, 2025). According to Jensen and Meckling (2019), high leverage can exacerbate agency conflicts between shareholders and creditors, increasing perceived risks and the cost of equity. Despite these insights, Gerged et al. (2021) and Intellinews (2025) have not fully explored how CED, earnings management, information asymmetry, leverage, profitability, and company size collectively affect the cost of equity in Indonesia's energy sector, where environmental and financial transparency is critical yet underdeveloped. This research gap highlights the need for an empirical study to address these factors in a unified framework.

However, Intellinews (2025) has focused on developed markets and has not integrated environmental disclosure and financial variables in a single framework within Indonesia's energy sector. Empirical cases underscore the importance of this issue: for example, the bankruptcy of PT Sri Rejeki Isman Tbk (Sritex) and the debt restructuring of PT Garuda Indonesia show that a low cost of equity does not always reflect healthy financial conditions. Conversely, companies like PT Medco Power Indonesia, which pursue clean energy initiatives, face challenges due to limited disclosure of technical and regulatory information, reducing global investor confidence (Prasetyaningsih et al., 2025). By addressing this gap, this study contributes to sustainable finance literature and provides insights for investors, regulators, and corporate managers to enhance financial governance and efficiency. This study aims to fill that gap by empirically examining how carbon emission disclosure, earnings management, information asymmetry, and leverage affect the cost of equity with profitability and firm size included as control variables in Indonesia's energy companies.

## **LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT**

### **Theoretical Foundations**

The study of the cost of equity is deeply rooted in financial theories that explain how firms signal their quality and manage risks. According to Spence (1978), signalling Theory suggests that companies use credible information disclosures to reduce uncertainty and convey positive attributes to investors. In this study, Carbon Emission Disclosure (CED) acts as a signal of a company's commitment to sustainability, potentially lowering the cost of equity by reducing investor risk perceptions (Bui et al., 2020). Similarly, Agency Theory, as described by Jensen and Meckling (2019), highlights conflicts of interest between management and shareholders, which can increase the cost of equity when practices like earnings management or high leverage create uncertainty. These theories are particularly relevant in Indonesia's energy sector, where environmental and financial transparency are critical due to high carbon emissions and regulatory pressures (intellinews, 2025). This study uses these theories to investigate how investor expectations and the cost of stock are impacted by CED, earnings management, information asymmetry, leverage, profitability, and company size. The study's focus on energy businesses listed on the Indonesia Stock Exchange is in line with the theories, which offer a framework for comprehending how clear disclosures and prudent financial procedures can lower perceived risks.

### **The Determinants of Cost of Equity and Hypothesis Development**

Carbon Emission Disclosure (CED) reflects a company's efforts to report its carbon emissions and mitigation strategies, often included in sustainability or ESG reports. Transparent CED reduces information risk, enabling investors to better assess environmental risks, which can lower the cost of equity (Garzón & Zorio, 2021). According to Gerged et al. (2021), companies with high CED tend to have lower equity costs due to increased investor confidence. Earnings management (EM), measured through discretionary accruals, manipulates financial reports to achieve specific goals, reducing the credibility of financial statements (Indarti & Widiatmoko, 2021; Sosnowski, 2021; Nguyen et al., 2023). This practice increases investor uncertainty, leading to higher risk premiums and cost of equity (Fasihah et al., 2023). Information Asymmetry (IA), measured by bid-ask spread, occurs when management holds more information than investors, increasing perceived risks and the cost of equity (Muslim & Setiawan, 2021). Leverage, measured by the Debt-to-Asset Ratio (DAR), signals higher financial risk due to increased debt, prompting investors to demand higher returns (Clark et al., 2023). Profitability, measured by Return on Assets (ROA), and company size, measured by total assets, also influence the cost of equity, as profitable and larger firms are often perceived as less risky (Nurdiani et al., 2023; Nuraini & Cahyadi, 2025).

In Indonesia's energy sector, these variables are particularly critical due to the unique challenges of high environmental impact and regulatory scrutiny. For instance,

companies with high leverage may face increased investor scepticism, especially when combined with poor CED, as it signals potential financial and environmental risks (Li et al., 2017; Bansal, 2024; Ro et al., 2025). Similarly, earnings management practices in less transparent markets like Indonesia can exacerbate information asymmetry, further elevating the cost of equity (Sunaryo & Saripujiana, 2018; Putra & Hatta, 2023). These dynamics highlight the need for an integrated analysis of these factors to understand their combined impact on investor perceptions and financing costs. Based on these relationships, the study proposes the following hypotheses:

- H1: Carbon emission disclosure has a significant effect on the cost of equity.
- H2: Earnings management has a significant effect on the cost of equity.
- H3: Information asymmetry has a significant effect on the cost of equity.
- H4: Leverage has a significant effect on the cost of equity.

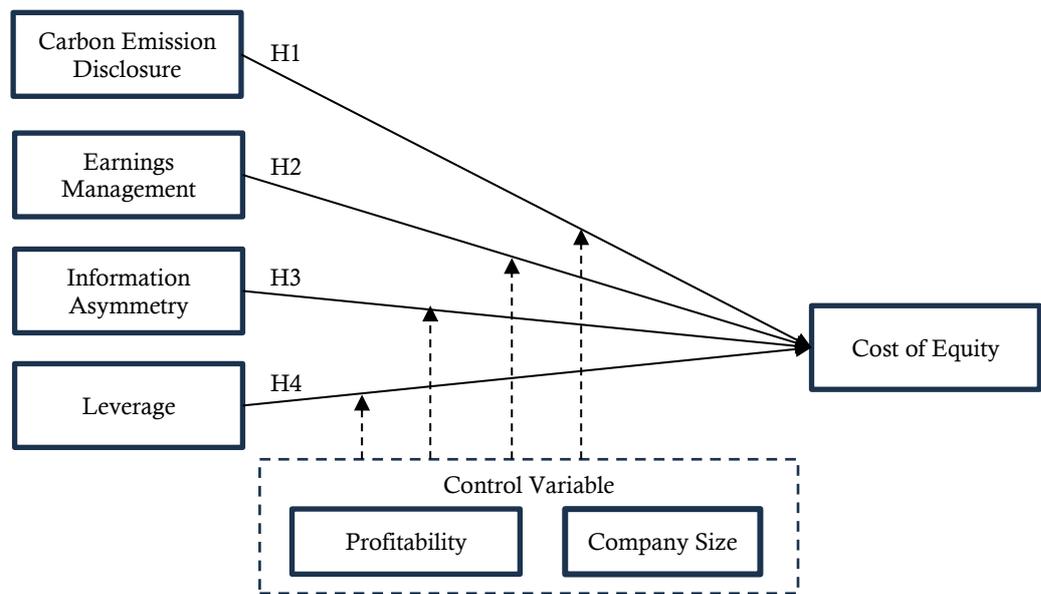


Figure 1. Research Framework

Figure 1 integrates Signalling Theory and Agency Theory to explain how the variables affect the cost of equity. According to Kirby (2019), the cost of equity, calculated using the Capital Asset Pricing Model (CAPM), reflects investor expectations shaped by firm-specific risks. CED signals environmental responsibility, potentially reducing the cost of equity by lowering risk perceptions (Albarrak et al., 2019; Yu et al., 2021). Conversely, earnings management and information asymmetry increase uncertainty, elevating the cost of equity due to higher risk premiums (Kiswanto & Fitriani, 2019). Leverage increases financial risk, further impacting investor return expectations (Mulyati, 2018). Profitability and company size act as control variables, as more profitable and larger firms may face lower equity costs due to perceived stability (Fina et al., 2024). Figure 1 shows how CED, earnings management, information asymmetry, leverage, profitability, company size, and the cost of equity are related to each other. The framework is specifically designed for Indonesia's energy sector, where investor trust depends on financial governance and environmental transparency (Prasetyaningsih et al., 2025). The study intends to offer empirical insights into how these factors combined affect the cost of equity by testing these correlations.

## RESEARCH METHODS

This study investigates the impact of carbon emission disclosure, earnings management, information asymmetry, leverage, profitability, and company size on the cost of equity in energy companies listed on the Indonesia Stock Exchange (IDX) from

2021 to 2023. A quantitative approach with panel data regression was used to test causal relationships among variables, aligning with the study's explanatory purpose. The energy sector was chosen due to its high environmental impact and regulatory demands, making it a relevant context for examining financing costs.

**Table 1.** Sample Selection Process with Criteria

No.	Criterion	Not Meeting the Criteria	Total
1.	Number of all energy companies listed on the IDX		85
2.	The Company presents complete financial statements for the period 2021-2023, and is presented in Rupiah	(48)	37
3.	Number of sample companies		37
4.	Observation period (years)		3
5.	Number of observations as data in the study		111

Source: Data processed by the author (2025)

Table 1 shows the population consists of all 85 energy sector companies listed on the IDX from 2021 to 2023. Using purposive sampling, the study selected 37 companies that provided complete financial statements in Rupiah for the period, resulting in 111 observations (37 companies  $\times$  3 years). This selection ensures data consistency and relevance, focusing on firms with sufficient disclosure to measure variables like carbon emissions and financial metrics accurately. The dependent variable, cost of equity, is calculated using the Capital Asset Pricing Model (CAPM), expressed as  $R_f + \beta(R_m - R_f)$ , where  $R_f$  is the risk-free rate,  $\beta$  is the stock's beta, and  $R_m$  is the market return. Independent variables include carbon emission disclosure (measured by a carbon disclosure index based on sustainability reports), earnings management (measured by discretionary accruals), information asymmetry (measured by bid-ask spread), and leverage (measured by debt-to-asset ratio, calculated as total debt/total assets  $\times$  100%). Control variables include profitability (measured by Return on Assets, calculated as Net Income/Total Assets  $\times$  100%) and company size (measured as the natural logarithm of total assets), as these factors influence investor risk perceptions (Nuraini & Cahyadi, 2025). This study consisted of one dependent variable, four independent variables, and two control variables. The details of the variable measurement are described in Table 2.

**Table 2.** Variable Operations

Variables	Indicator	Scale	Researchers
Cost of Equity (COE)	$R_f + \beta(R_m - R_f)$	Ratio	Uzeta-Obregon et al. (2024)
Carbon Emission Disclosure (CED)	$\frac{\sum \chi_i}{18}$	Ratio	Majidah et al. (2025)
Earnings Management (EM)	$\frac{TA_{it}}{A_{it-1}} - NDA_{it}$	Ratio	Fandriani & Tunjung (2019)
Information Asymmetry (IA)	$\frac{Ask - Bid}{Ask + Bid}$	Ratio	Yahaya (2025)
Leverage (DAR)	$\frac{\text{Total Hutang}}{\text{Total Aset}} \times 100\%$	Ratio	Fandriani & Tunjung (2019)
Profitability (ROA)	$\frac{\text{Net Income}}{\text{Total Aset}} \times 100\%$	Ratio	Fandriani & Tunjung (2019)
Company Size (SIZE)	$\ln(\text{Total Assets})$	Ratio	Fandriani & Tunjung (2019)

Source: Data processed by the author (2025)

The empirical model used in this study is a panel data regression with the following general forms:

$$COE_{it} = \alpha + \beta_1 CED_{it} + \beta_2 EM_{it} + \beta_3 IA_{it} + \beta_4 DAR_{it} + \beta_5 ROA_{it} + \beta_6 SIZE_{it} + e$$

Information:

COE <sub>it</sub>	= Cost of Equity
$\alpha$	= Constant
$\beta_{1,2,3,4,5,6}$	= Variable Coefficients
CED <sub>it</sub>	= Carbon Emission Disclosure
EM <sub>it</sub>	= Earnings Management
IA <sub>it</sub>	= Information Asymmetry
DAR <sub>it</sub>	= Leverage
ROA <sub>it</sub>	= Profitability
SIZE <sub>it</sub>	= Company Size
$e_{it}$	= Error Rate

Stata 19.5 was used to analyze the data in multiple steps. To comprehend the distribution of the data and the features of the variables, descriptive statistical tests were conducted. The study used the Chow Test, Hausman Test, and Lagrange Multiplier Test to choose the best panel regression model. It found that the Fixed Effect Model (FEM) is best because it accounts for individual company effects. To verify the validity of the model, traditional assumption tests were conducted, such as heteroscedasticity (Breusch-Pagan) and multicollinearity (Variance Inflation Factor). The model's explanatory ability was measured by the coefficient of determination (Adjusted R2), and the F-test for simultaneous effects and the t-test for partial effects were used in the hypothesis testing process.

## RESULTS

This study reports the results of a panel data regression analysis that looked at how the Cost of Equity (COE) in 37 energy sector companies listed on the Indonesia Stock Exchange between 2021 to 2023 was affected by factors like Carbon Emission Disclosure (CED), Earnings Management (EM), Information Asymmetry (IA), Leverage (DAR), Profitability (ROA), and Company Size (SIZE). To guarantee reliable results, the study, which was carried out with Stata 19.5, incorporates descriptive statistics, model selection tests, traditional assumption tests, and hypothesis testing. The results are organized to highlight the sample characteristics, variable distributions, model suitability, and hypothesis outcomes, providing insights into how these factors influence financing costs in Indonesia's energy sector. Key findings address the research gap by showing the varying impacts of environmental and financial factors on investor risk perceptions, with implications for sustainable finance practices.

Table 3 shows 37 energy sector companies that were used as research samples in the last 3 years during the 2021-2023 period, which will then be subject to descriptive statistical tests.

Based on the results of the Chow test in Table 4, the regression model that is more suitable in this study is the Common Effect Model (CEM) because the Prob > F value of 0.5469 is greater than 0.05. However, the selection of the final model still needs to be compared with the results of the third test and the Lagrange multiplier test to ensure the overall suitability of the model. Based on the test results in Table 4, it was obtained that the chi-square value of 13.98 with a probability of 0.0157 indicates a significance level of < 5%, then H0 is rejected and H1 is accepted. Thus, based on the results of the third test, the Fixed Effect Model (FEM) model was declared more appropriate to be used in this study. It was obtained that the chibar2 value (01) was 0.00 with a p-value of 1.000, with a value of Var(u) = 0, which indicated that there were no individual effects or random variants between companies. Thus, the Common Effect Model (CEM) model is more appropriate than the Random Effect Model (REM) in this test result. Considering that the results of the third test are more sensitive in testing the consistency of estimates and are prioritized when potential individual effects can affect the regression results, the Fixed

Effect Model (FEM) was chosen as the most appropriate panel regression model and used in the subsequent hypothesis testing in this study.

**Table 3.** List of Research Samples of Energy Sector Companies

No.	Company Code	Company Name
1.	ADRO	Adaro Energi Indonesia Tbk
2.	AKRA	AKR Corporindo Tbk
3.	APEX	Apexindo Pratama Duta Tbk
4.	BESS	Batulicin Nusantara Maritim Tbk
5.	BSSR	Baramulti Suksessarana Tbk
6.	BULL	Buana Lintas Lautan Tbk
7.	BUMI	Bumi Resources Tbk
8.	BYAN	Bayan Resources Tbk
9.	DOID	Delta Dunia Makmur Tbk
10.	DSSA	Dian Swastatika Sentosa Tbk
11.	DWGL	Dwi Guna Laksana Tbk
12.	ELSA	Elnusa Tbk
13.	ENRG	Energi Mega Persada Tbk
14.	GEMS	Golden Energy Mines Tbk
15.	HRUM	Harum Energy Tbk
16.	INDY	Indika Energi Tbk
17.	ITMG	Indo Tambangraya Megah Tbk
18.	KKGI	Resource Alam Indonesia Tbk
19.	LEAD	Logindo Samudramakmur Tbk
20.	MBAP	Mitrabara Adiperdana Tbk
21.	MBSS	Mitrabahtera Segara Sejati Tbk
22.	MEDC	Medco Energi Internasional Tbk
23.	MYOH	Samindo Resources Tbk
24.	PGAS	Perusahaan Gas Negara Tbk
25.	PSSI	IMC Pelita Logistik Tbk
26.	PTBA	Bukit Asam Tbk
27.	PTRO	Petrosea Tbk
28.	RAJA	Rukun Raharja Tbk
29.	RIGS	RIG Tenders Indonesia Tbk
30.	RUIS	Radiant Utama Interinsco Tbk
31.	SHIP	Sillo Maritime Perdana Tbk
32.	SURE	Super Energy Tbk
33.	TEBE	Dana Brata Luhur Tbk
34.	TOBA	TBS Energi Utama Tbk
35.	TPMA	Trans Power Marine Tbk
36.	UNIQ	Ulima Nitra Tbk
37.	WINS	Wintermar Offshore Marine Tbk

**Table 4.** Chow, Hausman and Lagrange Multiplier Test Results

Test	Analysis	Value
Chow	F-statistic	0.96
	df (numerator, denominator)	(36, 68)
	Prob > F	0.5469
Housman	Chi-square ( $\chi^2$ )	13.98
	Degree of freedom (df)	5
Lagrange	Prob > $\chi^2$	0.0157
	chibar <sup>2</sup> (1)	0.00
	Prob > chibar <sup>2</sup>	1.000

Source: Data processed by the author (2025)

Table 5 presents the cost of equity, which ranges from 0.0208 (Super Energy Tbk in 2021) to 0.2531 (Delta Dunia Makmur Tbk in 2021), with a mean of 0.0702 (7.02%), indicating moderate market risk but high variability in investor expectations. CED shows a mean of 0.6306 (63.06%), with a minimum of 0.0556 (Logindo Samudramakmur Tbk in 2023) and a maximum of 1.0000 (Bukit Asam Tbk in 2021), suggesting uneven disclosure practices. Earnings management varies widely, with a mean of -338.1439, reflecting potential income-decreasing practices. Information asymmetry has a low mean

of 0.0087, indicating relatively low market information gaps. Leverage averages 0.4366 (43.66%), while profitability and company size show significant variation, with means of 0.2200 and 26.5146, respectively. This distribution highlights the diverse financial and environmental profiles of energy firms, underscoring the need to account for these variations in regression analysis

**Table 5.** Descriptive Statistical Test Results

Variables	N	Mean	Std. Dev.	Minimum	Maximum
Cost of Equity	111	0.0702	0.0465	0.0208	0.2531
Carbon Emission Disclosure	111	0.6306	0.2392	0.0556	1.0000
Earnings Management	111	-338.1439	3022.811	-31772.94	16.7404
Information Asymmetry	111	0.0087	0.0304	-0.2222	0.1057
Leverage	111	0.4366	0.2291	0.0008	1.0000
Profitability	111	0.2200	0.8398	-0.4069	8.4791
Company Size	111	26.5146	3.1544	18.8984	32.5483

The Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) were compared in order to choose the best regression model. With a p-value of 0.5469 and an F-statistic of 0.96, the Chow Test indicated that there was no discernible difference between CEM and FEM. But according to the Hausman Test, FEM is more appropriate because of the large individual effects, as evidenced by the chi-square value of 13.98 ( $p=0.0157$ ). The use of FEM was further supported by the Lagrange Multiplier Test, which produced a  $\chi^2$  value of 0.00 ( $p=1.000$ ), indicating the absence of random effects. The trustworthiness of the regression results in the context of the energy sector is increased by these tests, which guarantee that the selected FEM takes company-specific variances into account.

**Table 6.** Multicollinearity and Heteroskedasticity Test Results

Variables	VIF	1/VIF	Prob > t	Information
SIZE	1.15	0.8723	0.075	Marginal significant at 10%
DAR	1.14	0.8747	0.126	Insignificant
ROA	1.13	0.8885	0.968	Insignificant
CED	1.08	0.9262	0.007	Significant at 1%
EM	1.06	0.9461	0.006	Significant at 1%
IA	1.02	0.9794	0.062	Marginal significance at 10%
Constant			0.025	Significant at 5%

Table 6 showed that all the variables we looked at had a low VIF score, with the average being 1.10 and individual scores ranging from 1.02 to 1.15. This is good news because a VIF score under 10 and a tolerance value above 0.1 mean there is no multicollinearity. In simple terms, this tells us that the variables in our model are not too closely related to each other, which means our regression analysis is reliable.

The F-test for simultaneous effects, with an F (6.36) statistic of 11558.78 ( $p=0.0000$ ) and a correlation between individual effects and regressors of -0.9618 across 37 clusters, confirms that the independent and control variables collectively explain variations in COE. This strong simultaneous effect supports the model's validity, suggesting that the combined influence of CED, EM, IA, DAR, ROA, and SIZE is significant, even if individual effects vary. Based on the results of the heteroscedasticity test in Table 6, which has been corrected using the robust standard errors method in the FEM regression model, it can be seen that there is an adjustment of the standard value of the error in several variables. Therefore, the use of vce (robust) in this model is appropriate to improve the estimation to make it more stable. This model yields a value of  $F(6.36) = 11558.78$  with a  $\text{Prob} > F = 0.0000$ , which means that the model remains significant overall despite being corrected. With the problem of heteroscedasticity, the estimation results can be considered valid for use in hypothesis testing.

Table 7. F Test Results

Statistics	Value
F(6, 36)	11.558.78
Prob > F	0.0000
corr(u_i, Xb)	-0.9618
Number of clusters in ID (cluster)	37

Source: Data processed by the author (2025)

Based on the results in Table 7 of the F-test with robust standard errors, an F value of 11.558.78 was obtained with a significance level of Prob > F = 0.0000. Thus, the results of the F-test show that the regression model as a whole is feasible to use because the independent variables and control variables together are able to explain the variations that occur in the dependent variables.

Table 8. T- Test and R-Square Results

Variable	Coefficient	T-statistics	Prob > t	Result	Conclusion
CED	-0.1116	-1.83	0.075	Insignificant	Rejected
EM	1.20E-06	1.57	0.126	Insignificant	Rejected
IA	-0.0062	-0.04	0.968	Insignificant	Rejected
DAR	0.0587	2.83	0.007	Significant	Accepted
ROA	0.0038	2.90	0.006	Significant	
SIZE	-0.0277	-1.93	0.062	Insignificant	
<b>R-squared:</b>					
Within	0.1560				
Between	0.0552				
Overall	0.0035				

Table 8 shows that DAR (p=0.007) and ROA (p=0.006) significantly affect COE, supporting H4. CED (p=0.075) and SIZE (p=0.062) are marginally significant, while EM (p=0.126) and IA (p=0.968) are insignificant, leading to the rejection of H1, H2, and H3. These findings suggest that financial structure and profitability strongly influence investor expectations, while environmental disclosure and information gaps have weaker effects, possibly due to inconsistent reporting practices in Indonesia's energy sector (Majidah et al., 2025).

An R-square value (within) of 0.1560 was achieved based on the panel regression using FEM findings displayed in Table 8. This indicates that the variation in the independent and control variables accounts for 15.60% of the variation in the dependent variable. While the R-square (overall) value of 0.0035 shows that the model can explain the overall variation of dependent variables without distinguishing between changes within and between persons, the R-square (between) value of 0.0552 shows that the model can explain variations between firms. Thus, although this model shows a significant influence of several cost of equity variables, the low R2 value (15.60%) indicates that there are still other factors outside the model that affect the amount of the company's cost of equity.

Based on the results of the tests that have been carried out, the following equations are obtained:

$$\text{COE}_{it} = 0.849949 - 0,1116007 \text{ CED}_{it} + 0,0000012 \text{ EM}_{it} - 0,0066181 \text{ IA}_{it} + 0,0586578 \text{ DAR}_{it} + 0,0038175 \text{ ROA}_{it} - 0,0277324 \text{ SIZE}_{it} + e_{it}$$

Based on the regression results, it is known that Carbon Emission Disclosure (CED) has a negative influence on the Cost of Equity (COE), which means that the higher the carbon emission disclosure, the lower the company's equity cost. Earnings Management (EM) shows a positive but very small influence on COE, so practically the impact tends to be weak. Furthermore, Information Asymmetry (IA) hurts COE, which indicates that the lower the level of information asymmetry, the lower the cost of equity. The Variable Leverage (DAR) has a positive influence, meaning that the higher the company's debt level, the greater the cost of equity incurred. The Profitability Variable (ROA) also showed

a positive relationship with COE, suggesting that more profitable companies actually have slightly higher costs of equity, although the impact is relatively small. Finally, Company Size (SIZE) has a negative effect, indicating that larger companies tend to have a lower Cost of Equity.

## DISCUSSION

This study examines the effects of carbon emission disclosure, earnings management, information asymmetry, leverage, profitability, and company size on the cost of equity in Indonesia's energy sector from 2021 to 2023. The results indicate that leverage and profitability (ROA) significantly influence COE, supporting H4 and H5. At the same time, carbon emission disclosure, earnings management, information asymmetry, and company size are not statistically significant, leading to the rejection of H1, H2, H3, and H6. According to Gerged et al. (2021), transparent CED is expected to reduce COE by lowering investor risk perceptions. However, the marginal significance of CED ( $p=0.075$ ) in this study suggests that inconsistent disclosure practices in Indonesia's energy sector may limit its impact. This finding aligns with Signalling Theory, which posits that credible signals like environmental disclosures reduce uncertainty (Spence, 1978). However, the uneven quality of sustainability reports in Indonesia, often lacking standardised metrics, may weaken CED's signalling effect, as noted by Majidah et al. (2025).

The insignificant effect of earnings management (EM,  $p=0.126$ ) contradicts expectations from Agency Theory, which suggests that manipulative financial reporting increases investor uncertainty and COE (Jensen & Meckling, 2019). This result may stem from the diverse nature of EM practices, where income-decreasing accruals, as reflected in the negative mean (-338.1439), do not consistently signal risk to investors (Indarti & Widiatmoko, 2021). Similarly, the insignificant effect of information asymmetry (IA,  $p=0.968$ ) may be attributed to Indonesia's relatively inefficient capital market, where bid-ask spreads do not fully capture information gaps (Sunaryo & Saripujiana, 2018). This finding contrasts with studies in more developed markets, where IA significantly raises COE (Muslim & Setiawan, 2021). The high variability in EM and low mean IA (0.0087) suggest that these factors may be less relevant in Indonesia's energy sector, possibly due to limited market liquidity or investor awareness (Abbas et al., 2023).

Leverage (DAR,  $p=0.007$ ) positively affects COE, confirming that higher debt levels increase financial risk, prompting investors to demand higher returns (Clark et al., 2023). This aligns with Agency Theory, as high leverage exacerbates conflicts between shareholders and creditors (Jensen & Meckling, 2019). Profitability (ROA,  $p=0.006$ ) also significantly reduces COE, as more profitable firms are perceived as less risky (Nuraini & Cahyadi, 2025). The marginal significance of company size (SIZE,  $p=0.062$ ) suggests that larger firms may benefit from economies of scale, but this effect is weakened by market inefficiencies in Indonesia (Kristantiningtyas & Dewi, 2024). The low R-squared (15.60% within) indicates that other factors, such as regulatory changes or global ESG trends, may influence COE, highlighting the need for broader models (Li et al., 2017).

These findings have important implications for companies, investors, and regulators in Indonesia's energy sector. Firms should prioritize improving the quality and consistency of CED to enhance investor confidence and reduce financing costs, especially as global ESG standards tighten (Xu et al., 2024). Managers must also balance leverage to avoid excessive risk premiums while leveraging profitability to signal financial health. Investors can use these insights to assess risks more effectively, focusing on firms with strong ROA and moderate DAR. Regulators, such as the Financial Services Authority (OJK), should enforce standardized sustainability reporting to strengthen CED's signaling effect and improve market transparency (Supriadi et al., 2024). These steps can enhance financing efficiency and support sustainable development in Indonesia's energy sector. Beyond firm-level implications, these findings highlight the broader connection between financial transparency, sustainability policy, and investor confidence. Aligning carbon disclosure practices with Indonesia's green financial initiatives, such as the OJK Green Taxonomy and the national net-zero roadmap, can enhance access to sustainable

financing. Furthermore, integrating global standards like GRI and ISSB reporting frameworks would strengthen information comparability, supporting investor decision-making and attracting long-term capital inflows toward the energy transition agenda.

## CONCLUSION

This study investigated factors influencing the cost of equity (COE) in 37 energy companies listed on the Indonesia Stock Exchange from 2021 to 2023, focusing on carbon emission disclosure, earnings management, information asymmetry, leverage, profitability, and company size. The results show that only leverage and profitability significantly affect the cost of equity, while other factors have no statistical impact. Specifically, higher leverage increases perceived financial risk and thus the COE, while higher profitability lowers perceived risk and financing costs. These findings indicate that investors in Indonesia's energy sector still prioritize financial performance and capital structure over non-financial disclosures when assessing investment risk.

Practically, companies should manage debt levels prudently and improve profitability to minimize financing costs while gradually enhancing environmental disclosure quality to meet global ESG expectations. For investors, focusing on firms with strong financial fundamentals and balanced leverage may offer better risk-adjusted returns. Policymakers and regulators, such as the Financial Services Authority (OJK), should strengthen sustainability reporting frameworks and align them with global standards (e.g., GRI, ISSB) to improve transparency and investor confidence.

Despite its limitations, such as a relatively small sample size (111 observations) and short observation period (2021–2023), this study contributes to understanding the interaction between financial and environmental factors in determining equity financing costs. Future research could expand the sample, extend the observation period, and include additional variables such as corporate governance and market liquidity to deepen insights into sustainable financing strategies in Indonesia's emerging markets.

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