

Original Article

Evaluating the Impact of ESG Integration on the Financial Performance of Pertamina Geothermal Energy: A Sustainable Growth Perspective

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Abstract: *The idea of Environmental, Social, and Governance (ESG) integration has become a key premise directing the strategies and operations of energy firms globally in response to these complex issues Globally Consistent ESG Reporting. This thesis aims to assess how the incorporation of ESG principles affects Pertamina Geothermal Energy's financial performance through meticulous analysis and extensive research. The analysis includes a thorough evaluation of prior financial performance measures, both before and after ESG integration, and a close look at important criteria, including sales growth, profitability, and return on investment. The author uses business ESG performance to build financial estimates. To achieve the company's promises of expansion and sustainability through increased production, injection, and startup. In addition, it examines the many dimensions of the business, including sustainability policies, community involvement programs, and the improvement of corporate governance. According to the computation of absolute valuation using discounted cash flow, the value of each PGEO share is Rp1.069 if using a 10Yr Bond Rate and Rp1.221 using Green Bond, which is both still undervalued, and the IPO price is Rp1.280,00 (as per May 2024). The results of this thesis promise to shed light on a future course in an era where the energy industry is positioned at a crucial crossroads, combining the demand for dependable energy supplies with the need to reduce environmental consequences. The gap between market pricing and fundamental valuations underscores the importance of thorough evaluation and smart investment decisions that prioritize long-term sustainability and financial health.*

Keywords: *Discounted Cashflow, ESG, Green Bond, Valuation.*

I. INTRODUCTION

Geothermal energy has become a promising option in the search for sustainable energy sources. It is crucial for the shift away from fossil fuels and toward a greener, more sustainable energy matrix since it is one of the most sustainable and ecologically benign energy sources (IRENA, 2021). Pertamina Geothermal Energy, a division of PT Pertamina (Persero), the nation of Indonesia's state-owned energy conglomerate, holds a key role in this situation. Pertamina Geothermal Energy represents the country's dedication to sustainable and responsible energy production by being tasked with exploring and using Indonesia's enormous geothermal potential (Annual Report Pertamina Geothermal Energy, 2023). However, the integration of ESG principles into the core of Pertamina Geothermal Energy's operations is not merely a matter of compliance or public relations. It signifies a major shift in the company's business strategy and highlights its dedication to responsible resource use, community involvement, and effective corporate governance (UNDP, 2021). It means going beyond the conventional maximal profit and short-term advantages paradigm, pushing the firm toward new frontiers, innovations, and opportunities. At the same time, the pathway of ESG integration is paved with challenges and complexities. Pertamina Geothermal Energy finds itself having to balance on thin rope between its financial goals and requirements as a company, and the demands of social responsibility and environmental sustainability entailed by ESG. In the long run, therefore, success can only be lengthy if such equilibrium is achieved. How ESG integration affects financial performance is therefore, of essence to investigate.

The thesis, therefore, embarks on a journey to understand the heart of this issue. It attempts to assess how the integration of ESG principles into its operations affects the financial performance of Pertamina Geothermal Energy with proper analysis and detailed research. This would include a critical examination of the past financial performance measures prior to and after ESG integration and a check for key criteria such as sales growth, profitability, and return on investment. It also scrutinizes various dimensions of ESG integration within the corporation, including sustainability policies, community involvement programs, and improvement in corporate governance. The main objective of this study is to identify the effects and also to provide handy tips. Off the back of best industry practices and real case studies instigated, this thesis has developed the proper strategies and recommendations which Pertamina Geothermal Energy should steer toward on the issues raised to establish a sustainable growth



brand. It underlines that while doing so, financial viability and sustainability commitments are mutually beneficial and conduct the behaviour of quandary between both entities; it does not have to be at the cost of one another.

Beyond Pertamina Geothermal Energy's corporate walls, this study's relevance is felt. The results of this thesis promise to shed light on a future course in an era where the energy industry is positioned at a crucial crossroads, combining the demand for dependable energy supplies with the need to reduce environmental consequences. They provide insightful information to Pertamina Geothermal Energy as well as the larger energy sector, which is juggling the competing demands of economic success and environmental responsibility. This thesis serves as a testament to the potential for ESG integration to spur positive change, fostering a new era where financial growth and environmental responsibility are not seen as competing forces but rather as harmonious components of a better tomorrow as the world community unites in its commitment to a sustainable and prosperous future.

II. LITERATURE REVIEW

A) *Environmental, Social, and Governance (ESG)*

The three sustainability pillars that are essential to a business's long-term performance are referred to as ESG. The three pillars of sustainability include management of the company's environmental impact, management of its social effect, and management of its governance procedures. For instance, during 2021, Li et al. constructed the ESG framework on three pillars:

- Environmental (E): This includes the impact of business operations on the environment in terms of climate change, pollution, and overexploitation of natural resources. Remaining in NDCs, ESG considers how.
- Social (S): This is the pillar looking into a firm in regard to social factors, including labor practices, community, and human rights. A few examples of social elements in the NDCs are the one about the impact of climate policy on local communities and how benefits and costs are to be shared.
- Governance (G): This is the dimension that assesses the way a company is governed, such as by its board structure, CEO compensation, and transparency. In the case of NDC activity, governance would thus imply the institutional frameworks and policies that aid in the realization of climate targets.

Theoretical justification of ESG also exists in relation to NDCs. According to Windyswara, 2018, NDCs are nationally determined targets for the reduction of GHG emissions, which countries submit to the UNFCCC. These contributions are therefore very critical to meet the global goal enshrined in the Paris Agreement to limit warming over pre-industrial levels to well below 2°C and to work down further to 1.5°C above pre-industrial levels.

Indonesia's NDC seeks to achieve a 29% reduction in GHG emissions by 2030 relative to 2005 levels, and this target can be increased to 41% if there is cooperation from developed nations. And more importantly, it has to do with changing the energy balance of Indonesia from fossil fuel-based to renewable-based. This can involve massive investment in technology relevant to renewable energy and related infrastructure.

Carbon credits are a scheme by the Clean Development Mechanism and the International Carbon Reduction and Offset Alliance, which allows rich countries to be able to invest in poor emission-reducing projects in poor countries (Teo, 2024). These credits can then be traded and used to offset emissions in the country investing in them. ESG factors remain vital for the carbon credit market by ensuring the coherence of the projected measures to both environmental and social considerations. The theoretical underpinning inside ESG for NDCs, Indonesian targets, and carbon credits delineates a need for firmly placing environmental, social, and governance factors into the pigeonhole of climate policies. That is to say, and such activities ought not only to be environmentally correct but must also be socially fair and controlled by transparent and responsible institutions. Settings like Indonesia's adoption of ESG allow the state authorities to achieve climate targets by promoting sustainable development and avoiding all possible negative climate consequences in country areas.

ES consummate integration assists organizations like Pertamina Geothermal Energy to reduce risk and lead to opportunities by enhancing the long-term sustainability of firms. Integrating ESG into its activities will enable PGE to minimize its impact on the environment, strengthen its social impact, and enhance better governance procedures. As evidenced, ESG integration facilitates improving the financial performance of a firm. ESG practices have been associated with an increased stock price, reduced capital costs, and better financial performance of the organization. The ESG criteria describe the performance of an organization in adhering to the norms and standards of the environment, social, and governance domains. Examples of standard ESG measures, among many others, are greenhouse gas emission, water use, waste disposal, energy use, carbon footprint, diversity and inclusion, labor practices and human rights, community development and participation, and supply chain management. An important aspect of ESG integration is that of ESG reporting, making information available to stakeholders regarding company performance with respect to sustainability. It may be mandatory or voluntary, and it may show up in different forms, such as an integrated report, annual report, or sustainability report. ESG ratings assess the companies' ESG performance. Actually, some companies provide ESG ratings, including MSCI, Sustainalytics, and Morningstar. The ESG ratings are tools

that allow one to assess a firm's exposure to material ESG risks and how well it is managing those risks. We conclude this chapter with a survey of the ESG literature, tucking in on how ESG integration impacts financial performance. Importance of ESG integration; influence of ESG measurements in financial success.

B) PESTEL Analysis

PESTEL Analysis is part of the strategy identified within which one analyzes the macroenvironmental factors that can have impacts on the operation and performance of any organization. Each letter in PESTEL stands for:

- **Political:** It includes government policies, regulations, political stability, and geopolitical events that might influence the company's operation and strategic choices in conducting business. For Pertamina Geothermal Energy, since the firm is laminated by changing government policies related to renewable energy, emission reduction, or international trade agreements, it will influence the company's sustainable growth and financial performance.
- **Economic:** These are the macroeconomic conditions, economic growth rates, inflation, exchange rates, and fiscal policies (Hitt et al., 2018). Pertamina Geothermal Energy may be influenced by the fluctuations in an economy and also by the directions that consumer expenditure patterns and energy demand take by changes in economic fortunes.
- **Social:** The social factors relate to the trends in society, demographic changes, cultural values, and consumption behavior of consumers. With Pertamina Geothermal Energy operating geographical markets differently, understanding these social factors is crucial for growth and financial success in a sustainable way.
- **Technological:** These are advancements, innovations, or disruptive technologies in the industry in question. Pertamina Geothermal Energy has to monitor and be abreast of the technological changes occurring with regard to the production of geothermal energy, energy storage, and efficiency improvement if it is to remain competitive and post impressive financial results.
- **Environmental:** Some of the environmental factors are ecological trends, climate change concerns, sustainability initiatives, and environmental regulations. As Pertamina Geothermal Energy is involved in the energy business, it has to be concerned with its impact on the environment since it has to keep adhering to standards and regulations that will keep it compliant with the requirements enshrined in environmental laws to ensure continued growth.
- **Legal:** These are the national and international, local laws, regulations, and compliance requirements against which the firm is measured (Johnson et al., 2017). Pertamina Geothermal Energy has to consider issues about land use, energy licensing, emissions standards, and environmental protection, among others, in its quest to create optimal financial results.
- An embedded PESTEL dimension in your theoretical foundation lets you acknowledge the existence and importance of external forces driving the sustainable growth and financial performance of Pertamina Geothermal Energy. These might contextualize the role of ESG integration much better and, therefore, explain how it aligns and reacts as such to the challenges and opportunities put forward by the PESTEL dimensions.

C) Absolute Valuation Considering ESG Factor

The impact of ESG integration on financial performance must necessarily be premised on an understanding of Environmental, Social, and Governance criteria. The framework, central to sustainable development, investments, and business practice, consists of three primary dimensions: Environmental, Social, and Governance—the trio is explained lucidly here for further reference. It is, therefore, an important consideration that long-term financial decisions and related investment decisions are considered with serious attention paid to these ESG factors.

Regarding the investment criteria, ESG standards are parameters by which a socially responsible investor can measure potential investments, as noted in 'What Is ESG Investing? – Forbes Advisor, 2023). Organizations around the world, such as Sustainalytics, Sustainable Fitch and MSCI, do this with 'standardized methods to measure ESG risks, which then produce ratings that tell how DCF should be, as per the accounts of Acwi, 2023. Notably, companies exhibiting transparency and commendable ESG performance attain elevated ratings, enhancing their accessibility to funding avenues.

After being the first country in ASEAN to issue an SDG-linked Sukuk in September 2021, the group has been evidencing its commitment to the attainment and institutionalization of sustainable financing mechanisms (ESG in Indonesia: Access to Finance, Oxford Business Group, 2021). The evolving investment landscape, as delineated in Bloomberg 2022, underscores a predilection towards renewable and clean energy, representing 39% of total preferences, reflecting fund managers' inclination towards sectors promising optimal returns on investment.

The interplay between ESG-funded debt's cost and the Weighted Average Cost of Capital (WACC) remains pivotal, shaping the firm's valuation trajectory (Rahat & Nguyen, 2024). This intricate relationship further underscores the emergence of ESG-influenced WACC, encompassing diverse financing options and environmental stewardship initiatives, including carbon trading mechanisms aimed at achieving net-zero emissions. It is in light of this fact that the present thesis critically evaluates the financial performance of Pertamina Geothermal Energy with respect to an ESG integration perspective in an attempt to shed some light on its implications in the broader context of sustainable growth.

D) Sustainable Growth Theory

The theory of sustainable growth is that long-term prosperity and success are mostly based on the ability to grow a firm responsibly and sustainably. It became prominent with the introduction of the "Triple Bottom Line" (TBL) concept developed by John Elkington in the early 1990s. The TBL framework is based on three dimensions: economic—profit, environmental—planet, and social—people.

- **Holistic Approach:** The theory of sustainable growth is holistic in its approach to success in business. It says that while financial profits are a necessary condition, they are not enough to sustain the business in the long run. It postulates that sustainable growth has to be viewed from three perspectives: environmental and social, alongside financial gains.
- **Environmental Responsibility:** It involves what the organization can do to minimize the harming to the environment as much as possible. This might include reduced carbon emissions, resource conservation, and environmental-friendly activities. In Pertamina Geothermal Energy, growth that is sustainable could bear the meaning of lightening the environmental impact of geothermal generation.
- **Social Responsibility:** Other than environmental influences, the growth that the sustainable growth theory stresses is supposed to have positive contributions towards the social aspects, which Elkington refers to as the third bottom line. This hole would include the good treatment of its employees, the community, and social welfare. In the context of Pertamina Geothermal Energy, it would be related to community involvement, generating employment opportunities, and so on, in terms of social development activities.
- **Long-Term Perspective:** It is considered pathological in the long run by the sustainable growth theory if firms pursue short-term profit at the cost of environmental and social factors. It encourages firms to consider the long-term consequences of options and make sure that they are aligned with the broader goals of sustainability and responsible business practices.
- **Stakeholder Engagement:** Guided by Stakeholder Theory, this view recognizes that stakeholders such as employees, customers, communities, and investors have stakeholder claims against the corporation's activities, thus calling for active engagement between them and the firm for the understanding of their issues and aspirations.
- **Mitigation of Risk:** Actually, sustainable growth is equated to risk management, too. In other words, companies that are proactive in identifying and mitigating environmental and social risks are better placed to negotiate challenges and uncertainties; hence, their financial shocks are reduced.
- **Reputation and Brand Value:** An organization embracing sustainability and responsible practices can be aligned with better reputation and brand value. Sustainability can result in a good reputation, which may capture socially mindful investors, customers, and partners.

Against this backdrop, if the company adopts the Sustainable Growth Theory in the context of Pertamina Geothermal Energy, it would mean the performance viewed in financial terms cannot be considered in isolation; rather, as part of a greater strategy concerning environment, social impact, and resilience in the long term. Pertamina Geothermal Energy may achieve sustainable growth by incorporating ESG aspects into its decision-making processes, benefiting not just its bottom line but also the environment, society, and long-term viability. Emphasizing ESG principles guarantees that the company addresses significant environmental and social challenges while improving its corporate governance processes. This complete strategy not only strengthens PGEO's reputation and stakeholder confidence but also promotes innovation and operational efficiency.

E) Methodology

The author will utilize a combination of strategies to investigate data for PT Pertamina Geothermal Energy Tbk in order to see how ESG Integration affects PT's financial performance with two valuation outputs. First, past financial data from 2019 to 2023 that is made public on the Indonesia Stock Exchange (IDX) will serve as the foundation for future projections. The internal financial health will then be assessed using financial ratio analysis. Porter's Five Forces will be utilized to examine external factors in order to better comprehend the overall context. After that, financial estimates will be created, and the valuation will be determined.

The Porter's Five Forces will help in visualizing the current economic scenario and give an idea of how to act in such a situation to see the result of macroeconomics. When evaluating external influences, Porter's Five Forces are highly helpful. By comprehending the current situation, a corporation may more easily evaluate its momentum and steer in the economic direction rather than struggling against the headwind.

In a scholarly context, asset valuation is generally approached through three distinct methodologies. Firstly, the Discounted Cash Flow (DCF) valuation method establishes a correlation between the intrinsic value of an asset and the present value (PV) of its anticipated future cash flows. Secondly, the Relative Valuation technique assesses an asset's worth by juxtaposing its pricing metrics against those of comparable assets, employing standardized indicators such as earnings, cash flows, book value, or sales. Lastly, the Contingent Claim Valuation strategy employs sophisticated option pricing models to

determine the intrinsic value of assets characterized by option-like attributes, as expounded by (Damodaran, 2015).

There are several steps to calculate the intrinsic value of a company:

1. Gather historical data. This data will be used to project future growth and capital budgeting needs.
2. Determine financing sources and amounts. This involves using the weighted average cost of capital (WACC).

$$WACC = \frac{E}{V} \times k_e + \frac{D}{V} \times k_d(1 - T_c) \dots (1)$$

Where:

E = Equity Value

D = Debt Value

V = E+D

k_e = Cost of Equity

k_d = Cost of Debt

The discrepancy in discount rates for FCFE and FCFF emanates from varying emergent risks. The Weighted Average Cost of Capital (WACC) embodies the anticipated average future cost, calculated by weighting specific capital costs based on their capital structure proportions, as delineated by Gitman & Zutter (2012). Equity cost elucidates stakeholder anticipations, often ascertained through the Capital Asset Pricing Model (CAPM) as articulated by (Damodaran, 2015).

$$k_e = R_f + \beta(R_m - R_f) \dots (2)$$

Where:

R_f = Risk-Free Rate

R_m = Market Risk Premium

β = Beta

The anticipated return on investments with inherent risk is gauged in relation to the risk-free rate, augmented by an anticipated risk premium. The risk-free rate (R_f) is typically anchored to a ten-year government bond yield. Within the framework of the Capital Asset Pricing Model (CAPM), an investment's beta quantifies the risk it contributes to a broader market portfolio, as articulated by (Damodaran, 2015). For entities with an established market presence spanning three years or more, the beta can be sourced from PEFINDO beta data. However, in the absence of pertinent historical data for PGEO, the beta is approximated by referencing comparable firms within the same industry. Utilizing betas from analogous business entities, we employ a prescribed methodology to estimate PGEO's unlevered beta, as delineated by Damodaran (2015).

$$\beta_{unlevered} = \frac{\beta_{comparable \text{ firm}}}{\left[1 + (1 - t_c) \times \left[\left(\frac{D}{E} \right)_{comparable \text{ firm}} \right] \right]} \dots (3)$$

$$\beta_{unlevered} = \beta_{unlevered} \times \left[1 + (1 - t_c) \times \frac{D}{E} \right] \dots (4)$$

3. Calculate cash flow. This is done using the discounted cash flow (DCF) method.

$$DCF = \sum \frac{FCF_t}{(1 + WACC)^t} \dots (5)$$

Where:

FCF_t = Free Cash Flow in Period t

4. Determine the weighted average cost of capital and terminal value. The WACC is a measure of a company's overall cost of capital, while the terminal value is the estimated value of the company at the end of the DCF analysis period. FCFF and FCFE facilitate firm valuation through DCF methodologies.

$$Value_{FCFE} = \sum_{t=1}^{t=n} \frac{FCFE_t}{(1 + k_e)^t} + \frac{Terminal \ Value_{FCFE \ n}}{(1 + k_e)^n} \dots (6)$$

$$Terminal Value_{FCFE\ t} = \frac{FCFE_{t+1}}{k_e - g} \dots (7)$$

Where:

- n = Life of Asset
 FCFE_t = Free Cash Flow to Equity in Period t
 K_e = Cost of Equity
 g = Stable Growth Rate

$$Value_{FCFE} = \sum_{t=1}^{t=n} \frac{FCFE_t}{(1 + WACC)^t} + \frac{Terminal Value_{FCFE\ n}}{(1 + WACC)^n} \dots (8)$$

$$Terminal Value_{FCFE\ t} = \frac{FCFE_{t+1}}{WACC - g} \dots (9)$$

Where:

- n = Life of Asset
 FCFF_t = Free Cash Flow to Firm in Period t
 WACC = Weighted Average Cost of Capital
 g = Stable Growth Rate

5. In this respect, the DCF approach is applied for green bond valuation. The green bond extracted from the sustainability report of Pertamina Geothermal Energy yielded 5.15%. With regard to cost estimation, it is based on proposed cash flows estimated from the bond's coupon payment, coupled with its principal repayment at maturity. Further, the discount rate is obtained by using the yield to maturity of a 10-year government bond, which proxies for the risk-free rate.
6. The 10-year government bond value is also estimated with a DCF approach. Cash flows are estimated using coupon payments on the bond and its principal repayment at maturity. The discount rate is derived from the yield to maturity of the 10-year government bond, which is assumed to be a proxy for the risk-free rate.

$$10Yr\ Gov.\ Bond\ Value = \sum_{t=1}^{t=n} \frac{Coupon\ Repayment_t}{(1 + r)^t} + \frac{Principal\ Repayment}{(1 + r)^n} \dots (10)$$

Where:

- Coupon Repayment_t = Coupon Repayment at period t
 r = Discount rate (yield to maturity)
 n = Number of periods until maturity

7. The ESG factors incorporate the impact of a green bond on the future financials of the firm. The valuation is adjusted for the probable benefits accruable from this green bond, such as increased investor confidence and improved reputation. We are then helped in establishing the increment in the business valuation by comparing the green bond with the 10-year government bond. This comparison indicates how ESG integration can help improve the financial KPIs and value of the company through green bonds.
8. Value per share: This will be arrived at by taking the intrinsic value of the company calculated in 7 above and dividing it by the outstanding shares.

$$Value\ per\ share = \frac{Intrinsic\ Value}{Outstanding\ Shares} \dots (11)$$

III. RESULTS AND DISCUSSION

A) PESTEL Analysis

To undertake Business Environment Analysis, the author employs the PESTEL framework, which categorizes and evaluates a critical set of external elements (political, environmental, sociocultural, technological, economic, and legal). PESTEL analysis can help us identify threats and opportunities for the organization PESTEL analysis can help us identify threats and opportunities for the organization (Casañ et al., 2021).

a. Political

The Indonesian government is heavily dedicated to renewable energy, in line with worldwide efforts to prevent climate change. The government has implemented steps to promote renewable energy adoption, such as legal frameworks, financial incentives, and project facilitation (Agarwal et al., 2024). This regulatory assistance extends to encouraging Environmental,

Social, and Governance (ESG) practices, which can help Pertamina Geothermal Energy (PGEO) integrate ESG concepts successfully. Indonesia's government has already targeted that the energy supply mix will be 23% from renewable energy in 2025 (*Diseminasi RUPTL 2021-2030*, 2021). The government mentioned that the critical points of the target are geothermal power and hydropower plants.

b. Economic

The growing global and domestic demand for renewable energy creates significant prospects for Pertamina Geothermal Energy (PGE). Indonesia's renewable energy industry is expanding due to government support and private sector investment in solar, wind, and other renewable sources (Market Research Company - Mordor Intelligence, n.d.). Economic incentives for green energy projects, such as subsidies and tax breaks, boost profitability and stimulate market expansion. According to Research & Markets, the worldwide renewable energy market is predicted to develop at a CAGR of 3.55% until 2025, driven by falling expenditures and advancements in storage and smart grid technologies.

c. Sociocultural

Due to sociocultural factors constantly differing across groups, managers need to closely monitor such trends and consider the implications for firm strategy (Casañ et al., 2021). Positive opinion in new and renewable energy is already proven by the COP28 agreement (COP28 The Glasgow Climate Pact, 2021).

d. Technological

Regarding New and Renewable Energy (NRE), PGEO should be concerned about numerous NRE producers. According to the Ministry of Energy and Mineral Resources (MEMR), Indonesia has various NRE choices. In terms of capacity addition, hydropower and geothermal are still preferable to PLN due to their dispatchable nature and suitability as base load generators. Although according to the Indonesia Energy Transition Outlook (2022), in terms of capacity addition, hydroelectric and geothermal power plants are still preferable to PLN due to their dispatchable nature and suitability as base load generators, PGEO must remain wary of several New and Renewable Energy (NRE) producers.

e. Environmental

Ecological considerations encompass a wide range of environmental challenges, including the natural environment, global warming, and sustainable economic growth. Organizations and the natural environment exist in an interdependent relationship. There is a factor that the author regards as an ecological issue.

f. Legal

Legal considerations include the official consequences of political processes, such as laws, mandates, rules, and court rulings, which can have a direct impact on a company's profit potential (Casañ et al., 2021).

- a. Presidential Regulation No.4 of 2016 about electricity infrastructure should prioritize utilizing new and renewable energy,
- b. Presidential Regulation No. 112 of 2022 about accelerating the development of renewable energy for the provision of electricity,
- c. Constitution No. 30 of 2009 about electricity regulation,
- d. Constitution No. 21 of 2017 about geothermal regulation,
- e. Government Regulation No. 14 of 2012 and No. 23 of 2014 about electricity supply business,
- f. Government Regulation No.7 of 2017 about geothermal utilization,
- g. Government Regulation No. 25 of 2021 about energy and mineral resources mining activities,
- h. Ministry of Energy and Mineral Resources Regulation No.33 of 2018 about geothermal data and information management and regulation,
- i. Ministry of Energy and Mineral Resources Regulation No. 37 of 2017 about geothermal sites,
- j. Ministry of Finance Decision No. 90/PMK.02/2017 about government taxes.

B) Porter Five Forces Analysis

Five key competitive forces or called Porter's model that managers must consider when analyzing the industry environment and creating a competitive strategy. Those are the threat of entry, the power of suppliers, the power of buyers, the threat of substitutes, and the rivalry between existing competitors (Grundy, 2006).

a. Threat of Entry - High

Several significant reasons contribute to the geothermal energy sector's relatively high entrance barriers. To begin, significant capital investment is required for initial exploration, drilling, and plant construction. Geothermal power projects necessitate enormous investment, especially during the exploratory and drilling stages, which are fraught with uncertainty and danger. The unpredictability of subsurface exploration requires investors to commit significant amounts with no assurance of success, as the potential of geothermal resources can only be proved by costly drilling techniques. Technological

skills are also critical to the effective development and operation of geothermal energy plants. Specialized expertise in geology, drilling, and geothermal technology is necessary, limiting the number of prospective new entrants who can effectively compete in this market. Finally, geothermal projects require permission from regulatory bodies and environmental licenses. Most geothermal resources are found in hilly areas; access is usually a problem, and it may have to navigate relevant legal systems to obtain licenses, especially when resources cross into forested and protected places.

However, renewable energy lives on in Indonesia due to government incentives and supporting policies. Moreover, the Indonesian government has shown its commitment to promoting the diffusion of renewable energy by using all approaches, from legal frameworks to financial incentives and help, which reaches specific projects. Those are policies that would potentially shed the financial and legal barriers for new entrants, increasing competition against Pertamina Geothermal Energy.

b. The Power of Suppliers - Moderate

Supplier power within the geothermal business will be moderate. PGEO depends upon a few specialized vendors of equipment and technology required for drilling and running the plant operations. Vendors may have more bargaining leverage because there are fewer vendors for these high-tech components. However, PGEO's established partnerships and large-scale operations may limit its authority to some extent.

c. The Power of Buyers - High

Buyer power ranges from moderate to high due to a variety of reasons. First, purchasers can convert to alternative renewable energy sources such as solar or wind, increasing their negotiating power. Given the availability of these options, PGEO must remain competitive in terms of pricing and efficiency in order to retain consumers.

d. The Threat of Substitute - High

Geothermal power plant's final product is electricity, which offers a wide range of potential alternatives, from traditional fossil fuels to various renewable energy sources. The availability and developments of solar, wind, and hydropower, together with breakthroughs in battery storage and smart grid technology, pose a substantial threat to geothermal energy. However, geothermal energy remains attractive because it generates consistent and predictable power, as opposed to solar, wind, and water power plants, which rely on intermittent resources. This dependability helps to reduce the threat posed by these alternatives.

e. The Rivalry Among Existing Competitors - Moderate

More competitors enter the market as a result of government backing and subsidies for renewable energy projects, which lower entry barriers. The possible flood of new competitors may put more pressure on the market. Competition is also expected to intensify due to the expanding renewable energy sector, which is being driven by government targets for renewable adoption and increased demand. Although Pertamina Geothermal Energy has a competitive advantage due to its established presence and experience, pressure from competitors still exists, particularly as the industry grows. Furthermore, when renewable energy technologies advance—such as solar, wind, and battery storage—alternative energy sources become more competitive, which helps to temper industry rivalry.

C) Valuation

Following the previously discussed research, those conclusions serve as the established business solution's parameters. The answers to the research questions are found in the business solution.

Table 1. Financial Assumption

Assumption		
Revenue Growth	4.49%	Company's Processed Data
Product Price	Calculated	Company's Processed Data
COGS, G&A, Carbon Credit Sales, Foreign exchange gain, Others Income/Expense, Interest Expense	% of Sales	Company's Processed Data
Tax Rate	35%	Company's Processed Data
Projection Duration	5 Years	Company's data with the assumption
Risk-Free Rate	6.65%	10 Years of Government Bond Yield
Risk Premium	7.27%	Damodaran Country Risk Premium
Company Spread	0.80%	BBB Damodaran Company spread
Terminal Growth	3.55%	Market Analysis by Mordor Intelligence

Using the aid of analyst data, a growth rate, and several financial parameters, the author produced a projected balance sheet and income statement. To forecast the income statement, the financial projection starts by determining the proportion of sales. The computation's findings indicate a 4.49% annual growth rate in revenue. The Free Cash Flow to the Firm (FCFF) calculation requires knowledge about this revenue growth rate. The FCFF forecast will include the terminal value at the end of the projection period.

Table 2. Financial Projections

FCFF Projections	2024F	2025F	2026F	2027F	2028F
Net Sales	423,548	441,541	460,299	479,853	500,238
COGS	(218,237)	(227,508)	(237,173)	(247,249)	(257,752)
Gross Profit	205,311	214,033	223,125	232,604	242,486
G&A Expenses	(5,943)	(6,195)	(6,458)	(6,733)	(7,019)
Carbon credit sales	2,363	2,464	2,568	2,678	2,791
Foreign exchange gain, net	6,243	6,508	6,784	7,073	7,373
Other Income	(23,417)	(24,412)	(25,449)	(26,530)	(27,657)
FCFF Projections	2024F	2025F	2026F	2027F	2028F
Total Operating Profit/Expense	(20,754)	(21,635)	(22,554)	(23,512)	(24,511)
EBIT	184,557	192,398	200,571	209,092	217,974
Interest Expenses	(20,347)	(21,211)	(22,113)	(23,052)	(24,031)
EBT	164,210	171,186	178,458	186,040	193,943
Tax Rate	35%	35%	35%	35%	35%
Tax Expenses	(57,474)	(59,915)	(62,460)	(65,114)	(67,880)
Net Profit (Earning After Tax)	106,737	111,271	115,998	120,926	126,063
Capital Expenditure	56,430.56	58,827.85	61,326.98	63,932.27	66,648.24
Depreciation and Amortization	106,916.42	111,458.45	116,193.43	121,129.56	126,275.39
Δ Networking Capital	30,471.33	31,970.91	33,544.30	35,195.11	36,927.16
FCFF	126,751.14	131,250.81	135,910.21	140,735.02	145,731.11
Discount Factor	0.89	0.79	0.70	0.63	0.56
Terminal Value	1,708,881.17				

Following the previously discussed research, those conclusions serve as the established business solution's parameters. The answers to the research questions are found in the business solution.

To examine the cost of equity, cost of debt, and Weighted Average Cost of Capital (WACC), we use two different bond rates. The objective is clear: choose the most cost-effective financing source among equity options, such as retained earnings and rights offerings, and debt options, such as conventional or green bonds. The method entails calculating the Cost of Equity using levered beta data from comparable companies (DSSA, KEEN, and POWR), converting to unlevered beta, and obtaining PGEO's individual cost of equity using its Debt-to-Equity Ratio (DER). For the Cost of Debt, we calculate interest expenditure relative to total long-term debt, then adjust for taxes to get the after-tax cost. The WACC is then determined by combining the Cost of Equity and the after-tax Cost of Debt for each bond rate scenario. Option 1 uses the current 10-year bond rate as a baseline for conventional debt, whereas Option 2 investigates the possible reduced cost of debt associated with green bonds, which are preferred for environmentally sustainable projects.

Table 3. Beta

Firm	Pefindo Beta
DSSA	1.497
POWR	0.603
KEEN	0.702
Average leverage beta industry	0.934

Table 4. Weighted Average Cost of Capital (WACC)

	10Yr Bond Rate (Opt 1)	Green Bond (Opt 2)
Cost of Equity	13.44%	11.94%
Cost of Debt	9.52%	8.02%
WACC	12.38%	10.88%

After calculating WACC and FCFF we should calculate terminal value using the last projected FCFF and using terminal growth. This resulted in the terminal value of 1,708,881.16 (in thousand USD) for using a 10-year Bond Rate and 2,057,993.59 (in thousand USD) for using a Green Bond. The present value is calculated using the terminal value and free cash flow to the company. The discount rate used for the calculation is 0.56 and 0.60; the outcome is shown in the table below.

Table 5. Present Value Calculation

PV FCFF	10Yr Bond Rate	Green Bond
2023	-916,235.00	-916,235.00
2024	112,787.38	114,311.11
2025	103,924.81	106,751.78
2026	95,758.64	99,692.34
2027	88,234.15	93,099.74
2028	81,300.91	86,943.11
Total DCF	482,005.89	500,798.09
PV Terminal Value	953,355.79	1,227,797.91

After calculating the present value, we can calculate the value of equity in common stock by dividing the value of equity in common stock and weighted common shares outstanding; the calculation is shown in the table below.

Table 6. Value of Equity per Share Calculation

	10Yr Bond Rate	Green Bond
PV of 5 years FCFF	482,005.89	500,798.09
PV of Terminal Value	953,355.79	1,227,797.91
Enterprise Value	1,435,361.68	1,728,595.99
Cash and Cash Equivalent	677,717.00	677,717.00
Value of the Firm	2,113,078.68	2,406,312.99
Value of Outstanding Debt	53,125.00	53,125.00
Non Controlling Interest	-24.00	-24.00
Preferred Stock	0.00	0.00
Value of Equity in Common Stock	2,059,977.68	2,353,211.99
Weighted Common Shares Outstanding	31,046,142,000	31,046,142,000
Value of Equity per Share	1,069	1,221
Current Price (as May 2024)	1,280	1,280

Based on the calculation result, the firm value is Rp. 1,069.00 for using the 10Yr Bond Rate and Rp. 1,221.00 for using Green Bond. This number is shown after multiplied with Indonesian kurs Rp.16,104.12. That means the PGEO price is overvalued.

IV. CONCLUSION

Pertamina Geothermal Energy Tbk (PGEO) emphasizes the multiple nature of the company's performance, particularly in terms of financial indicators and ESG integration. PGEO has established itself as a major participant in Indonesia's renewable energy sector, and its recent IPO has increased its market presence and dedication to ESG principles. The company's ambitious goal of tripling sales over the next decade demonstrates its growth ambitions and strategic vision. PGEO's adherence to ESG norms has received widespread notice, enhancing its brand and potentially providing a competitive advantage in the market. The company's initiatives in environmental sustainability, social responsibility, and strong corporate governance are not only consistent with worldwide best practices but also reflect growing investor demand for sustainable investments. This devotion is especially significant in an era when ESG factors are more important in investment decisions.

PGEO's achievement of one of Indonesia's finest ESG ratings was a key milestone, which was highlighted during its initial public offering. As investor ESG awareness has grown, the company's top sustainable grade from Fitch has become an important consideration. Furthermore, PGEO's growth story promises to treble revenue within a decade, as stated in its prospectus. However, a thorough examination of PGEO's past financial performance yields critical insights, and despite these positive aspects, a thorough financial analysis suggests that PGEO's market price may not match its true value. The valuation results show that PGEO's share price is overvalued. The firm's valuation is Rp. 1,069.00 using the 10-year bond rate and Rp. 1,221.00 under the Green Bond scenario, both after conversion at Rp. 16,104.12 per USD. This mismatch shows that PGEO's market pricing does not correspond to its intrinsic value.

Furthermore, according to relative valuation, PGEO's stock price is Rp. 1,195.00, with an EPS of Rp. 52,173 and a PER of 19.18. Despite these measures indicating a high market price relative to earnings, PGEO looks to have a higher fundamental

or intrinsic worth than its present market price. As a result, the absolute valuation provides a recommended value that reflects the company's future investment potential.

Nonetheless, PGEO's strong ESG credentials and development prospects make it a fascinating story for long-term investors. The company's strategic ambitions in sustainable energy production, together with its strong ESG framework, set it positioned for future success. Investors who appreciate ESG factors may find PGEO's long-term value proposition appealing, notwithstanding the market's current overvalued.

In conclusion, while PGEO has good ESG credentials and ambitious growth possibilities, potential investors should exercise care. The gap between market pricing and fundamental valuations underscores the importance of thorough evaluation and smart investment decisions that prioritize long-term sustainability and financial health. In other words, while PGEO's market valuation raises certain worries, the company's dedication to ESG principles and sustainable growth remains a strong strength. The company's ability to negotiate the difficulties of financial performance and ESG integration will be critical to achieving its growth objectives and providing value to its stakeholders.

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