JURNAL ECONOMINA e-ISSN: 2963-1181
Volume 5, Number 10, October 2026
Homepage: ejournal.45mataram.ac.id/index.php/economina

Does Governance Drive Decarbonization? Internal Governance, Auditor Tenure, and Emission Performance in Indonesia

Roy Budiharjo[1*], Asrarul Rahman[2], Idayu Rahmawati[3]
[1*23]Bachelor of Accounting Study Program, Faculty of Economics and Business, Telkom University, Bandung, Indonesia

[*]*Corresponding Author: roybudiharjo@telkomuniversity.ac.id*

Article History
Received: 05-09-2026
Revised: 11-10-2026
Published: 30-10-2026

Keywords: ***Emission Performance, Corporate Governance,Auditor Tenure,ESG Score, Two-Way Fixed Effects***

ABSTRACT

This study examines whether internal governance performance and auditor tenure drive the carbon emissions performance of public companies in Indonesia. Balanced panel data were obtained from the LSEG database for 109 companies listed on the Indonesia Stock Exchange during the 2022–2025 period. Emissions performance is measured by the LSEG emission category score, governance performance is measured by the governance pillar score, while firm size and leverage serve as control variables. Models were selected using the Chow, Hausman, and Lagrange Multiplier tests, then estimated using two-way fixed-effects regressions and clustered standard errors per firm. The results show that governance performance has a positive effect on emissions performance, and this finding is consistent across all model specifications. Auditor tenure also has a positive effect after controlling for annual trends, although the evidence is weaker and sensitive to specification. Firm size and leverage have no effect in the main model. These findings position internal governance as the primary driver of corporate decarbonization, while external auditors play a supporting role.

INTRODUCTION

Climate change has shifted the way capital markets assess companies. Carbon emissions are no longer viewed as a technical issue in production, but rather as a business risk that determines access to funding, reputation, and business continuity. Indonesia faces significant challenges. The government is targeting a 31.89% reduction in greenhouse gas emissions through its own efforts and 43.20% with international support by 2030, and *net-zero emissions* by 2060 (Wahyuningrum et al., 2025). Such targets are difficult to achieve without the involvement of corporations, one of the largest sources of emissions.

From a regulatory perspective, Financial Services Authority (OJK) Regulation No. 51/POJK.03/2017 requires issuers to prepare sustainability reports (Financial Services Authority, 2017). However, this reporting obligation does not automatically translate into improved performance. Gunawan et al. (2022) noted that sustainability reporting practices in Indonesia are indeed developing, but their environmental content is often shallow. Arvidsson and Dumay (2022) cautioned against a similar trend globally: increasing ESG reporting

volumes do not necessarily translate into improved ESG performance. The crucial question, then, is what mechanisms drive companies to truly improve their emissions performance, rather than simply reporting it.

Corporate governance is a strong candidate. An effective board, a sound ownership structure, and an integrated CSR strategy provide direction and oversight for environmental management decisions (de Villiers et al., 2011). Empirical evidence from Australia (Elsayih et al., 2021), developing countries (Cordova et al., 2021), and the ASEAN region (Handoyo et al., 2024) demonstrates a positive relationship between governance and carbon performance. However, findings in Indonesia are not consistent. Wahyuningrum et al. (2025) found that some governance attributes improve carbon performance, while board independence is negatively related. These mixed findings open up the opportunity to examine governance as a performance entity, rather than simply a collection of structural attributes.

The second party rarely highlighted is the external auditor. While auditors do not directly audit emissions, a long-term engagement provides auditors with a deep understanding of the client's business model and risks, including those stemming from environmental issues. Asante-Appiah and Lambert (2023) show that external auditors help clients manage ESG reputational risk, while Wang et al. (2023) found that auditors consider clients' ESG performance when issuing their opinions. Furthermore, the literature on auditor tenure remains divided between arguments that promote learning and arguments that undermine independence (Johnson et al., 2002; Myers et al., 2003). The link between auditor tenure and client emissions performance remains relatively unexamined, particularly in emerging markets.

Building on this gap, this study examines the influence of governance performance and auditor tenure on the emissions performance of public companies in Indonesia. It offers three contributions. First, this study shifts the focus from carbon disclosure to emissions performance, in line with criticisms that reporting does not necessarily reflect real improvements (Jiang et al., 2023). Second, this study brings auditor tenure into the discussion of carbon governance, an aspect rarely addressed by previous research. Third, this study uses panel data from 2022–2025 with firm and year fixed effects, thus eliminating unobserved firm characteristics and market-wide trends.

Theoretical Basis and Hypothesis Development

Agency theory views governance as a set of mechanisms to align managers' interests with owners' and discourage opportunistic behavior (Jensen & Meckling, 1976). Emission reduction investments are generally expensive upfront and only yield long-term benefits, so short-term-oriented managers tend to delay them. Stakeholder theory complements this view: a company's survival depends on its ability to meet the expectations of various stakeholders, including demands for environmental responsibility (Freeman, 1984). Legitimacy theory adds that companies strive to maintain alignment with social values to maintain public acceptance (Deegan, 2002). The problem is, legitimacy can be pursued symbolically through disclosure

without improving performance (Jiang et al., 2023). Governance and third-party oversight differentiate substantive commitments from merely cosmetic ones.

Strong governance improves the quality of board oversight, clarifies management accountability, and incorporates sustainability issues into corporate strategy. Bui et al. (2020) found that climate governance improves both carbon disclosure and performance. Karim et al. (2021) and Houqe and Khan (2023) identified governance as a determinant of carbon reporting quality, while Elleuch Lahyani (2022) and Al Amosh and Khatib (2022) linked board composition and ownership structure to environmental disclosure. Top leadership characteristics also influence climate change disclosure (Cahyono et al., 2024). In the ASEAN region, Handoyo et al. (2024) found that corporate governance positively impacts a company's ability to reduce emissions. Based on these arguments, the first hypothesis is formulated as follows.

H1: Governance performance has a positive effect on emission performance.

Auditor tenure can be interpreted in two ways. The learning view suggests that longer engagements provide auditors with specific knowledge about the client, thus improving audit quality. Johnson et al. (2002) found lower financial reporting quality on shorter engagements, and Myers et al. (2003) found that earnings quality tends to improve with longer tenure. This accumulated knowledge enables auditors to identify material environmental risks and encourages management to address them (Asante-Appiah & Lambert, 2023). The opposite view suggests that prolonged familiarity can erode auditor skepticism. In Indonesia, Government Regulation No. 20 of 2015 restricts audit engagements by the same public accountant but does not mandate rotation of public accounting firms (Government of the Republic of Indonesia, 2015), thus maintaining variability in engagement lengths across firms. Following the learning argument, the second hypothesis is formulated as follows.

H2: Auditor engagement period has a positive effect on emission performance.

The framework of this research is summarized in Figure 1.

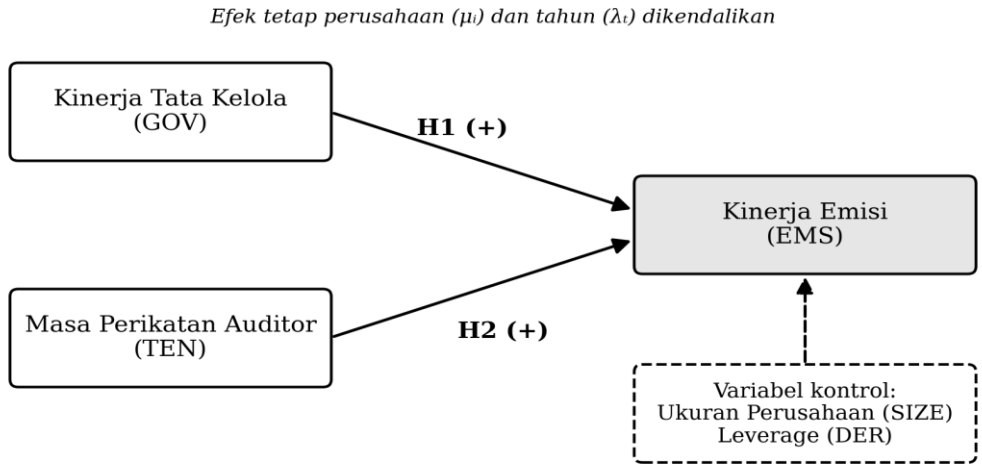


Figure 1. Research model

RESEARCH METHODS

This research uses a quantitative approach with secondary panel data. The study population consists of companies listed on the Indonesia Stock Exchange. The sample was selected purposively, *with* the criteria being companies with ESG scores and complete financial data in the LSEG (formerly Refinitiv) database for 2022–2025. These criteria resulted in 109 companies with 436 company-year observations in a balanced panel.

Emissions performance (EMS) is measured using the LSEG emissions category score on a scale of 0–100, reflecting a company's commitment and effectiveness in reducing emissions from its operational processes. A higher score indicates better emissions performance (LSEG, 2023). Governance performance (GOV) is measured using the LSEG governance pillar score, which summarizes the categories of management, shareholders, and CSR strategy. Auditor tenure (TEN) is measured by the number of consecutive years the company has been audited by the same auditor. Company size (SIZE) and leverage (DER) are included as control variables, following Wahyuningrum et al. (2025). Operational definitions of all variables are presented in Table 1.

Table 1. Operational definitions of variables

Variables	Symbol	Measurement	Role
Emission performance	EMS	LSEG emission category score (0–100)	Dependent
Governance performance	GOV	LSEG governance pillar score (0–100)	Independent
Auditor engagement period	TEN	Number of consecutive years audited by the same auditor	Independent
Company size	SIZE	Natural logarithm of total assets	Control
Leverage	DER	Total debt divided by total equity	Control

Source: LSEG, processed by the author

The DER data contains one extreme observation, 117.135 times, which is significantly higher than the other observations. To prevent the estimate from being dominated by a single data point, the DER is winsorized *at* the 1st and 99th percentiles, resulting in a range of 0.000–6.584. The research model is formulated as follows.

$$EMS_{it} = \beta_0 + \beta_1 GOV_{it} + \beta_2 TEN_{it} + \beta_3 SIZE_{it} + \beta_4 DER_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

The symbol $\mu i_{captures}$ firm fixed effects, $\lambda t_{captures}$ year fixed effects, and $\varepsilon it_{represents}$ the error. Model selection is performed using the Chow test, the Hausman test, and the Lagrange Multiplier test, followed by an F-test for joint significance of year effects. Assumption tests include residual normality (Jarque-Bera), multicollinearity (VIF), heteroscedasticity (Breusch-

Pagan), and panel data autocorrelation (Wooldridge, 2010). To anticipate autocorrelation and heteroscedasticity, the model is estimated with cluster *-robust standard errors per firm* . Hypotheses are tested at a 5% significance level. Data processing is performed using Python using the statsmodels and linearmodels libraries.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 2 presents descriptive statistics for the research variables. The average emissions score was 54.844 with a standard deviation of 23.977, and the range stretched from 0.000 to 99.754. This wide distribution indicates a wide gap between companies that have seriously managed emissions and those that have not. The average governance score was 50.286. The average auditor engagement period was 3.739 years, with the longest engagement reaching 16 years.

Table 2. Descriptive statistics (N = 436)

Variables	Average	Standard deviation	Minimum	Maximum
EMS	54,844	23,977	0,000	99,754
GOV	50,286	21,539	3,168	93,802
TEN (year)	3,739	3,276	1,000	16,000
SIZE	31,391	1,476	27,320	35,579
DER (before winsorize)	0.955	5,712	0,000	117,135
DER (after winsorize)	0.669	1,021	0,000	6,584

Source: Processed data, 2026

Interannual patterns are also worth noting. The average emission score rose from 51.16 in 2022 to 59.31 in 2025, while the average auditor tenure actually decreased from 4.39 to 3.25 years. These two opposing trends are why it's important to control for year effects in the model, as without them, the overall market trend can be misinterpreted as the variable's influence.

Model Selection and Assumption Testing

The model selection results are presented in Table 3. The Chow and Hausman tests both suggest a fixed-effects model. The F-test for year effects is also significant, so the two-way fixed-effects model, controlling for both firm and year, is selected as the primary model.

Table 3. Results of model selection test

Test	Statistics	p	Decision
Chow	F(108; 323) = 14.192	< 0.001	Fixed effects are more precise than pooled

Test	Statistics	p	Decision
Hausman	$\chi^2(4) = 14.990$	0.005	Fixed effects are more appropriate than random effects.
Lagrange Multiplier	LM = 360.674	< 0.001	Random effects are more precise than pooled effects.
Year effect	F(3; 320) = 12.851	< 0.001	Year effects need to be controlled

Source: Processed data, 2026

Table 4 summarizes the assumption tests. The residuals are normally distributed and no multicollinearity is found, with the highest VIF of 1.192. The Breusch-Pagan test is at the limit of significance, while the Wooldridge test detects autocorrelation. Both of these issues are addressed by standard errors clustered by company, which remains valid even though the errors are correlated across years and their variance is not constant.

Table 4. Results of assumption tests

Test	Statistics	p	Conclusion
Normality (Jarque-Bera)	JB = 1,608	0.448	Normal residual
Multicollinearity	Max VIF = 1.192	–	There is no multicollinearity
Heteroscedasticity (Breusch-Pagan)	LM = 9.383	0.052	Significance limits
Autocorrelation (Wooldridge)	F(1; 108) = 25.291	< 0.001	There is autocorrelation

Source: Processed data, 2026

Regression Results

Table 5 compares two specifications. Model 1 controls only for firm effects, while Model 2 controls for both firm and year effects. Model 2 serves as the basis for hypothesis testing because the year effect proves significant.

Table 5. Fixed effects regression results with clustered standard errors per company

Variables	Model 1: Coef.	t	p	Model 2: Coef.	t	p
Constant	−305,387	−2,471	0,014	52,855	0,341	0,733
GOV	0,231	2,534	0,012	0,227	2,330	0,020
TEN	0,243	1,215	0,225	0,462	1,979	0,049
SIZE	11,090	2,800	0,005	−0,362	−0,073	0,942
DER	−0,597	−0,375	0,708	0.324	0.219	0.827

Variables	Model 1: Coef.	t	p	Model 2: Coef.	t	p
Company effects	Yes			Yes		
Year effect	No			Yes		
R^2 within	0.063			0.028		
F (p)	4.732 (0.001)			2.092 (0.082)		
Observation / company	436 / 109			436 / 109		

Source: Processed data, 2026

In Model 2, governance performance has a positive and significant effect on emissions performance (coefficient 0.227; p = 0.020). A one-point increase in the governance score within the same company is followed by an approximately 0.227-point increase in the emissions score, thus H1 is accepted. This result is stable, as Model 1 produces nearly identical coefficients. Auditor tenure also has a positive and significant effect (coefficient 0.462; p = 0.049), thus H2 is accepted. However, the p-value, which is just below 5%, and the loss of significance in Model 1 indicate that the evidence for H2 is more fragile than for H1.

Firm size is significant in Model 1, but is no longer significant after controlling for year effects. This means that the effect of firm size in Model 1 likely rides on the upward trend in emission scores across the market. Leverage is insignificant in both models. Small R^2 values are typical in fixed-effects models, as they only measure within-firm variation from year to year, while permanent differences between firms are already absorbed by the fixed effects. The F-test with clustered standard errors in Model 2 is significant at the 10% level.

Discussion

The H1 findings reinforce the view that corporate decarbonization is primarily driven from within. As management quality, shareholder protection, and the integration of CSR strategies improve, companies tend to improve their emissions management. These findings align with those of Elsayih et al. (2021), Cordova et al. (2021), Bui et al. (2020), and Handoyo et al. (2024). These findings also offer a different perspective on the findings of Wahyuningrum et al. (2025), which found board independence negatively related to carbon performance. While a single structural attribute may be ineffective, governance, measured as overall performance, remains associated with improved emissions. From an agency theory perspective, good governance reduces managers' tendency to delay long-term environmental investments (Jensen & Meckling, 1976). From a legitimacy theory perspective, good governance encourages legitimacy to be pursued through improved performance, not simply through disclosure (Deegan, 2002; Jiang et al., 2023).

The findings of H2 support the learning argument. Auditors with longer tenure with clients have deeper knowledge of the client's business risks, including those arising from

environmental issues, and can encourage management to address them (Asante-Appiah & Lambert, 2023; Myers et al., 2003). However, these findings should be read with caution. Financial statement auditors do not directly examine emissions data, and assurance on sustainability reports in Indonesia is still voluntary. The effect of auditor tenure likely operates indirectly, for example through relationship stability and auditor input on internal controls. The loss of significance in Model 1 also suggests that this effect only becomes apparent after adverse market trends are controlled.

The insignificant effect of leverage is consistent with Wahyuningrum et al. (2025), who also found no effect of DER on carbon performance. Funding structure does not appear to be a channel for environmental discipline in Indonesia. Firm size, which is no longer significant in Model 2, differs from the findings of Wahyuningrum et al. (2025). This difference is understandable, as the fixed-effects model only utilizes relatively small changes in firm size over four years, while differences in size between firms are already absorbed by the fixed effects.

CONCLUSION AND SUGGESTIONS

This study concludes that governance performance is the most consistent driver of the emissions performance of public companies in Indonesia. Companies that improve their governance from year to year also improve their emissions management, and this relationship persists across various model specifications. Auditor tenure also contributes positively after controlling for annual trends, but the evidence is weaker. Firm size and leverage have no effect in the main model.

Practically, boards of commissioners and directors need to position the emissions agenda as part of governance performance, not merely a reporting matter. Audit committees can consider the auditor's knowledge of a client's environmental risks when assessing the sustainability of the engagement, without compromising independence. For regulators, these findings suggest that strengthening sustainability governance and encouraging assurance of sustainability reporting has the potential to have a more tangible impact than mandatory disclosures alone.

This study has several limitations. The observation period is only four years and the sample is limited to companies covered by LSEG, which tend to be large. LSEG's emissions scores are relative rankings, not absolute emissions amounts. Auditor tenure does not differentiate between public accounting and public accounting firms, and the study does not specifically address potential endogeneity. Future research could use actual emissions intensity, examine the role of sustainability report assurance, compare high- and low-emission sectors, and employ dynamic panel methods to strengthen causal inference.

BIBLIOGRAPHY

Al Amosh, H., & Khatib, S. F. A. (2022). Ownership structure and environmental, social and governance performance disclosure: The moderating role of the board independence.

Journal of Business and Socio-Economic Development, 2(1), 49–66. https://doi.org/10.1108/JBSED-07-2021-0094

Arvidsson, S., & Dumay, J. (2022). Corporate ESG reporting quantity, quality and performance: Where to now for environmental policy and practice? *Business Strategy and the Environment, 31*(3), 1091–1110. https://doi.org/10.1002/bse.2937

Asante-Appiah, B., & Lambert, T. A. (2023). The role of the external auditor in managing environmental, social, and governance (ESG) reputation risk. *Review of Accounting Studies, 28*(4), 2589–2641. https://doi.org/10.1007/s11142-022-09706-z

Bui, B., Houqe, M. N., & Zaman, M. (2020). Climate governance effects on carbon disclosure and performance. *The British Accounting Review, 52*(2), 100880. https://doi.org/10.1016/j.bar.2019.100880

Cahyono, S., Ardianto, A., & Nasih, M. (2024). Breaking barriers: CEOs STEM educational background and corporate climate change disclosure. *International Journal of Accounting & Information Management, 32*(4), 651–684. https://doi.org/10.1108/IJAIM-10-2023-0268

Cordova, C., Zorio-Grima, A., & Merello, P. (2021). Contextual and corporate governance effects on carbon accounting and carbon performance in emerging economies. *Corporate Governance: The International Journal of Business in Society, 21*(3), 536–550. https://doi.org/10.1108/CG-10-2020-0473

de Villiers, C., Naiker, V., & van Staden, C. J. (2011). The effect of board characteristics on firm environmental performance. *Journal of Management, 37*(6), 1636–1663. https://doi.org/10.1177/0149206311411506

Deegan, C. (2002). Introduction: The legitimising effect of social and environmental disclosures – a theoretical foundation. *Accounting, Auditing & Accountability Journal, 15*(3), 282–311. https://doi.org/10.1108/09513570210435852

Elleuch Lahyani, F. (2022). Corporate board diversity and carbon disclosure: Evidence from France. *Accounting Research Journal, 35*(6), 721–736. https://doi.org/10.1108/ARJ-12-2021-0350

Elsayih, J., Datt, R., & Tang, Q. (2021). Corporate governance and carbon emissions performance: Empirical evidence from Australia. *Australasian Journal of Environmental Management, 28*(4), 433–459. https://doi.org/10.1080/14486563.2021.1989066

Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Pitman.

Gunawan, J., Permatasari, P., & Fauzi, H. (2022). The evolution of sustainability reporting practices in Indonesia. *Journal of Cleaner Production, 358*, 131798. https://doi.org/10.1016/j.jclepro.2022.131798

Handoyo, S., Yudianto, I., & Dahlan, M. (2024). Exploring firm and country's specific factors affecting carbon emission reduction performance: Study on selected ASEAN countries. *Heliyon, 10*, e37036. https://doi.org/10.1016/j.heliyon.2024.e37036

Houqe, M. N., & Khan, H. Z. (2023). What determines the quality of carbon reporting? A system-oriented theories and corporate governance perspective. *Business Strategy and the Environment, 32*(6), 3197–3216. https://doi.org/10.1002/bse.3295

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Jiang, Y., Fan, H., Zhu, Y., & Xu, J. F. (2023). Carbon disclosure: A legitimizing tool or a governance tool? Evidence from listed US companies. *Journal of International Financial Management & Accounting, 34*(1), 36–70. https://doi.org/10.1111/jifm.12161

Johnson, V. E., Khurana, I. K., & Reynolds, J. K. (2002). Audit-firm tenure and the quality of financial reports. *Contemporary Accounting Research, 19*(4), 637–660.

Karim, A. E., Albitar, K., & Elmarzouky, M. (2021). A novel measure of corporate carbon emission disclosure, the effect of capital expenditures and corporate governance. *Journal of Environmental Management, 290*, 112581. https://doi.org/10.1016/j.jenvman.2021.112581

LSEG. (2023). *Environmental, social and governance scores from LSEG* [Methodology document]. London Stock Exchange Group.

Myers, J.N., Myers, L.A., & Omer, T.C. (2003). Exploring the terms of the auditor-client relationship and the quality of earnings: A case for mandatory auditor rotation? *The Accounting Review, 78* (3), 779–799. https://doi.org/10.2308/accr.2003.78.3.779

Financial Services Authority. (2017). *Financial Services Authority Regulation Number 51/POJK.03/2017 concerning the Implementation of Sustainable Finance for Financial Services Institutions, Issuers, and Public Companies* .

Government of the Republic of Indonesia. (2015). *Government Regulation Number 20 of 2015 concerning Public Accounting Practices* .

Wahyuningrum, I. F. S., Baroroh, N., Yanto, H., Hidayah, R., Puspita, A. S., & Elviana, L. D. (2025). Corporate governance: Driving climate change disclosure and advancing SDGs. *Journal of Risk and Financial Management, 18*(5), 234. https://doi.org/10.3390/jrfm18050234

Wang, X., Song, X., & Sun, M. (2023). How does a company's ESG performance affect the issuance of an audit opinion? The moderating role of auditor experience. *International Journal of Environmental Research and Public Health, 20*(5), 3878. https://doi.org/10.3390/ijerph20053878

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data* (2nd ed.). MIT Press.