THE INFLUENCE OF GREEN ACCOUNTING ON GREENHOUSE GASES IN PUBLIC COMPANIES

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Abstract

The purpose of this study is to examine the effect of green accounting (X) on greenhouse gas emissions (Y) in public companies. This study uses quantitative research. The sample used in this study was 300 companies listed in the Indonesian Sharia Stock Index (ISSI) for the 2021-2023 period. The data sources were secondary data from the Indonesian Stock Exchange, the Indonesian Sharia Stock Index, and related companies. Data analysis used was validity and reliability tests, simple linear regression, heteroscedasticity tests, multicollinearity tests, coefficient of determination, and hypothesis testing. Based on the results of the study on the effect of green accounting on greenhouse gas emissions in public companies, the following conclusions can be drawn: Simple linear regression analysis shows Y = 0.551 + 0.033 X, indicating a positive regression direction. This means there is a positive and increasing effect between green accounting (X) and greenhouse gas emissions (Y) in public companies. The results of the hypothesis test at a significance level of 0.05 can be seen that the calculated T (3.103) > T table (1.968) and p value 0.002 < 0.05, so the hypothesis is accepted explaining that green accounting (X) has a significant effect on greenhouse gases (Y) in public companies**.**

Keywords: Green Accounting, Greenhouse Gases, Public Companies

INTRODUCTION

Companies operating in accordance with Islamic principles tend to integrate the values of Maqasid Shariah, which emphasizes a balance between economic profit and social and environmental responsibility. This encourages the implementation of green accounting, which aligns with efforts to reduce greenhouse gas emissions. Companies listed on the Indonesian Sharia Stock Index (ISSI) or the Jakarta Islamic Index (JII) often have policies that support environmental sustainability, including energy efficiency and emissions reduction. By 2024, there were 671 companies listed on Islamic stocks.

In many countries, including Indonesia, regulations related to green accounting are still voluntary and not yet mandatory standards. The Islamic Stock Index (ISSI) and the Jakarta Islamic Index (JII) do not yet have specific indicators related to environmental sustainability in their accounting standards. This leaves many Islamic-based companies without clear policies related to green accounting (FI, 2020).

Global warming is caused by increased greenhouse gases, air pollution, the greenhouse effect, deforestation, and other factors (Webmaster, 2020). This can lead to extreme climate change. Furthermore, increased industrial activity is also a trigger for global warming. Therefore, companies are expected to develop sustainable technologies and innovations to mitigate global warming. In this regard, green accounting offers a more responsible approach to resource management and environmental impact reduction.(Hardiyansah, M., & Agustini, 2021).

Figure 1.1
Sectors Contributing the Largest Carbon Emissions in Indonesia in 2024

The sectors contributing the most carbon emissions in Indonesia in 2024 were the manufacturing industry, with 340.71 million tons of CO2e, followed by electricity and gas procurement with 297.22 million tons of CO2e, agriculture/forestry/fisheries with 86.5 million tons of CO2e, transportation with 81.08 million tons of CO2e, water/wastewater treatment with 30.84 million tons of CO2e, mining/quarrying with 29.28 million tons of CO2e, and other sectors with 21.6 million tons of CO2e.

Environmental issues directly related to energy production and consumption include air pollution, climate change, water pollution, thermal pollution, and solid waste disposal. Air pollutant emissions from the combustion of fossil fuels are the main cause of urban air pollution (Karen, 2020). The impact of excess greenhouse gases in the atmosphere can trap more heat from the sun, causing an increase in the average global temperature. This warming has led to the melting of polar ice caps, increased sea surface temperatures, and changes in

weather patterns. The long-term impacts of global warming include ecosystem changes, habitat loss, and the potential extinction of vulnerable or endangered species (MENKLHK, 2023).

Research Henri, (2023) indicates that green accounting influences greenhouse gas emissions in public companies. This research is similar to (Meidiyah., 2021), (Zuhrufiyah, D., & Anggraeni, 2019), (Dang & Akkemik, 2023), (Alfianda et al., 2024); (Yesiani et al., 2023); dan (Mawarti & Murwaningsari, 2024) which shows that carbon emissions disclosure has a significant impact.

REVIEW OF LITERATURE

Green Accounting

Green accounting is the process of recognizing, measuring, recording, summarizing, reporting, and disclosing information on objects, transactions, events, or the impacts of a corporation's economic, social, and environmental activities on society and the environment, as well as the corporation itself, in a single, integrated accounting information reporting package to benefit users in assessing and making economic and non-economic decisions (Andreas, 2018). Green accounting, as a new paradigm in accounting, advocates that the accounting process should focus not only on financial transactions to produce financial reports to determine the profit/loss of a corporate entity, but also on social transactions or events (people) and the environment (planet), thus providing information on social and environmental accounting.

In the Qur'an, Surah al-a'raf ayat 31 Allah Subhanahu Wa Ta'ala berfirman;

يٰبَنِيْٓ اٰدَمَ خُذُوْا زِيْنَتَكُمْ عِنْدَ كُلِّ مَسْجِدٍ وَّكُلُوْا وَاشْرَبُوْا وَلَا تُسْرِفُوْٓا اِنَّهٗ لَا يُحِبُّ الْمُسْرِفِيْنَ ۚ

"O children and grandchildren of Adam! Wear your nice clothes every time (entering) the mosque, eat and drink, but do not overdo it. Indeed, Allah does not like people who overdo it." (QS Al-A'raf: 31)

Emphasizes avoiding waste and distributing wealth fairly to those in need (People). Excessive exploitation of natural resources (QS Hud: 85) can lead to disasters such as floods or droughts. This Islamic view aligns with ESG efforts in measuring environmental impacts (Planet) as mentioned in Surah Ar-Rum (30): 41 and Surah Al-Baqarah (2): 267. Profit in business activities is permitted as long as it complies with Islamic rules, including the prohibition against usury and dishonesty (Surah An-Nisa [4]: 29) (Fauzan et al., 2024).

Greenhouse Gas Emissions

GHG emissions are the release of greenhouse gases (GHGs) into the atmosphere in a specific area over a specific period of time. According to Regulation of the Minister of Environment and Forestry of the Republic of Indonesia No. P.73/MENLHK/SETJEN/KUM.1/12/2017 concerning Guidelines for the Implementation and Reporting of the National GHG Inventory, GHGs are gases contained in the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation. According to the United Nations Framework Convention on Climate Change (UNFCCC), there are six main types of GHGs: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), sulfur

hexafluoride (SF6), perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs) (Nadeak & Nasrudin, 2023).

Pada tingkat emisi itu, Indonesia secara signifikan berkontribusi pada upaya global mencegah peningkatan temperatur lebih dari 2°C pada 2050 (KLHK, 2020). Allah Subhanahu Wa Ta'ala berfirman:

وَاِ ذَا الْبِحَا رُ سُجِّرَتْ

"(And when the ocean is ignited) this pronunciation can be read Sujjirat, and Sujirat, meaning ignited so that the ocean becomes fire." (QS. At-Takwir 81: 6)

The Qur'an itself has hinted at the dangers of climate change and global warming, as in the Surah At-Takwir verse 6. In these two suras, there are the words "heated" and "made to overflow" as a sign of the end of the world, which is very similar to the phenomenon of global warming. These two surahs teach us a lesson to always pay attention to the weather and not disturb the balance.

RESEARCH METHOD

This study uses a quantitative approach to measure the relationship between green accounting and greenhouse gas emission reduction in public companies. The population is public companies listed on the Indonesia Stock Exchange (IDX) in the Indonesian Sharia Stock Index (ISSI). The sample is companies that use purposive sampling based on the criteria of companies that have adopted green accounting and submitted data related to greenhouse gas emissions. A total of 528 companies were selected as the population in this study, with observations conducted for 3 years. Thus, the total research data obtained is 300. The data source is secondary data obtained from the Indonesian Stock Exchange, sharia stock companies, and sustainability reporting. The operational definition is exogenous variables (green accounting), endogenous variables (greenhouse gas emissions). The data analysis method in this study is simple linear regression with the SPSS 26 application.

RESULTS AND DISCUSSION

Descriptive Statistical Analysis

Descriptive statistical analysis is used to generally describe the variables being analyzed, such as the average (mean), maximum, minimum, standard deviation, and other values. The statistical results can be seen in the following table:

Table 1
Descriptive Statistical Results

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Green Accounting	300	2.00	5.00	3.9233	.84844
Greenhouse Gases	300	.33	.94	.6785	.15640
Valid N (listwise)	300				

Source: Data processed from SPSS, 2025

From the table above, it can be concluded that:

a) Green accounting shows an average of 3.9233, or 392.3%. The maximum value is 5.00, the lowest value is 2.00, and the standard deviation is 0.8484. These values indicate that the company has good green accounting.
b) Greenhouse gas values show an average of 0.6785, or 67.85%. The maximum value is 0.94, the lowest value is 0.33, and the standard deviation is 0.1564. These values indicate that the company has good greenhouse gas values.

Data Analysis

Validity and Reliability Tests

Validity Tests

To test the validity, the r value must first be determined using the following formula: df = Number of Cases – 2 or 300 – 2 = 298, with a significance level of 0.05%. The value is 0.113. The Correlation section shows that if the calculated r value is greater than the table r value (0.113), the statement is valid. However, if the calculated r value is less than the table r value (0.113), the statement is invalid.

Table 2
Validity Test

Indicator	Variable	R Table (n-2)	R Calculation	Description
GA 1	Green Accounting (X)	0.113	0.881	Valid
GA 2		0.113	0.775	Valid
GA 3		0.113	0.747	Valid
GRK 1	Greenhouse Gas (Y)	0.113	0.969	Valid
GRK 2		0.113	0.957	Valid
GRK 3		0.113	0.945	Valid

Source: Data Processed by Researchers, 2025

The table shows that all statements in the research indicators are valid because the calculated r value is greater than the table r value (0.113).

Reliability Test

Table 3
Reliability Test

Variable	Cronbach's Alpha	Description
Green Accounting (X)	**0.963**	Reliable
Greenhouse Gases (Y)	**0.987**	Reliable

Source: Data Processed by Researchers, 2025

The table shows that a Cronbach's alpha value > 0.7 indicates reliability. The green accounting variable (X) has a Cronbach's alpha value of 0.963 > 0.7. Greenhouse gases (Y) have a Cronbach's alpha value of 0.987 > 0.7, indicating reliability.

Coefficient Determinant ($R2$) Value

Table 4
Coefficient Determinant (R^2)

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.177[a]	.031	.028	.15419	1.790
a. Predictors: (Constant), Green Accounting					

b. Dependent Variable: Greenhouse Gases

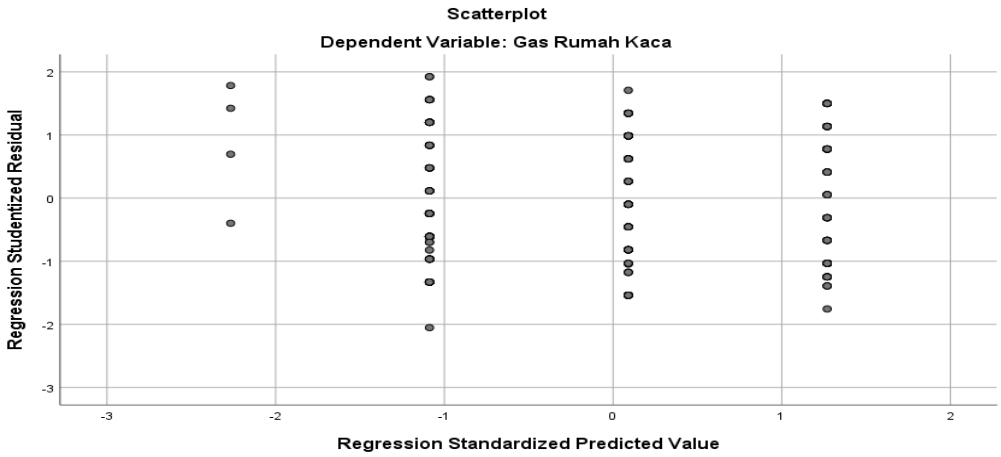
Source: Data processed from SPSS, 2025

The table above shows that the coefficient of determination (R Square/R2) is 0.028, meaning that the effect of green accounting on energy efficiency is 2.8%, with the remaining 97.2% being influenced by other variables.

Classical Assumption Test

1) Heteroscedasticity Test

Figure 1
Heteroscedasticity Test



Based on the figure, it can be seen that there is no heteroscedasticity because there is no clear pattern and the points are spread above and below the number 0 on the Y-axis, thus meeting the heteroscedasticity test.

2) Multicollinearity Test

Table 5
Multicollinearity Test

Independent Variable	Tolerance	VIF	Description
Green Accounting (X)	1.000	1.000	Free from Multicollinearity

Source: Data Processed by Researchers, 2025

Based on the analysis results in the table, the tolerance calculation results indicate that the independent variables have a tolerance value ≥ 0.10 and a VIF ≤ 10, indicating that there is no multicollinearity among the independent variables in the regression model.

Simple Linear Regression Analysis

Simple linear regression analysis was used in this study to prove the hypothesis regarding the influence of green accounting variables on greenhouse gases. The statistical calculations for the simple linear regression analysis used in this study were performed using SPSS version 26, summarized as follows:

Table 6
Simple Linear Regression Analysis

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.551	.042		13.052	.000		
	Green Accounting	**.033**	.011	.177	**3.103**	**.002**	**1.000**	**1.000**
a. Dependent Variable: Greenhouse Gases								

Source: Data Processed by Researchers, 2025

$Y = \alpha + \beta_1 X + e$

Y = 0.551 +0. 033 X

Based on the obtained equation, it can be explained that the effect of green accounting (X) on the endogenous variable of greenhouse gases (Y) in public companies is as follows:

1) α = 0.551, which means that if there is no green accounting (X), the consistent value of greenhouse gases (Y) is 0.551.
2) β = 0.033, which means that for every one-unit increase in the level of green accounting (X), greenhouse gases (Y) will increase by 0.033. Since the value of the regression coefficient is positive (+), it can be concluded that green accounting (X) has a positive effect on greenhouse gases (Y). Therefore, the regression equation is 0.551 + 0.033.

Hypothesis Testing

Table 7
Hypothesis Testing

Independent Variable	T Calculation	T Table	Significant	Description
Green Accounting (X)	3.103	1.968	0.002	Influential

Source: Data Processed by Researchers, 2025

Based on the table above, the calculated t-value for the green accounting variable (X) is 3.103. These calculated t-values are then compared with the t-values from the t-distribution table. With α = 5% and df = n-k-1 = 300-1-1 = 298, the t-value is 1.968. The hypothesis "**green accounting has a significant effect on greenhouse gas emissions in public companies**" is supported. The results of the regression model test for all variables show a calculated t-value of 3.103 > 1.968. This indicates that the hypothesis is accepted, meaning that green accounting (X) has a significant effect on greenhouse gas emissions (Y) in public companies.

Discussion

Stakeholder theory states that organizations must consider the interests and expectations of all stakeholders, not just shareholders. Stakeholders can include employees, customers, suppliers, investors, regulators, and the wider community in which the organization operates. Furthermore, according to legitimacy theory, because a business generates profits for investors, it can send a positive signal to them. This is demonstrated by the company's ability to reduce operating costs, minimize fuel consumption, conserve electricity, and use efficient machinery, thus reducing production costs.

Furthermore, public companies that implement green accounting tend to be more transparent in reporting their environmental impact. This not only increases accountability

but also builds trust among stakeholders, including investors and consumers (Putri, H. D., & Agustin, 2023). By providing clear reports on greenhouse gas emissions, companies can demonstrate their commitment to social responsibility and sustainability, which in turn can enhance the company's image and competitiveness in the market.

Finally, although green accounting offers benefits in reducing greenhouse gas emissions, challenges remain in its implementation. Companies need to invest in technology and training to ensure that green accounting practices are implemented effectively (Haryanto, A., & Sari, 2021). The following are some examples of the impact of green accounting on greenhouse gas emissions in public companies:

A. PT Aneka Tambang Tbk

During the 2021–2023 period, it also maintained its PROPER rating of excellent (5), with a reduction in GHG emissions of 0.772. The company implemented a comprehensive decarbonization strategy through the identification of emission sources, measurement of emission loads, collection of emission factor activity data, and regular reporting of carbon sequestration in reclamation and revegetation areas. The implementation of renewable energy, environmentally friendly fuels, and efficiency in production processes are key pillars of emissions control.

From a green accounting perspective, ANTAM has integrated environmental data into its sustainability planning and performance reporting system. For example, replacing marine fuel oil with electricity supplied by PLN for nickel ore processing at its ferronickel plant has the potential to significantly reduce emissions. The implementation of co-firing at a subsidiary's coal-fired power plant and the use of solar panels for mine road lighting also demonstrate the link between emission recording, energy intensity monitoring, and the implementation of mitigation actions based on environmental accounting data.

This empirical evidence indicates that ANTAM's implementation of green accounting serves not only as a reporting instrument but also guides the planning of measurable emission reduction strategies. The integration of environmental data and operational decisions demonstrates the significant impact of green accounting on reducing GHG emissions, particularly in the mining industry, which has high emission potential (Alamsyah, A., & Sari, 2021).

B. PT Perusahaan Gas Negara Tbk

Maintained a PROPER rating of "very good" (5) for the 2021–2023 period, with a reduction in GHG emissions to 0.555. The implementation of green accounting has been carried out through consistent carbon footprint calculations since 2012, using PERMENLH No. 12 of 2012, the IPCC Guidelines, and the GHG Protocol. The integration of these scientific methods into the environmental accounting system enables the company to accurately identify emission sources, thus making its reduction strategies more effective.

PGN's energy efficiency measures include optimizing energy consumption in operational activities and implementing a Safety, Occupational Health, Security, Environmental Management, and Energy Management System (K3P2LE). Management has approved a total emissions reduction target of >0.09% from BAU by 2023 for the 2020–2024 period. The company's PROPER structure ensures compliance with all regulatory requirements and the measurable implementation of its emissions reduction program.

Empirical findings indicate that the implementation of green accounting has a positive impact on reducing GHG emissions at PGN, as recording the costs and benefits of

environmental programs influences strategic decision-making. This data-driven approach facilitates the achievement of realistic and sustainable emission reduction targets (CDP, 2021).

CONCLUSION

The simple linear regression analysis reveals the equation Y = 0.551 + 0.033X, indicating a positive regression direction. This suggests that green accounting (X) has a positive effect on greenhouse gas emissions (Y), meaning that an increase in the green accounting variable is associated with a rise in greenhouse gas emissions in public companies. Furthermore, the hypothesis testing results show a significance level of 0.05, with the calculated t-value (3.103) exceeding the critical t-value (1.968) and a p-value of 0.002, which is below 0.05. These findings confirm that the green accounting variable has a significant effect on greenhouse gas emissions in public companies. Additionally, the validity test results are deemed valid since the calculated r-value exceeds the table r-value (0.113), while the reliability test shows a Cronbach's alpha value greater than 0.7, indicating that the variables used in the analysis are reliable.

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