CARBON MANAGEMENT ACCOUNTING, FINANCIAL PERFORMANCE, AND CARBON TAX POLICY INITIATIVES: EVIDENCE FROM INDONESIAN ENERGY FIRMS

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Article History:
Received : April 23, 2026
Revised : August 31, 2026
Accepted : September 03, 2026

Keywords:
Carbon Management Accounting, Carbon Tax Policy Initiative, Financial Performance

Abstract:
Purpose – This study examines the effects of Carbon Management Accounting (CMA) and Financial Performance (FP) on Carbon Tax Policy Initiatives (CTPI) among energy companies listed on the Indonesia Stock Exchange during 2022–2024.
Methods – A quantitative approach used secondary data from annual and sustainability reports. The sample comprised 36 energy firms and 108 firm-year observations. Panel regression employed the random-effects model, supported by robustness tests and additional analysis of CTPI development.
Findings – CMA has a positive and significant association with CTPI ($\beta = 0.5875$, $p < 0.0000$), whereas FP, proxied by Return on Assets (ROA), has no significant effect ($\beta = -0.1689$, $p = 0.0709$). CMA remains positive across alternative covariance specifications. Mean CTPI increased from 0.8330 in 2022 to 0.9310 in 2024.
Research Implications – Strengthening carbon management accounting capabilities may help firms develop carbon-related strategic responses in an evolving carbon-pricing environment. Regulators may strengthen carbon accounting guidance and carbon-information systems.
Originality – This study links internal carbon management capability with observable corporate responses to an emerging carbon-pricing environment, providing evidence from Indonesian energy companies.

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How to cite this article : Rizki, M. F., Ardana, W., Ameraldo, F., & Rabaya, A. J. (2026). Carbon management accounting, financial performance, and carbon tax policy initiatives: Evidence from Indonesian energy firms. Assets: Jurnal Ekonomi, Manajemen, dan Akuntansi, 16(2), 211–230. https://doi.org/10.24252/assets.v16i2.67282

INTRODUCTION

Climate change has become one of the most pressing global challenges, attracting increasing attention from governments, international organisations, researchers, and business communities. The continuous rise in greenhouse gas (GHG) emissions has accelerated global warming, resulting in increasingly severe environmental, economic, and social consequences. According to the Intergovernmental Panel on Climate Change (IPCC), human activities remain the dominant driver of climate change through the accumulation of greenhouse gases in the atmosphere, particularly carbon dioxide (CO_2), methane, and nitrous oxide (IPCC, 2023). Global temperature projections indicate that, without substantial reductions in carbon emissions, average temperatures are expected to increase by approximately 2.4–2.6°C by the end of the century, significantly exceeding the targets established under the Paris Agreement (Liu et al., 2023; IPCC, 2023). Such conditions are expected to intensify extreme weather events, rising sea levels, biodiversity loss, water scarcity, and economic disruption, with developing countries being among the most vulnerable to these climate-related risks.

As one of the largest developing economies, Indonesia faces considerable challenges in balancing economic growth with environmental sustainability. Through its Nationally Determined Contribution (Government of Indonesia), Indonesia has committed to reducing greenhouse gas emissions by 29% through domestic efforts and by up to 41% with international assistance by 2030 (Government of Indonesia, 2022). Nevertheless, achieving these targets remains challenging because the Indonesian economy continues to rely heavily on fossil fuel-based energy, particularly within the energy sector, which represents one of the country's major sources of carbon emissions. This creates a tangible regulatory and operational challenge for energy companies, as carbon-related policies increasingly require firms to generate reliable emissions information and demonstrate measurable mitigation efforts. The regulatory landscape has also become more concrete. Indonesia established the legal basis for carbon taxation through Law No. 7 of 2021 on Harmonisation of Tax Regulations (UU HPP), which specifies that the carbon tax roadmap includes emission-reduction strategies, priority sector targets, alignment with renewable energy development, and consistency with other policies. In parallel, the Indonesia Carbon Exchange (IDXCarbon) was officially launched in September 2023, creating an institutional mechanism for carbon trading and increasing the relevance of carbon-related information for market participants.

At the firm level, this regulatory transition creates a particular challenge for energy companies because carbon-related policy implementation depends on the availability and quality of company-level emissions information. The development of Indonesia's carbon market illustrates this challenge. By the fourth quarter of 2024, IDX Carbon had 100 registered users, of which only 16% were issuers or public companies, while 5,805,953 tCO_2e of greenhouse-gas emission reduction certificates had been issued in the national registry and 1,349,894 tCO_2e had been recorded on the carbon exchange. OJK also reported that the integration of emission allocation data and the carbon exchange was still being developed, particularly for the energy sector. These developments demonstrate Indonesia's transition toward a carbon

pricing framework intended to encourage emission reductions, improve energy efficiency, and strengthen corporate accountability in carbon management. For energy companies, this creates a need to strengthen internal carbon information systems so that emissions can be measured, monitored, disclosed, and incorporated into strategic responses to carbon-related regulation.

Against this evolving regulatory and information environment, companies are expected not only to comply with environmental regulations but also to develop internal management systems capable of measuring, controlling, and reporting carbon-related activities. One of the most important mechanisms supporting this objective is Carbon Management Accounting (CMA). CMA extends conventional management accounting by integrating carbon emissions into managerial planning, performance evaluation, and strategic decision-making. Through systematic identification, measurement, and reporting of carbon-related costs and emissions, CMA enables firms to improve environmental transparency, strengthen internal carbon governance, and prepare for increasingly stringent climate regulations. Consequently, companies equipped with comprehensive carbon management systems are expected to respond more effectively to an evolving carbon-pricing environment, including emerging carbon tax policies, because reliable carbon information facilitates regulatory alignment and supports the development of carbon-related strategic responses.

Unlike carbon emission disclosure, which primarily reflects external reporting practices, CMA represents an internal managerial capability that influences how organisations formulate environmental strategies and allocate resources to support sustainability objectives. As carbon taxation increasingly requires firms to quantify and monitor emissions accurately, the effectiveness of carbon pricing policies depends not only on government regulations but also on companies' internal accounting systems. Therefore, understanding the role of CMA in supporting corporate strategic responses to Indonesia's emerging carbon-pricing and carbon-tax framework has become increasingly important, particularly in emerging economies where carbon-pricing mechanisms and their supporting information systems are still developing.

Despite the growing body of literature on carbon accounting and corporate sustainability, several important research gaps remain. Existing studies have primarily focused on carbon emission disclosure, environmental reporting, green accounting, environmental performance, and ESG practices as determinants of firm value or financial performance (Cahyadi & Sitinjak, 2022; Cohen et al., 2023; Munir & Pratama, 2025). Comparatively little attention has been devoted to examining how internal carbon management systems influence firms' observable strategic responses to emerging carbon-pricing policies, particularly in developing countries where regulatory frameworks are still evolving. This issue is particularly relevant for Indonesian energy companies because the expansion of carbon-pricing institutions increases the need for firms to translate carbon-related information into measurable emission-reduction strategies and coordinated corporate policies. More importantly, previous studies generally position carbon taxation as an external institutional setting or regulatory background rather than as a corporate strategic response reflected in firms' carbon policy initiatives. Consequently, limited

empirical evidence explains whether firms equipped with stronger carbon management capabilities are more likely to demonstrate observable carbon-related strategic responses, including emission reduction strategies, priority targets, renewable energy alignment, and policy alignment, within an emerging carbon-pricing environment.

This raises an important possibility of decoupling between firms' internal carbon management capabilities and their observable strategic responses to emerging carbon-pricing regulations. In other words, the existence of carbon-related accounting capabilities does not necessarily ensure that firms translate such capabilities into concrete emission-reduction strategies and policy alignment. Examining this relationship is particularly relevant in emerging regulatory settings, where institutional pressure is increasing while carbon-pricing mechanisms and corporate responses are still developing.

Furthermore, empirical findings concerning the role of financial performance remain inconclusive. While several studies report that financially stronger firms are more capable of investing in environmental initiatives and adapting to sustainability regulations (Naranjo Tuesta et al., 2021; Shrestha et al., 2023), other studies argue that the costs associated with environmental investments and carbon management reduce financial benefits and weaken market responses (Kazemian et al., 2022). Recent evidence also shows mixed relationships between profitability and tax-related behaviour, with profitability negatively associated with tax aggressiveness in Indonesian banking firms (Prada et al., 2024), but positively associated with tax aggressiveness among Indonesian energy firms (Dinata & Rizki, 2026). These contradictory findings indicate that financial capability alone may not adequately explain firms' preparedness for carbon taxation, suggesting the need to simultaneously consider organisational capabilities represented by Carbon Management Accounting.

This study addresses these gaps by providing several important contributions to the environmental accounting literature. First, unlike previous studies that predominantly examine the consequences of carbon disclosure or environmental reporting, this study positions Carbon Tax Policy Initiative (CTPI) as the primary dependent variable, thereby shifting the analytical focus toward observable corporate strategic responses to an emerging carbon-pricing environment. Second, although Suswandoyo (2025) examines the relationship between Carbon Management Accounting and Carbon Tax Policy Initiative in Indonesian mining companies, the present study extends this line of inquiry by examining whether internal carbon management capability is associated with broader corporate carbon-related strategic responses in the energy sector. The study is particularly relevant to the Indonesian energy sector because its carbon-intensive activities and exposure to the ongoing energy transition create a setting in which firms must translate carbon-related information and internal capabilities into strategic responses to evolving regulatory pressures. Accordingly, this study does not claim novelty solely from differences in industry or observation period, but from examining the relationship between internal carbon management capability and corporate carbon-related responses within an emerging carbon-pricing environment.

Third, this study integrates three complementary theoretical perspectives to explain corporate responses to emerging carbon-pricing regulations. The Natural Resource-Based View (NRBV) conceptualises Carbon Management Accounting as an internal environmental capability that enables firms to develop and utilise carbon-related knowledge and information in strategic decision-making (Hart, 1995). Institutional Theory, particularly the concept of coercive pressure, explains how emerging government regulations encourage firms to align their environmental practices with evolving regulatory expectations (DiMaggio & Powell, 1983). Legitimacy Theory complements these perspectives by explaining firms' motivation to maintain alignment with broader social and environmental expectations (Dowling & Pfeffer, 1975; Suchman, 1995; Deegan, 2019). This integrated perspective allows the study to examine how internal carbon management capability and regulatory pressure jointly provide a basis for corporate responses to emerging carbon-pricing policies. Consequently, the study contributes theoretically by connecting internal environmental capability, regulatory pressure, and organisational legitimacy in the context of carbon-related corporate initiatives in an emerging economy.

THEORETICAL REVIEW

Natural Resource-Based View

The Natural Resource-Based View (NRBV) provides a theoretical foundation for understanding environmental management capabilities as strategic organisational resources. Hart (1995) argues that firms can develop competitive capabilities by effectively managing their relationship with the natural environment. From this perspective, environmental capabilities are not merely responses to external pressures but can become organisational resources that support firms in addressing environmental challenges and developing long-term strategies.

In the context of carbon management, Carbon Management Accounting (CMA) can be viewed as an internal environmental capability that enables firms to identify, measure, monitor, and communicate carbon-related information for managerial decision-making. CMA therefore provides firms with organisational knowledge and information necessary to incorporate carbon considerations into planning, performance evaluation, resource allocation, and environmental management (Burritt et al., 2019; Tang & Luo, 2021). From an NRBV perspective, firms with stronger CMA capabilities are better positioned to translate carbon-related information into strategic environmental responses. This perspective is particularly relevant to the present study because CMA represents the internal organisational capability through which firms can respond to an evolving carbon-pricing environment.

Institutional Theory

Institutional Theory provides a complementary explanation for why firms develop responses to emerging environmental regulations. Organisations operate within institutional environments characterised by regulatory, normative, and social expectations. DiMaggio and Powell (1983) particularly highlight coercive institutional pressure, whereby organisations adapt their structures and practices in response to formal requirements and pressures from authorities and other powerful institutions.

In the Indonesian carbon-pricing context, the development of carbon-related regulations creates an emerging source of coercive pressure for energy companies. Firms are increasingly expected to align their environmental strategies, emission-

reduction activities, and carbon-related information with government policy directions. Accordingly, Carbon Tax Policy Initiatives (CTPI) can be understood as a corporate response to an evolving regulatory environment, reflected in emission-reduction strategies, priority targets, renewable-energy alignment, and policy alignment. Institutional Theory therefore explains the external regulatory mechanism through which firms are encouraged to adapt their environmental strategies.

This perspective complements the NRBV by distinguishing between the internal capability required to respond to carbon regulation and the external institutional pressure that motivates such responses. While NRBV explains why firms with stronger carbon management capabilities are better equipped to respond, Institutional Theory explains why firms face incentives to align their environmental strategies with emerging regulatory expectations.

Legitimacy Theory

Legitimacy theory is one of the main theoretical foundations used to explain how firms respond to social and environmental pressures through their business practices and reporting activities. According to Dowling and Pfeffer (1975), organizations continuously seek to ensure that their operations are aligned with societal values, norms, and expectations in order to maintain their legitimacy and long-term survival. In contemporary literature, legitimacy is viewed as a dynamic concept, where firms must actively adapt their strategies and practices to increasing demands for transparency and sustainability (Deegan, 2019; Suchman, 1995). Recent studies further highlight that pressures from stakeholders, including regulators and investors, encourage firms to enhance environmental disclosure as a means of securing legitimacy (Haque & Ntim, 2020; Orazalin & Mahmood, 2020). Therefore, legitimacy theory is particularly relevant in explaining why firms adopt carbon accounting practices and sustainability reporting in response to climate change issues.

In the context of carbon accounting, legitimacy theory provides a strong explanation for the role of *carbon management accounting* (CMA) as a strategic mechanism for gaining and maintaining legitimacy. CMA enables firms to systematically measure, control, and disclose carbon emissions, thereby reducing the legitimacy gap between societal expectations and corporate practices. Empirical evidence suggests that carbon disclosure and environmental accounting practices play a crucial role in enhancing corporate credibility and strengthening relationships with stakeholders (Burritt et al., 2019; Tang & Luo, 2021). Moreover, firms with strong financial performance tend to have greater capacity to implement environmental initiatives and improve the quality of disclosure, which ultimately reinforces corporate legitimacy (Orazalin, 2020; Clarkson *et al.*, 2011). This indicates that CMA functions not only as an internal decision-making tool but also as an external instrument for building reputation and public trust.

Unlike CMA, which captures internal carbon accounting practices, CTPI reflects the firm's strategic response to carbon taxation policies. The four indicators used in this study—carbon emission reduction strategies, priority action targets, renewable energy alignment, and policy alignment—capture organizational preparedness for carbon pricing rather than carbon accounting capability. Therefore, although both

constructs are measured from corporate reports, they represent different dimensions of corporate environmental behaviour.

Furthermore, legitimacy theory provides an important perspective for understanding how firms respond to stakeholder and societal expectations regarding environmental responsibility. Firms with strong financial performance may have greater capacity and incentives to maintain their reputation and stakeholder confidence through environmentally responsible practices. In this study, however, legitimacy theory is complemented by the Natural Resource-Based View (NRBV) and Institutional Theory to provide a more comprehensive explanation of corporate responses to carbon-related regulation. NRBV views environmental capabilities as strategic organisational resources that can support firms in addressing environmental challenges and creating long-term value (Hart, 1995). From this perspective, CMA represents an internal organisational capability that enables firms to develop, manage, and utilise carbon-related information in responding to environmental challenges. Meanwhile, Institutional Theory, particularly the concept of coercive isomorphism, explains how regulatory pressures encourage firms to align their organisational practices with emerging carbon-related regulations (DiMaggio & Powell, 1983). Accordingly, legitimacy theory explains firms' motivation to maintain social acceptance, NRBV explains the role of internal carbon management capability, and Institutional Theory explains the influence of regulatory pressure on corporate responses to carbon-related policies.

The Impact of Carbon Management Accounting on Carbon Tax Policy Initiatives

Carbon management accounting (CMA) is regarded as a crucial environmental accounting system for supporting the systematic management and reporting of carbon emissions, particularly in the context of implementing carbon tax policies. Bowen & Wittneben (2011) emphasise that an environmental accounting system capable of accurately measuring and reporting carbon emissions is a key prerequisite for the effectiveness of carbon tax policies, given that such policies are heavily reliant on the validity of emissions data. In line with this, Weichselberger and Lagström (2021) state that the development of environmental accounting systems, including CMA, can strengthen companies' capacity to respond to regulatory pressures and environmentally-based fiscal policies. Furthermore, Angga Prasetia et al. (2025) found that the readiness of carbon emissions accounting systems has a significant influence on the successful implementation of carbon taxes in developing countries, as CMA enables companies to align internal policies with external regulatory demands.

CMA in this study refers to a firm's internal accounting capability to identify, measure, monitor, and report carbon-related information for managerial decision-making and regulatory compliance. Following Burritt et al. (2019), CMA extends beyond environmental disclosure by integrating carbon-related information into internal management processes. Accordingly, this study measures CMA using four disclosure-based indicators covering carbon trading information, energy consumption information, carbon-related savings, and corporate carbon emissions reporting. Although these indicators are identified from annual and sustainability reports, they represent a firm's internal carbon accounting capability rather than its policy commitment. Therefore, CMA is conceptually distinct from Carbon Tax

Policy Initiative (CTPI), which reflects a firm's strategic readiness and commitment to support carbon taxation policies.

From the NRBV perspective, CMA represents an internal environmental capability that enables firms to develop, organise, and utilise carbon-related information in environmental and strategic decision-making (Hart, 1995). Firms with stronger CMA capabilities are therefore better positioned to identify carbon-related risks, monitor emissions, and integrate environmental considerations into organisational planning. This capability becomes particularly relevant when firms face emerging carbon-pricing regulations.

Institutional Theory further suggests that firms respond to coercive regulatory pressures by aligning their organisational practices with government expectations (DiMaggio & Powell, 1983). In this context, CMA can provide the internal information and organisational capability necessary for firms to translate regulatory expectations into concrete carbon-related strategies. Legitimacy Theory provides an additional explanation, as firms may also seek to demonstrate conformity with environmental expectations and maintain organisational legitimacy (Dowling & Pfeffer, 1975; Suchman, 1995).

Empirical evidence also supports the expected relationship. Burritt et al. (2019) emphasise the role of environmental management accounting in supporting managerial decision-making and environmental accountability, while Tang and Luo (2021) demonstrate that structured carbon management systems are associated with proactive carbon mitigation. Suswandoyo (2025) further reports a positive relationship between CMA and CTPI among Indonesian mining companies. Therefore, firms with stronger CMA capabilities are expected to demonstrate greater engagement in carbon-related policy initiatives.:

H1: Carbon management accounting has a positive impact on carbon tax policy initiatives.

The Impact of Financial Performance on Carbon Tax Policy Initiatives

Financial performance reflects a firm's ability to generate profits from its assets and represents its operational efficiency and accounting profitability. Hariyanto and Cahyani (2025) state that financial pressure influences managerial decisions. From the perspective of Legitimacy Theory, companies with stronger financial performance may have greater incentives to maintain their reputation and stakeholder support by demonstrating compliance with environmental expectations. Yunus et al. (2020) further show that pressure from regulators and institutional investors encourages companies to adopt more transparent carbon management strategies as part of their corporate social responsibility.

Financial performance (FP), proxied by Return on Assets (ROA), reflects a company's ability to generate profits from its assets and indicates its operational efficiency. Firms with stronger profitability may possess greater financial capacity to support environmental initiatives and respond to emerging climate-related requirements. Empirically, previous research suggests that financial performance can be associated with environmental disclosure and corporate value, although the strength and direction of this relationship may vary across contexts (Clarkson et al., 2011; Orazalin & Mahmood, 2020). Dewi (2025) also examines the relationship

between carbon emission disclosure, environmental performance, and firm value, highlighting the relevance of financial conditions in understanding corporate environmental practices. From the perspective of Legitimacy Theory, financially stronger firms may have greater incentives to maintain their reputation and stakeholder confidence through responsible environmental practices. Therefore, this study expects financial performance to have a positive influence on Carbon Tax Policy Initiatives:

H2: Financial Performance has a positive and significant impact on the Carbon Tax Policy Initiative.

RESEARCH METHODS

This study employs a quantitative approach with the aim of testing the influence of carbon management accounting (CMA) and financial performance (FP) on carbon tax policy initiatives (CTPI). These purposive sampling criteria include:

Table 1. Sample Selection Criteria

No	Selection Criteria	Number
1	Energy companies listed on the Indonesia Stock Exchange (IDX) between 2022 and 2024	87
2	Energy companies were inconsistently listed on the IDX in 2022-2024	-21
3	Energy companies that were inconsistently published sustainability reports in 2022–2024	-21
4	Companies that inconsistently published annual reports in 2022–2024	-9
Total Research Sample		**36**
Total Research Observations = 36 × 3		**108**

Source: IDX, 2026

The following are the independent and dependent variables in this study, along with their measurements:

1. Carbon Management Accounting (CMA) is measured using four indicators, namely:
   1. Disclosure of carbon emissions trading information
   2. Disclosure of energy consumption information
   3. Disclosure of savings information relating to carbon-neutral labelling and products
   4. Corporate carbon emissions reporting

   A score of 1 is awarded if the indicator is disclosed in the annual report and sustainability report, and a score of 0 is awarded if the indicator is not disclosed. The following is the formula for measuring carbon management accounting.

$$CMA = \frac{Number\ of\ indicators\ disclosed}{4}$$

2. Financial performance (FP) is measured using Return on Assets (ROA) according to the following formula:

$$ROA = \frac{Net\ profit}{Total\ Assets}$$

3. CTPI refers to observable corporate strategic responses to the emerging carbon-pricing policy environment rather than actual carbon-tax implementation, payment, or compliance. Following Suswandoyo (2025), CTPI is operationalised through four indicators:
   1. Carbon emission reduction strategies
   2. Priority action targets
   3. Alignment with renewable energy development
   4. Alignment between various policies

   Each disclosed indicator receives a score of 1 and each undisclosed indicator receives 0. Higher CTPI scores indicate a greater extent of observable carbon-related strategic responses and policy alignment. The CTPI index is calculated as:

$$CTPI = \frac{Number\ of\ indicators\ disclosed}{4}$$

The data analysis technique employed is panel data regression, using EViews 12 software. This analysis is used to test the influence of independent variables on the dependent variable, both simultaneously and partially, thereby providing empirical evidence regarding the relationship between CMA, FP and CTPI in energy companies in Indonesia.

To assess the robustness of the regression results, additional estimations were conducted using alternative White clustered covariance specifications, namely White period (cross-section cluster) and White cross-section (period cluster) standard errors. These specifications were employed to assess whether the estimated relationships, particularly the association between CMA and CTPI, remain stable under alternative treatments of the error structure.

In addition, a temporal analysis of CTPI was conducted as an additional analysis to examine whether firms' observable carbon-related strategic responses changed during the 2022–2024 observation period. The analysis compares the mean CTPI, minimum, and maximum values across the three years.

RESULTS AND DISCUSSION

This descriptive approach is used to explain or describe the facts relating to the variables under study. This study comprises 108 observations, drawn from 36 energy companies listed on the Indonesia Stock Exchange over the period 2022–2024. Table 2 below presents the results of the descriptive statistical analysis:

Table 2. Results of the Descriptive Analysis

Descriptive Statistics	Y	X1	X2
Mean	0.879630	0.715278	0.134722
Median	1.000000	0.750000	0.050000
Maximum	1.000000	1.000000	0.880000
Minimum	0.000000	0.000000	-0.250000
Std. dev	0.220136	0.245183	0.209866

Source: The data was analysed using Eviews 12, 2026

Based on the results presented the panel data model selection was conducted sequentially using the Chow Test, Hausman Test, and Breusch–Pagan Lagrange

Multiplier (LM) Test. The Chow Test produced a probability value of 0.0000, which is lower than the 5% significance level (0.05), indicating that the Fixed Effect Model (FEM) is preferred over the Common Effect Model (CEM). Subsequently, the Hausman Test yielded a probability value of 0.0857, which exceeds 0.05, suggesting that the Random Effect Model (REM) is more appropriate than FEM. Finally, the Breusch–Pagan LM Test produced a probability value of 0.0035, which is below 0.05, indicating that the Random Effect Model (REM) is preferred over the Common Effect Model (CEM). Based on these sequential model selection procedures, the Random Effect Model (REM) was selected as the most appropriate model for this study.

Table 3. Panel Data Model Selection

Panel Data Model	Prob.	Decision
Chow Test	0.0000	FEM
Hausmen Test	0.0857	REM
Breusch–Pagan LM Test	0.0035	REM

Source: The data was analysed using Eviews 12, 2026

Panel data using the Random Effect Model (REM) approach, the classical assumption tests conducted are limited to multicollinearity and heteroscedasticity tests. The multicollinearity test is used to determine whether there is a high correlation among independent variables, while the heteroscedasticity test is applied to ensure that the error variance remains constant so that the model estimation is efficient. Meanwhile, the normality test is not conducted because, in panel data analysis, particularly with a large number of observations, the normality assumption is not considered a primary requirement due to the Central Limit Theorem, which states that the residual distribution will approach normality as the sample size increases. Furthermore, violations of the normality assumption do not cause the estimator to become biased (Gujarati, Porter, & Gunasekar, 2021). The autocorrelation test is also not conducted because the Random Effect Model has accommodated the error structure in panel data through the Generalized Least Squares (GLS) approach, resulting in estimators that remain BLUE (Best Linear Unbiased Estimator) (Wooldridge, 2019). Therefore, this study focuses the classical assumption tests only on multicollinearity and heteroscedasticity tests.

Table 4. Multicollinearity Test Results

	X1	X2
Carbon Management Accounting (X1)	1.000000	-0.178412
Financial Performance (X2)	-0.178412	1.000000

Source: The data was analysed using Eviews 12, 2026

Table 5. Heteroscedasticity Test Result

Variable	Prob.
Carbon Management Accounting	0.6709
Financial Performance	0.3759

Source: The data was analysed using Eviews 12, 2026

From Table 4 Multicollinearity Test Results and Table 5 Heteroscedastisity Test Results, it can be concluded that the research variables are free from multicollinearity and heteroscedasticity.

Hypothesis testing was conducted using a random effects model with a t-test to determine the effect of Carbon Management Accounting (X1) and Financial

Performance (X2) on the Carbon Tax Policy Initiative (Y). Table 6 below shows the results of the panel data regression model selection.

Table 6 Results of the Panel Data Regression Model Test

Variable	Coefficient	T-Statistic	Prob.
Constant	0.482127	7.972204	0.0000
Carbon Management Accounting	0.587539	7.917648	0.0000
Financial Performance	-0.168871	-1.824395	0.0709

Source: The data was analysed using Eviews 12, 2026

Consequently, the equation for the panel data regression model is as follows:

$$CTPI = 0.482127 + 0.587539*CMA - 0.168871*FP + \varepsilon$$

The results of the regression analysis in Table 6 show that the constant term of 0.482127 indicates the baseline level of the Carbon Tax Policy Initiative (CTPI) when the Carbon Management Accounting (CMA) and Financial performance (FP) variables are held constant. The CMA regression coefficient of 0.587539 indicates a positive relationship, meaning that an increase in CMA will increase CTPI, assuming other variables remain constant. The t-statistic value of 7.917648 and a probability of 0.0000 (<0.05) confirm that CMA has a positive and significant effect on CTPI. Conversely, the regression coefficient for FP of −0.168871 indicates a negative relationship, meaning that an increase in Financial performance tends to reduce the CTPI, assuming all other variables remain constant. However, the t-statistic value of −1.824395 and a probability of 0.0709 (>0.05) suggest that the effect of FP on the CTPI is not statistically significant. Overall, these results indicate that carbon management plays a more dominant role in driving carbon tax policy initiatives compared to a company's financial performance.

Table 7. Results of the Coefficient of Determination Test

Description	Score
R-squared	0.408338
Adjusted R-squared	0.397068

Source: The data was analysed using Eviews 12, 2026

The results of the panel data regression in Table 7 above show that the adjusted R-squared value is 0.397068. This indicates that 39.71% of the Carbon Tax Policy Initiative (Y) can be explained by the two independent variables, namely Carbon Management Accounting (X1) and Financial Performance (X2), whilst the remaining 60.29% is explained by variables not included in this research model.

Table 8. Robustness Test Results

Variables	Baseline Random Effects	White Period Cluster	White Cross-section Cluster
CMA	0.5875	0.588	0.5304
FP	−0.1689	−0.1662	−0.2029
Constant	0.4815	0.4815	0.5276
Observations	108	108	108
R-squared	0.4078	0.4078	0.4273
Adjusted R-squared	0.3965	0.3965	0.4164

Source: The data was analysed using Eviews 12, 2026

To assess the robustness of the main findings, the baseline random-effects model was re-estimated using alternative White clustered covariance specifications. As shown in Table 8, the coefficient of CMA remains positive across all specifications, ranging from 0.5304 to 0.5880. The direction of the CMA coefficient therefore remains stable across alternative model specifications, although its statistical significance varies. Meanwhile, FP remains negative across all specifications. Overall, the robustness analysis provides broadly consistent evidence that CMA is positively associated with CTPI, while the relationship between FP and CTPI is less consistent.

Table 9. Additional Analysis: Yearly Development of CTPI

Year	Number of Firms	Mean CTPI	Minimum	Maximum
2022	36	0.8330	0.0000	1.0000
2023	36	0.8890	0.0000	1.0000
2024	36	0.9310	0.5000	1.0000
Overall	**108**	**0.8840**	**0.0000**	**1.0000**

Source: The data was analysed using Eviews 12, 2026

As an additional analysis, the study examines the development of CTPI across the observation period. As presented in Table 9, the mean CTPI increased consistently from 0.8330 in 2022 to 0.8890 in 2023 and 0.9310 in 2024. The minimum CTPI also increased from 0.0000 in 2022 and 2023 to 0.5000 in 2024. This pattern indicates a general strengthening of observable carbon-related strategic responses among sampled energy firms over the 2022–2024 period. The increasing CTPI trend provides contextual evidence that firms' carbon-related initiatives became more prevalent as Indonesia's carbon-pricing framework continued to develop.

The Impact of Carbon Management Accounting on Carbon Tax Policy Initiatives

The empirical findings demonstrate that Carbon Management Accounting (CMA) has a positive and statistically significant effect on Carbon Tax Policy Initiatives (CTPI), thereby supporting H1. In this study, CTPI is interpreted as an observable corporate response to the emerging carbon-pricing policy environment, rather than as evidence of actual carbon-tax implementation or compliance. This result indicates that firms with more comprehensive carbon management systems are better positioned to develop carbon-related strategic responses through systematic carbon measurement, reporting, and environmental decision-making. Since effective carbon-pricing policies depend on credible emissions information, companies with stronger CMA practices may be better positioned to align their internal management systems with evolving environmental regulations. This finding is consistent with Bowen and Wittneben (2011), who argue that reliable carbon accounting constitutes a fundamental prerequisite for the effective implementation of carbon pricing mechanisms. Likewise, Burritt et al. (2019) emphasize that environmental management accounting provides essential information for managerial decision-making while enhancing corporate accountability in environmental management.

From an NRBV perspective, the positive relationship indicates that CMA functions as an internal environmental capability that enables firms to translate carbon-related information into strategic environmental responses (Hart, 1995). Firms with stronger carbon management capabilities may therefore be better equipped to respond to an evolving carbon-pricing environment because they possess more structured information for monitoring emissions and incorporating carbon

considerations into managerial decision-making. In this sense, CMA represents not merely a reporting practice but an organisational capability that supports the integration of environmental information into corporate strategy.

The finding is also consistent with Institutional Theory, particularly the role of coercive institutional pressure (DiMaggio & Powell, 1983). As Indonesia develops its carbon-pricing framework, energy companies face increasing expectations to align their environmental practices with regulatory requirements. CMA can facilitate this adaptation by providing the information and organisational infrastructure required to respond to such pressure. Legitimacy Theory complements these explanations by suggesting that firms may also strengthen their legitimacy by demonstrating alignment with broader environmental and societal expectations (Dowling & Pfeffer, 1975; Suchman, 1995; Deegan, 2019). Thus, the three perspectives provide complementary explanations: NRBV highlights the internal capability provided by CMA, Institutional Theory explains the regulatory pressure surrounding corporate responses, and Legitimacy Theory explains firms' motivation to maintain alignment with external expectations.

The present findings are broadly consistent with previous empirical evidence. Burritt et al. (2019) reported that environmental management accounting enhances corporate environmental performance and regulatory compliance, while Orazalin (2020) found that firms with stronger environmental governance systems are generally more responsive to sustainability-related regulations. Similarly, Suswandoyo (2025) demonstrated that CMA positively influences Carbon Tax Policy Initiatives among Indonesian mining companies. The consistency of these findings suggests that internal carbon management capability is relevant to firms' adaptation to climate-related regulatory developments.

Nevertheless, the present study extends this literature by examining the relationship between internal carbon management capability and broader corporate carbon-related strategic responses within an emerging carbon-pricing environment. Rather than assuming that the existence of CMA automatically leads to substantive policy responses, the findings provide evidence of an association between firms' carbon management capability and their observable carbon-related initiatives. This perspective highlights a potential link between internal accounting capability and corporate strategic response that remains underexplored in emerging-market settings.

This distinction is particularly relevant in Indonesia, where carbon-pricing institutions are still developing. The 2022–2024 observation period captures an environment in which firms were increasingly exposed to carbon-related regulatory developments, including the establishment of IDXCarbon, while the broader carbon-tax framework remained under development. The significant CMA–CTPI relationship therefore suggests that internal carbon information capabilities may help firms translate evolving regulatory expectations into measurable carbon-related strategies. The finding does not imply that CMA is the sole or dominant determinant of such responses; rather, it indicates that CMA represents an important internal capability associated with firms' responses to an evolving carbon-pricing environment.

The Impact of Financial performance on Carbon Tax Policy Initiatives

The empirical findings indicate that Financial Performance (FP), measured by Return on Assets (ROA), has no statistically significant effect on Carbon Tax Policy Initiatives (CTPI), leading to the rejection of H2. Although firms with stronger financial performance are generally expected to possess greater resources to support sustainability initiatives, the results suggest that profitability alone is insufficient to encourage firms to undertake carbon tax-related initiatives. This finding indicates that corporate engagement with carbon taxation depends not only on financial capacity but also on organisational commitment and environmental management capability. Prior empirical studies have shown that profitable firms are generally more capable of supporting environmental strategies and disclosure practices; however, stronger financial performance does not necessarily translate into greater preparedness for carbon-related policies (Clarkson et al., 2011; Orazalin & Mahmood, 2020).

From the perspective of Legitimacy Theory (Dowling & Pfeffer, 1975), firms with stronger financial performance are expected to preserve their legitimacy by maintaining stakeholder confidence and complying with environmental expectations. Companies with higher profitability possess greater financial resources to invest in sustainability initiatives and may use environmental compliance to strengthen their cor Suchman porate reputation (Deegan, 2019). Accordingly, the theoretical expectation underlying H2 was that financially stronger firms would demonstrate greater readiness to support carbon tax initiatives. However, the insignificant relationship observed in this study suggests that financial performance alone does not automatically translate into stronger organisational commitment to carbon taxation.

The present findings are broadly consistent with previous empirical evidence. Padang and Hernawati (2025) found that profitability, measured by ROA, has no statistically significant effect on ESG disclosure among Indonesian energy companies, indicating that stronger financial performance does not necessarily encourage greater environmental commitment. Similarly, Narula et al. (2024) reported that ESG factors do not consistently influence corporate performance in emerging markets, while Orazalin (2020)

and Haque and Ntim (2020) found that environmental disclosure is not always fully reflected in corporate valuation. Taken together, these findings indicate that the relationship between financial performance and environmental initiatives remains inconsistent, particularly in developing economies.

A plausible explanation for the insignificant relationship is that firms' responses to carbon taxation are more strongly influenced by internal environmental management systems and regulatory requirements than by financial performance. During the early implementation of Indonesia's carbon pricing framework, companies appear to prioritise regulatory compliance and organisational preparedness regardless of their profitability. This explanation is further supported by the significant effect of Carbon Management Accounting observed in this study, suggesting that firms with stronger internal carbon management systems are better equipped to respond to carbon taxation than firms relying solely on superior financial performance.

Overall, The insignificant relationship also provides a useful qualification to the theoretical expectations. Although NRBV suggests that organisational resources can

support environmental capabilities and Legitimacy Theory suggests that financially successful firms may have stronger incentives to maintain stakeholder approval, financial performance alone does not appear sufficient to explain corporate carbon-related initiatives in this setting. The finding therefore suggests that financial capacity should be distinguished from the organisational capabilities required to translate environmental information into strategic action.

The result does not imply that financial resources are irrelevant to environmental management. Rather, it suggests that profitability, measured by ROA, does not by itself constitute a sufficient organisational capability for responding to emerging carbon-pricing policies. This interpretation is consistent with the significant role of CMA found in this study, as CMA represents a more direct organisational capability for managing carbon-related information and activities

Robustness and Additional Analysis

The robustness analysis provides further evidence on the stability of the estimated relationship between Carbon Management Accounting (CMA) and Carbon Tax Policy Initiatives (CTPI). Across alternative clustered standard-error specifications, the coefficient of CMA remains positive, although its statistical significance varies across specifications. This indicates that the direction of the CMA–CTPI relationship is stable under alternative treatments of the error structure, while the variation in statistical significance warrants a cautious interpretation of the strength of the evidence. Overall, the robustness analysis supports the consistency of the positive association observed in the baseline model.

As an additional analysis, the distribution of CTPI was examined across the 2022–2024 observation period. The mean CTPI increased from 0.8330 in 2022 to 0.8890 in 2023 and 0.9310 in 2024. The proportion of observations with the highest CTPI score (1.0000) also increased from 63.89% in 2022 to 69.44% in 2023 and 75.00% in 2024. This pattern indicates an increasing prevalence of observable carbon-related strategic responses among the sampled energy companies over the study period. However, this temporal pattern should not be interpreted as evidence of actual carbon-tax implementation or compliance, given the evolving nature of Indonesia's carbon-pricing framework. Rather, it provides descriptive evidence that firms' observable carbon-related responses became more prevalent during the observation period.

CONCLUSION

This study investigates the association of Carbon Management Accounting (CMA) and Financial Performance (FP), proxied by Return on Assets (ROA), with Carbon Tax Policy Initiatives (CTPI) among energy companies listed on the Indonesia Stock Exchange during 2022–2024. The results indicate that CMA is positively and significantly associated with CTPI, suggesting that firms with stronger carbon management and reporting practices tend to demonstrate stronger observable carbon-related strategic responses. In contrast, FP has no statistically significant association with CTPI, indicating that profitability alone does not necessarily translate into stronger carbon-related initiatives. The robustness analysis confirms the stable positive direction of the CMA coefficient across alternative clustered standard-error specifications, although the level of statistical significance varies. The additional

analysis also shows that mean CTPI increased from 0.8330 in 2022 to 0.9310 in 2024, indicating a growing prevalence of observable carbon-related strategic responses among the sampled firms.

These findings highlight the importance of internal carbon management capabilities in responding to an evolving carbon-pricing and regulatory environment. Firms should therefore strengthen carbon data collection and measurement systems, improve the consistency and verification of carbon-related information, and integrate carbon information into budgeting, investment appraisal, and strategic decision-making. For regulators, the findings highlight the need for standardized carbon accounting guidelines and more consistent and reliable corporate carbon reporting to support the development of carbon-pricing policies. The study contributes to the environmental accounting literature by demonstrating that internal carbon management capability is more closely associated with observable carbon-related strategic responses than accounting profitability in the context examined.

However, this study has several limitations. First, the analysis is limited to 36 energy companies listed on the Indonesia Stock Exchange and covers only the 2022–2024 period, which may limit the generalizability of the findings to other sectors, countries, or longer observation periods. Second, CMA and CTPI are measured using disclosure-based indicators derived from corporate reports, which may not fully capture firms' actual internal carbon management practices or substantive policy responses. Third, the study considers only CMA and financial performance, while other organisational, governance, institutional, and regulatory factors may also influence corporate carbon-related responses. Future research could therefore extend the observation period, examine other sectors and countries, employ additional determinants, and complement disclosure-based measures with more direct measures of firms' carbon management practices and policy responses. Finally, the findings should not be interpreted as evidence of actual carbon-tax implementation or compliance because Indonesia's carbon-pricing framework was still evolving during the observation period.

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