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# Analysis of Carbon Emission Volume, Environmental Performance and Financial Performance of PT Kalbe Farma Tbk

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**Abstract**

This study aims to analyze the development of carbon emissions, environmental performance, and financial performance of PT Kalbe Farma Tbk during the 2017–2025 period. The research employs a horizontal analysis method with a quantitative descriptive approach. The data used are secondary data obtained from the company's annual reports, sustainability reports, and the Environmental Performance Rating Program (PROPER) data of PT Kalbe Farma Tbk. The population of this study consists of all financial reports, sustainability reports, and PROPER data of the company, while the sample consists of data from 2017 to 2025. The variables analyzed include carbon emission volume measured by total Scope 1 and Scope 2 emissions, environmental performance measured using PROPER ratings, and financial performance measured by Return on Assets (ROA) and Return on Equity (ROE). The results indicate that PT Kalbe Farma Tbk's carbon emissions fluctuated throughout the study period, with an overall increasing trend. Environmental performance showed a positive trend, as reflected in the improvement and consistency of the company's PROPER ratings. Meanwhile, financial performance, represented by ROA and ROE, experienced fluctuations during the observation period. Overall, the findings suggest that PT Kalbe Farma Tbk has demonstrated a commitment to integrating environmental sustainability practices with business operations while maintaining relatively stable financial performance despite various economic and operational challenges.

**Keywords** Carbon Emissions; Environmental Performance; Financial Performance; PROPER; Return on Assets (ROA); Return on Equity (ROE)



## INTRODUCTION

Climate change and global warming have become major issues that have received global attention in recent decades. One of the main causes of climate change is the increase in greenhouse gas (GHG) emissions, especially carbon dioxide ($CO_2$), resulting from industrial activities, transportation, and the use of fossil fuel-based

energy. This condition has encouraged various countries, including Indonesia, to increase their commitment to reducing carbon emissions through various sustainable development policies and programs. On the other hand, the business world is also required to not only focus on achieving economic profits, but also pay attention to environmental and social aspects as part of the company's responsibility to stakeholders. Transparency in carbon emission disclosure is also increasingly a concern for investors, regulators, and the public as part of the implementation of Environmental, Social, and Governance (ESG) principles. Improved ESG performance and disclosure can help companies improve the quality of accounting information and support the creation of more quality and sustainable companies. Wan, G., & Li, C. (2025).

As demands for sustainable business practices increase, companies are also being urged to be more transparent in disclosing environmental information through sustainability reports. One of the primary concerns is the company's carbon emissions. Disclosure of carbon emissions not only serves as a form of corporate accountability for the environment but also serves as an indicator for investors and stakeholders in assessing the company's commitment to Environmental, Social, and Governance (ESG) principles. The better a company manages its carbon emissions, the greater its opportunity to improve its reputation, operational efficiency, and business competitiveness. Companies that achieve good environmental ratings tend to have a higher level of transparency in disclosing environmental information, including carbon emissions, because they have stable environmental management policies and practices (Fazrin & Basit, 2025).

Companies that effectively manage their environmental impacts generally gain greater legitimacy and trust. One indicator used to assess the quality of corporate environmental management in Indonesia is the Corporate Performance Rating Program in Environmental Management (PROPER), organized by the Ministry of Environment and Forestry (KLHK). The PROPER rating reflects a company's ability to manage environmental aspects, from pollution control and energy efficiency to resource conservation and emission reduction to community empowerment. Therefore, environmental performance is a crucial factor influencing the long-term sustainability of a company's operations.

In addition to environmental aspects, financial performance is also an important indicator in assessing a company's success. Financial performance reflects a company's ability to generate profits and manage its resources effectively. In this study, financial performance is measured using Return on Assets (ROA) and Return

on Equity (ROE). Return on Assets (ROA) is a ratio used to measure a company's ability to generate profits by utilizing all its assets, thus reflecting the effectiveness of asset use in operational activities. Meanwhile, Return on Equity (ROE) indicates the rate of return obtained by shareholders on capital invested in the company, thus reflecting the company's ability to provide returns to capital owners (Brigham & Houston, 2019). The results of research by Senna & de Araujo Moxotó (2025) show a positive relationship between $CO_2$ emissions and the financial performance of companies listed on the Carbon Efficient Index (ICO2). This means that companies with higher carbon emissions tend to have better financial performance, as seen in indicators such as Earnings per Share (EPS), Return on Equity (ROE), and Return on Assets (ROA). Furthermore, Almonares et al. (2026) also revealed that carbon volume impacts a company's Return on Assets (ROA), but not its value. This indicates that managers tend to prioritize short-term profitability over long-term sustainability.

Environmental performance is linked to a company's financial performance; companies with environmentally friendly practices tend to have better financial performance. Kaakeh & Gokmenoglu (2022) explain that the impact of environmental performance on financial performance remained evident even during the COVID-19 crisis, indicating that companies with environmental commitments are more resilient to economic shocks. This indicates that sustainability practices are not only beneficial under normal conditions but can also increase the resilience and stability of a company's financial performance during crises. Research by Liu et al. (2023) found that carbon emission policies in China affect the financial performance of energy-intensive companies. This occurs because these policies encourage companies to increase cost efficiency, engage in carbon trading, and optimize asset utilization. Thus, environmental regulations not only serve as emission limits but can also drive improved financial performance through adjustments to operational strategies.

According to research conducted by Trimuliani and Febrianto (2023), carbon emission disclosure affects company value. The results of this study indicate that information regarding carbon emissions can be a positive signal for investors in determining investment decisions. Research by Lee et al. (2015) found that carbon emissions consistently reduce company value, indicating that companies with high carbon emission levels tend to obtain lower market valuations because they are perceived to have greater environmental risks. However, other studies show different results where the results of the study indicate a negative relationship between company carbon emissions and financial performance (Bharali & Maji, 2024; Bedi & Singh, 2024). Some of these studies found different results regarding the

relationship between environmental aspects and company financial performance, so further study is still needed.

PT Kalbe Farma Tbk is one of the largest pharmaceutical companies in Indonesia and consistently publishes annual reports and sustainability reports as a form of transparency to stakeholders. As a company with large-scale production activities, Kalbe Farma generates carbon emissions from energy use, production processes, and distribution activities. Furthermore, PT Kalbe Farma Tbk has consistently published sustainability reports since 2017, demonstrating its commitment to environmental awareness and responsibility.

## METHODS

This study aims to analyze the development of carbon emission volume, environmental performance, and financial performance at PT Kalbe Farma Tbk during the period 2017–2025. The study uses secondary data obtained from annual reports, sustainability reports, and the Corporate Performance Rating Program in Environmental Management (PROPER) report of PT Kalbe Farma Tbk. The analytical method used in this study is horizontal analysis. Horizontal analysis is an analytical method carried out by comparing data or financial reports from several periods to determine developments, changes, and trends that occur over time (Kasmir, 2019). Through this method, researchers can identify trends in carbon emission volume, environmental performance, and the company's financial performance during the observation period.

The population in this study is all data related to the volume of carbon emissions, environmental performance, and financial performance of PT Kalbe Farma Tbk. The research sample consists of all data contained in the financial statements (annual reports) and sustainability reports (sustainability reports) of PT Kalbe Farma Tbk for the period 2017-2025. The selection of this period is based on the fact that PT Kalbe Farma Tbk began publishing sustainability reports separately since 2017. Therefore, all data available in the sustainability reports and financial statements for the period 2017–2025 are used as research samples.

## FINDINGSAND DISCUSSION (Palatino Linotype 12, Space 1.15, Justify)

### Carbon Emission Volume

During the 2017–2018 period, PT Kalbe Farma Tbk began strengthening the implementation of sustainability activities through various energy efficiency and emission reduction programs. At this stage, the company's main challenges were the lack of an integrated energy management system and the limited use of renewable

energy. Therefore, the company focused on replacing more efficient equipment, such as replacing electric heaters with steam heaters, using inverters on chiller pumps, replacing conventional lamps with LEDs, and utilizing solar power for lighting and the operation of the Wastewater Treatment Plant (WWTP). In addition, Kalbe carried out emission control by improving boiler combustion and optimizing product distribution. These efforts succeeded in reducing total emissions from 79,662.27 tons of $CO_2$eq in 2017 to 77,665.50 tons of $CO_2$eq in 2018, while simultaneously encouraging an increase in the PROPER rating from Blue to Green.

In the 2019–2020 period, Kalbe faced increasingly complex sustainability challenges, particularly related to the high operational energy requirements and the company's lengthy supply chain. In 2020, the Covid-19 pandemic also posed an external challenge that impacted operational activities and sustainability management. To address these conditions, the company enhanced its energy efficiency program through condition-based maintenance on chillers, compressor system synchronization, air conditioning optimization, and the development of more energy-efficient semi-robotic technology. In terms of renewable energy, Kalbe expanded the use of solar panels in production facilities and began utilizing micro-hydro power in waste treatment facilities. Emission control programs were also strengthened through vehicle emission testing, boiler management, and the use of environmentally friendly refrigerants. Although total emissions increased to 82,317.29 tons of $CO_2$eq in 2019, they decreased again to 77,959.24 tons of $CO_2$eq in 2020, indicating that various energy efficiency strategies are beginning to yield positive results.

In 2021, Kalbe began implementing a more systematic approach to energy and environmental management. Key steps include the formation of an Energy Task Force and the implementation of the ISO 50001 Energy Management System at several production facilities. The company also expanded its renewable energy utilization by installing solar power plants (PLTS) at five factories and two warehouses with a capacity of 4,902 kWp, reducing emissions by approximately 3,941 tons of $CO_2$ per year. Energy savings efforts include chiller optimization, production room temperature adjustments, compressor synchronization, and boiler and HVAC system efficiency. However, increased production activity following the pandemic caused total emissions to rise significantly to 101,541.65 tons of $CO_2$eq. Despite this, the company was able to maintain its Green PROPER rating thanks to its consistent implementation of various environmental programs.

2022 marked the beginning of strengthening its sustainability strategy through the launch of Kalbe's Sustainability Roadmap, which focuses on five key initiatives: optimizing the renewable energy mix, minimizing the carbon footprint in the distribution chain, utilizing recycled materials, implementing green manufacturing, and strengthening the sustainable business ecosystem. The company also expanded its solar power plant (PLTS) capacity to approximately 6,156 kWp and operated a microhydro power plant (PLTMH) capable of generating electricity from wastewater. Although various energy efficiency and renewable energy programs succeeded in reducing emissions by approximately 5,344 tons of $CO_2$ per year, the company's total emissions still increased to 122,326.79 tons of $CO_2$eq, the highest figure during the study period. This indicates that growth in operational and production activities remains the main factor driving the increase in the company's carbon emissions.

In 2023, the implementation of the Sustainability Roadmap began to show more tangible results. Kalbe expanded the use of solar power plants to a capacity of 6.5 MWp, planted 5,522 mangrove trees in the Cilamaya coastal area, developed a circular economy through the use of recycled materials, and strengthened its green manufacturing program. Furthermore, the company began preparing Scope 3 emission calculations as part of its strategy towards Net Zero Emissions. Various energy saving efforts were implemented through HVAC optimization, cooling towers, inverter compressors, and more efficient cooling systems. As a result, total emissions were successfully reduced to 94,015.17 tons $CO_2$eq and the company received the PROPER Gold award, the highest award in environmental management. This achievement demonstrates that the implemented energy efficiency and emission reduction strategies have had a tangible impact on improving the company's environmental performance.

In the 2024–2025 period, Kalbe further strengthened its commitment to sustainability by developing a roadmap to Net Zero Emissions, expanding the use of electric vehicles for product distribution, and starting to calculate Scope 3 emissions that include employee travel, business trips, and logistics activities. The capacity of the solar power plant increased to approximately 8.5 MWp and was able to reduce emissions by more than 5,700 tons of $CO_2$ per year. The company also implemented various energy efficiency innovations such as smart utility systems, modernizing high-tech chillers and boilers, and optimizing energy use in production facilities. On the other hand, sustainability challenges are increasingly complex due to increasing global business activities, high energy needs, and demands for more sustainable supply chain management. Although total emissions increased again to 102,865.49

tons of $CO_2$eq in 2024 and remained relatively stable at 102,521.91 tons of $CO_2$eq in 2025, the company maintained its Green PROPER rating. This condition shows that various energy efficiency strategies, utilization of renewable energy, control of greenhouse gas emissions, and implementation of the Sustainability Roadmap have succeeded in restraining the rate of increase in emissions while maintaining the quality of the company's environmental performance at a good level.

**Environmental Performance**

PT Kalbe Farma Tbk's environmental performance during the 2017–2025 period shows a continuously improving trend, as reflected in the increasing and consistent PROPER rating. In 2017, the company received a Blue PROPER rating, indicating that environmental management has met all government-set requirements and conditions. During this period, the company began strengthening various energy efficiency and emission reduction programs through the use of more energy-efficient equipment, the use of solar power for facility lighting, the use of LED lights, and the optimization of utility systems in the factory. These efforts laid the foundation for improving environmental performance in the following years.

In 2018, Kalbe successfully upgraded its PROPER rating to Green and maintained it consistently until 2022. The Green rating indicates that the company not only meets environmental regulatory requirements, but also implements various innovations and environmental management programs that exceed government-mandated standards. This success was supported by a 7.24% reduction in carbon emissions compared to 2017, a 4.96% reduction in energy consumption, increased production process efficiency, improvements in boiler emission quality, and the development of renewable energy through the use of solar panels. During this period, Kalbe also began strengthening its environmental management system through controlling greenhouse gas emissions, managing waste, increasing energy efficiency, and conducting regular environmental reporting to relevant agencies.

The consistent achievement of the Green PROPER rating from 2019–2022 demonstrates that the company's environmental management system is increasingly integrated with its business strategy. Various programs supporting this achievement include the formation of an Energy Task Force, the implementation of the ISO 50001 Energy Management System, the development of a Sustainability Roadmap, the implementation of green manufacturing, the use of recycled materials, the development of an electricity-based distribution fleet, and the expansion of renewable energy utilization through solar power plants (PLTS) and microhydro power plants (PLTMH). Furthermore, the company actively controls emissions from

boilers, generators, and operational vehicles through regular emissions testing and improvements in fuel combustion efficiency. Although total carbon emissions have increased in several years due to increased production and distribution activities, the company has been able to maintain its Green PROPER rating due to its success in systematically and sustainably managing its environmental impacts.

Kalbe's environmental performance peaked in 2023 when the company successfully obtained the Gold PROPER, the highest award in the Corporate Performance Rating Assessment Program (PROPER). This rating indicates that the company has implemented excellent, innovative, sustainable environmental management and provided real benefits to the community and the surrounding environment. This achievement was supported by various sustainability programs such as increasing the capacity of solar power plants to 6.5 MWp, planting 5,522 mangrove trees in the Cilamaya coastal area, developing a circular economy through the use of recycled materials, strengthening green manufacturing, and developing a roadmap towards Net Zero Emissions. In 2024 and 2025, Kalbe again obtained the Green PROPER, but continued to demonstrate a strong commitment to environmental management through expanding the capacity of solar power plants to more than 8 MWp, using electric vehicles for product distribution, measuring Scope 3 emissions that include employee travel and logistics, and implementing Supplier Health, Safety, Security, Environment and Social Assessment (SHSSESA) for business partners. Overall, the consistent achievement of the Green PROPER and the Gold PROPER in 2023 demonstrate that PT Kalbe Farma Tbk has succeeded in developing an effective, sustainable environmental management system that aligns with ESG principles and national sustainable development targets.

**Financial performance**

**Return on Assets (ROA)**

During the 2017–2020 period, the ROA value of PT Kalbe Farma Tbk experienced a gradual decline from 14.47% in 2017 to 13.54% in 2018, 12.37% in 2019, and 12.11% in 2020. This decline occurred because the growth of the company's total assets was higher than the growth of net profit generated. During this period, Kalbe made various investments to strengthen production capacity, distribution, and business development, resulting in an increase in the value of assets in the form of fixed assets, accounts receivable, inventory, and cash and cash equivalents. The increase in fixed assets from 2017–2020 rose by 17.3%, 17.0%, 22.6%, and 6.4%, mainly derived from the company's investment in the construction and development of production facilities, the purchase of production machinery and equipment, factory utility

installations, distribution facilities, and various operational support assets used to increase production capacity and business efficiency. The highest increase in fixed assets in 2019 was 22.6%, which was used in the construction project for an over-the-counter drug factory in Myanmar, increasing OTC production capacity, and increasing production and distribution capacity, which had an impact on a significant decrease in ROA value in that year.

In addition, there was an increase in accounts receivable consecutively from 2017-2019 by 9.3%, 13.2%, 9.8% which caused the ROA value to decrease, this occurred in line with the increase in credit sales to customers and distributors, while the increase in inventory occurred in 2017 by 6.4% influenced by the company's efforts to maintain the availability of raw materials, goods in process, and finished goods to meet growing market demand. On the other hand, cash and cash equivalents also increased in 2017 by 13.2% as a result of strong operational cash flow and the company's strategy in maintaining liquidity to support investment and working capital needs.

In 2020, total assets increased again despite the company facing the Covid-19 pandemic, driven by a significant 71.3% increase in cash and cash equivalents and continued investment in productive assets. Because asset growth outpaced net profit growth, the company's effectiveness in generating profits from its assets declined relatively, resulting in a decline in ROA during the period. Nevertheless, the average ROA from 2017 to 2020, which was above 12%, indicates that the company was still able to utilize its assets effectively to generate profits.

In 2021 and 2022, the ROA increased from 12.40% to 12.70%. This increase was driven by a 16.5% increase in net profit in 2021 and 6.3% in 2022, a significant increase due to the post-pandemic economic recovery and the increasing demand for health products. Net sales also increased by 13.6% in 2021 and 10.2% in 2022, due to the high demand for health products, nutrition, prescription drugs, vitamins, and health supplements, which was still influenced by public awareness of health after the pandemic. In addition to domestic market growth, the company's improved performance was also supported by growing export sales to various countries that serve as Kalbe's international markets. Furthermore, all of Kalbe's business segments recorded positive growth, particularly the Distribution and Logistics and Health Products segments. Improved operational efficiency, cost control, and optimized asset utilization also contributed to the increase in profitability. As a result, net profit growth was higher than asset growth, thus increasing the company's ability to generate profits from its assets, which is reflected in the increase in ROA.

In 2023, the ROA value dropped sharply to 10.30%, the lowest value during the study period. This decline was primarily due to a decline in the company's net profit of approximately 18.2%. This condition was influenced by rising prices of imported raw materials, rising production costs, rising distribution costs, global inflation, supply chain pressures, and foreign exchange losses due to the weakening rupiah exchange rate against foreign currencies. Furthermore, the gross profit margin decreased by 1.6% to 38.8% due to rising raw material prices as a result of the global supply chain and product mix. The operating profit margin also decreased by 2.5% to 12.1% due to increases in the cost of goods sold, marketing costs, general and administrative costs, and research and development costs, resulting in lower profits generated from the company's assets. It can be concluded that the decline in the ROA value in 2023 indicates that the company's assets have not been able to generate optimal profits due to significant external and internal pressures.

In 2024 and 2025, ROA will increase again to 11.00% and 12.20%, respectively. This increase is driven by improving economic conditions, normalizing raw material prices, increasing operational efficiency, and sales growth across all business segments. The increase in ROA in 2024 is due to a 17.1% increase in net profit driven by a 7.2% increase in sales, and the increase in ROA in 2025 is due to a 13.1% increase in net profit driven by an 8.3% increase in sales. The company has also successfully increased productivity and improved its cost structure, resulting in a rebound in profit margins. Furthermore, product innovation strategies, strengthening distribution, digital transformation, and better working capital management have significantly contributed to the net profit increase. Because profit growth is faster than asset growth, the company's ability to utilize assets to generate profits has improved, resulting in ROA rising again, approaching pre-decline levels in 2023.

Overall, PT Kalbe Farma Tbk's Return on Assets (ROA) performance during the 2017–2025 period showed good conditions despite fluctuations. ROA decreased from 14.47% in 2017 to 12.11% in 2020, primarily due to faster total asset growth compared to net profit growth. However, considering the average ROA value for similar industries of 30% (Kasmir, 2019), PT Kalbe Farma's ROA value for the 2017–2025 period is considered unfavorable because it is still below the industry average.

**Return on Equity (ROE)**

The ROE of PT Kalbe Farma Tbk decreased from 17.30% in 2017 to 16.07% in 2018, 15.01% in 2019, and 14.96% in 2020. This decrease occurred because the company's equity growth was higher than the growth of net income. During this period, equity increased due to the accumulation of retained earnings that continued

to increase each year and a dividend distribution policy that maintained the company's capital structure. On the other hand, net income did increase each year, but not as much as the increase in equity owned. As a result, the rate of return obtained by shareholders on invested capital was lower. The decline in ROE during this period does not entirely indicate poor financial condition, but rather reflects the company's increasing capital base, requiring greater profits to maintain the same rate of return. This decline in ROE value can also be interpreted as a sign of the company's ability to generate net income with the ineffective use of equity or shareholder capital.

In 2021 and 2022, ROE increased from 14.97% to 15.60%. This increase was driven by higher net profit growth compared to the company's equity growth. Profit growth of 16.5% in 2021, driven by a 13.6% increase in sales, and profit growth of 6.3% in 2022, driven by a 10.2% increase in sales. This was due to the increased demand for health, nutrition, and pharmaceutical products following the pandemic, which successfully boosted the company's sales and profits. Furthermore, the company was able to maintain operational efficiency, resulting in increased profitability. Greater profit growth provides higher returns for shareholders, thus increasing the return on capital. Therefore, the increase in ROE during this period indicates that the company is increasingly effective in utilizing shareholder capital to generate profits.

ROE decreased significantly to 12.00% in 2023. This decrease was due to an 18.2% decrease in net profit due to rising raw material prices, rising operating costs, global inflation, supply chain disruptions, and foreign exchange losses. At the same time, the company's total equity continued to increase by approximately 4.6% due to the accumulation of retained earnings. This resulted in a lower return on each rupiah of shareholder capital compared to the previous year. Therefore, the decline in ROE in 2023 reflects the company's declining effectiveness in generating profits from its capital due to external pressures affecting its profitability.

In 2024 and 2025, ROE will increase again to 13.20% and 15.10%, respectively. This increase is driven by the company's increasing net profit as a result of sales growth, cost efficiency, normalization of raw material prices, improved profit margins, and increased operational productivity. The increase in ROE is due to a 17.1% increase in net profit driven by a 7.2% increase in sales, and the increase in ROE in 2025 is due to a 13.1% increase in net profit driven by an 8.3% increase in sales. The company's strategy of expanding the market, strengthening product innovation, and improving distribution effectiveness also contributed to the increase

in profits. Because net profit grows faster than equity growth, the rate of return to shareholders increases. Therefore, the increase in ROE during this period demonstrates the company's success in restoring profitability and increasing the effectiveness of shareholder capital utilization after experiencing a decline in 2023.

Overall, PT Kalbe Farma Tbk's Return on Equity (ROE) performance during the 2017–2025 period showed good conditions despite fluctuations. The ROE value experienced a gradual decline from 17.30% in 2017 to 14.96% in 2020, which was primarily due to the growth of total equity that was greater than the growth of net profit. However, when viewed from the average ROE value of 40% in the industry (Kasmir, 2019), PT Kalbe Farma's ROE value for the 2017–2025 period was considered unfavorable because it was still below the industry average.

## CONCLUSION

Based on the analysis results, the volume of carbon emissions of PT Kalbe Farma Tbk during the 2017–2025 period shows an increasing trend, although it fluctuates in certain years. Total carbon emissions from Scope 1 and Scope 2 increased from 79,662.27 tons of $CO_2$eq in 2017 to 102,521.91 tons of $CO_2$eq in 2025, with the highest emissions occurring in 2022 at 122,326.79 tons of $CO_2$eq. The increase in emissions was mainly influenced by the growth of the company's production and distribution activities. However, the company consistently implements various sustainability strategies through energy efficiency, energy savings, controlling greenhouse gas (GHG) emissions, utilizing renewable energy through solar power plants (PLTS) and micro-hydro power plants (PLTMH), and implementing the Sustainability Roadmap towards Net Zero Emission. These various efforts have succeeded in improving the company's environmental performance, as indicated by the consistent increase in the PROPER rating from Blue in 2017 to Green from 2018 to 2025, even reaching PROPER Gold in 2023. This finding shows that even though the volume of carbon emissions increases with business growth, the company is still able to manage its environmental impact well through various integrated sustainability programs.

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