

Company Fair Valuation Considering ESG Factor (Case Study: Pt Pertamina Geothermal Energy, Tbk)

Qiva Chandra Mahaputera Meizon Yusmar, Erman Sumirat, and Oktofa Yudha Sudrajad

ABSTRACT

The increments of environmental, social, and governance-based investments have been seen recently by institutions or retail investors. The growth has increased rapidly since 2012. Some research gives a positive correlation between the ESG factor represented by ESG rating and company performance. PT Pertamina Geothermal Energy, Tbk. (PGEO), IPO on 24th February 2023 has outstanding ESG performance. It was audited by Sustainable Fitch and got the highest second rank, 77 out of 100 points. Not only is it exceptional ESG performance, but it also has excellent business performance. PGEO started its journey of geothermal utilization in 1974, upon discovering 70 geothermal areas in Indonesia as a sub-business of PT Pertamina EP. PGEO was established in 2006 to continue the efforts to produce clean and environmentally friendly energy, and as of now, it has contributed 82% of the installed geothermal energy capacity in Indonesia. It has the world's most extensive geothermal installed capacity by December 2021 and promises to expand even more significantly in its prospectus. Investors should consider their value rather than positive sentiment as an investment decision. Then, this study determines whether the PGEO price is undervalued or overvalued considering their project expansion and ESG factor. This study utilizes secondary data from prospectuses, financial statements, annual reports, sustainability reports, company-published documents, and data from IDX.co.id and stockbit.com. The data was gathered and processed to understand the need to expand, analyze its financial performance, and value the company. The author considers company ESG performance to develop financial projections. To fulfill company promises in expansion and stay sustained by adding more production, injection, and startup wells, it needs 1.588.612.527 USD using ESG-based financing. The historical financial performance of PGEO is quite good, but the investor should be careful about its liquidity since the current liability is more significant than its current asset. Based on the calculation of absolute valuation using discounted cash flow, the value of each share of PGEO is Rp12.686,00, which is undervalued, and its IPO price is Rp875,00. Based on relative valuation using PER to its peers and average industry, PGEO's price is overvalued. The PGEO price that pars with the industry average is Rp490,00. The author can determine the fundamental value of PGEO.

Keywords: Discounted cash flow, ESG, geothermal, relative valuation, stock valuation.

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Q. C. M. M. Yusmar*

School of Business Management, Bandung
Institute of Technology, Indonesia.
(e-mail: qiva_chandra@sbm-itb.ac.id)

E. Sumirat

School of Business Management, Bandung
Institute of Technology, Indonesia.
(e-mail: erman.sumirat@sbm-itb.ac.id)

O. Y. Sudrajad

School of Business Management, Bandung
Institute of Technology, Indonesia.
(e-mail: oktofa@sbm-itb.ac.id)

*Corresponding Author

I. INTRODUCTION

In 2021, Moody's Investor Services research announcement, environmental, social, and governance-themed investments have seen increasing demand from institutional and retail investors, paving the way for continued growth for this strategy, which is a credit positive for the asset managers that offer it, Moody's Investors Service says in a new report. However, inflows into ESG products have been consistently strong, growing upwards of 140% from 2019. Since 1995, ESG assets have routinely grown at a compound annual growth rate of 14%, although the growth has increased rapidly since 2012. Many studies have focused on the relationship between companies with substantial environmental, social, and governance (ESG) characteristics

and corporate financial performance. The existing literature found positive, negative, and nonexistent correlations between ESG and financial performance, although most researchers found a positive correlation (Tu, 2021).

To address these issues, Giese and associates (2019) take a different approach. Instead of looking for correlations between ESG characteristics and financial performance in historical data, the authors first analyzed the transmission channels from ESG to financial performance and developed a fundamental understanding of how ESG characteristics affect corporations' valuations and risk profiles. Afterward, Giese *et al.* (2019) verified these transmission mechanisms using empirical analysis. They tested these transmission channels using MSCI ESG rating data and financial variables. This showed that companies' ESG information was

transmitted to their valuation and performance, both through their systematic risk profile (lower costs of capital and higher valuations) and their idiosyncratic risk profile (higher profitability and lower exposures to tail risk) (Giese *et al.*, 2019).

PT Pertamina Geothermal Energy, Tbk (PGEO) is currently a subsidiary of Sub Holding Power, New, and Renewable Energy (SH PNRE), represented by PT Pertamina Power Indonesia (PT PPI). PT PGE Tbk. They started their journey of geothermal utilization in 1974, upon discovering 70 geothermal areas in Indonesia as a sub-business of PT Pertamina EP. PT PGE Tbk. It was established in 2006 to continue the efforts to produce clean and environmentally friendly energy, and as of now, it has contributed 82% of the installed geothermal energy capacity in Indonesia (Pertamina Geothermal Energy Profile, n.d.).

TABLE I: PGEO FUTURE EXPANSION

WKP	Project Scenario	Projected Commercial Year	Net Production Capacity (MW)
Lumut Balai & Marga Bayur	Lumut Balai 2	2024	55
	Low Pressure	2025	13
	Binary Unit	2026	27
	Lumut Balai 3	2027	55
Hulu Lais	Flash Unit (2 units)	2025	110
	Binary Unit	2025	60
Ulubelu	Combined Cycle Unit	2025	10
	Binary 1	2024	10
	Binary 2	2026	20
Lahendong (Tompaso)	Steam Generation Unit 7 th unit	2027	25.3
	Steam Generation Unit 8 th unit	2028	25.3
	Steam Generation Unit 9 th unit	2033	25.3
	Bottoming Cycle 7 th & 8 th unit	2028	10
	Bottoming Cycle 9 th unit	2033	5

PGEO was already listed on February 24th, 2023, with an initial price of Rp875.00 and an IPO amount of 9.056 billion rupiahs. As stated on their prospectus, their plan for the gathered fund is approximately 85% for company business expansion till 2025, whether using conventional exploitation method (generating electricity) or co-generation technology utilization. PGEO needs to determine the necessity of capital budgeting for its growth (PT Pertamina Geothermal Energy Tbk 2022, 2023c).

By implementing their values, the company received good results on ESG assessments. Sustainable Fitch got the highest second rank from 1 to 5 scale, which got 77 out of 100 points, showing outstanding performance in ESG (PT Pertamina Geothermal Energy Tbk 2022, 2023a, 2023b). The most efficient funding needs to be determined to create more significant firm value. The new expansion project and the existing area will affect PGEO's value. PGEO's fair value based on combining their expansion projects and existing areas is not yet determined. Therefore, this final project should help investors make better PGEO stock investment decisions.

II. LITERATURE REVIEW

A. Financing Activities

The financing mix should minimize the hurdle rate and match the financed assets to fulfill the firm's long-term investment firm. Based on Damodaran (2011), there are only two options in which businesses can make money. The first is debt, and the second is equity. The essence of debt is that the firm promises to make fixed payments in the future (interest payments and repaying principal). If the firm fails to make those payments, you lose business control. With equity, you get whatever cash flows are left over after making debt payments (Damodaran, 2001).

B. Stock Valuation

In general terms, based on Damodaran (2012), there are three approaches to valuation. The first, discounted cash flow (DCF) valuation, relates the value of an asset to the present value (PV) of expected future cash flows on that asset. The second, relative valuation, estimates the value of an asset by looking at the pricing of comparable assets relative to a shared variable such as earnings, cash flows, book value, or sales. The third, contingent claim valuation, uses option pricing models to measure the value of assets that share option characteristics. One of the methods is to value the firm as an entire business using Free Cash Flow to the Firm (FCFF). The cash flows discounted are the cash flows to the firm, computed as if the firm had no debt and no tax benefits from interest expenses. The cash flows discounted are the cash flows to the firm, calculated as if the firm had no debt and no tax benefits from interest expenses.

Discounted cash flow (DCF), the companies that have a low score on ESG metrics will have a higher risk profile on average, and for such companies, one could argue for using a higher discount rate (resulting in a lower valuation) in the DCF (Bos, 2014). ESG funding will be an option for long-term debt resources to adjust the ESG factor into the absolute valuation in this research. The long-term debt rate as the cost of debt from ESG funding will impact WACC as a discount rate. Further, it will affect the firm's value (Chan *et al.*, 2022).

1) Absolute Valuation

This valuation approach fundamentally uses the present value rule, where the value of any asset is the present value of the expected future cash flow on it (Damodaran, 2012).

$$Value = \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^t} \quad (1)$$

where

N: Life of Asset,

CF_t: Cash Flow in Period t,

r: Discount rate reflecting the riskiness of the estimated cash flows.

The cash flows discounted are the cash flows to the firm, computed as if the firm had no debt and no tax benefits from interest expenses. The cash flows discounted are the cash flows to the firm, calculated as if the firm had no debt and no tax benefits from interest expenses (Damodaran, 2006, 2012).

$$Value_{FCFF} = \sum_{t=1}^{t=n} \frac{FCFF_t}{(1+wacc)^t} + \frac{Terminal Value_{FCFF n}}{(1+wacc)^n} \quad (2)$$

$$Terminal Value_{FCFF t} = \frac{FCFF_{t+1}}{wacc - g} \quad (3)$$

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.

The weighted average cost of capital (WACC) reflects the expected average future cost over the long run. It is found by weighting the cost of each specific type of capital by its proportion in the firm's capital structure (Gitman & Zutter, 2012). For debt, we call this price the interest rate. For equity, we call this price the cost of equity, and it consists of the dividends and capital gains stockholders expect (Brigman & Ehrhardt, 2008).

$$wacc = \frac{E}{V} \times k_e + \frac{D}{V} \times k_d(1 - T_c) \quad (4)$$

where

E: Equity Value,

D: Debt Value,

V: E + D,

k_e : Cost of Equity,

k_d : Cost of Debt.

We need to determine stockholder expectations, which are equal to the equity cost. One of the most common formulae is the Capital Asset Pricing Model (CAPM) (Damodaran, 2012), as mentioned below:

$$k_e = R_f + \beta(R_m - R_f) \quad (5)$$

where

R_f : Risk-Free Rate,

R_m : Market Risk Premium,

β : Sensitivity.

The expected returns on risky investments are then measured relative to the risk-free rate, with the risk creating an expected risk premium added to the risk-free rate. The Risk-free rate (R_f) will use a ten-year government bond. In the CAPM, the beta of an investment is the risk that the investment adds to a market Portfolio (Damodaran, 2012). For firms that have already three years or more published in the capital market, we can get the beta data from PEFINDO beta. However, since the PGEO doesn't have representative historical data (less than three years), we can estimate using some traded companies in the same business. The betas in common business will be used as the reference to estimate the unlevered beta of PGEO using the following formula (Damodaran, 2012).

$$\beta_{unlevered} = \frac{\beta_{comparable firms}}{[1 + (1 - t_c) \times (D/E)_{comparable firms}]} \quad (6)$$

$$\beta_{levered} = \beta_{unlevered} \times \left[1 + (1 - t_c) \times \frac{D}{E} \right] \quad (7)$$

2) Relative Valuation

Relative valuation aims to value assets based on how similar assets are to market price. While multiples are easy to use and intuitive, they are also accessible to misuse (Damodaran, 2012). Using the relative valuation, we could compare selected firms to comparable companies in the common business and average industrial. We can compare the value from ratio calculations and different ratios such as price to sales, EV to EBITDA, and EV to Invested Capital.

3) Absolute Valuation Considering ESG Factor

Discounted cash flow (DCF), the companies that have a low score on ESG metrics will have a higher risk profile on average, and for such companies, one could argue for using a higher discount rate (resulting in a lower valuation) in the DCF (Bos, 2014). ESG funding will be an option for long-term debt resources to adjust the ESG factor into the absolute valuation in this research. The long-term debt rate as the cost of debt from ESG funding will impact WACC as a discount rate. Further, it will affect the firm's value (Chan *et al.*, 2022).

III. METHODOLOGY

The data used in this research are secondary data from credible references. The following list is the secondary data sources used in this research. Published PGEO data such as full-year audited financial reports, prospectus, annual reports, and published information on the respective company website previous research supported, such as credible journals or articles. The last five years' historical data of the power generation company stock prices listed in the Indonesian Stock Exchange (IDX) were obtained from Yahoo Finance and the Stockbit website.

There are several steps to obtain a company's intrinsic value. The first step is to determine historical data that can be used as the basis of existing area projections and capital budgeting projects area. We can determine the amount of capital expenditure (CAPEX) needed for expansion based on published data. The baseline used for CAPEX calculation is the asset of Lumut Balai 1 in 2019. Then, we calculate another field of CAPEX proportional to the installed capacity and depend on Indonesia's inflation rate. IRENA already mentioned the total investment cost proportion of geothermal in Indonesia. The percentage of power plants is 42%, the steam field development is 14%, and drilling activity is 38% of the total investment cost (Ito & Ruiz, 2017).

The second step is determining financing sources and amounts using the WACC comparison. The next step is to calculate cash flow with discounted cash flow (Free Cash Flow) of the existing and expansion plan areas. The fourth step is determining the weighted average cost of capital and terminal value. The fifth step is to assess value per share. For the relative valuation, the author compares the P/E ratio of

PGEO to several common industries.

IV. RESULTS AND DISCUSSION

As mentioned in the first chapter, PGEO plans to grow its installed capacity. Based on a calculation of published data, PGEO needs capex to expand, as mentioned in the table below.

As mentioned in the first chapter, PGEO must drill more production and injection wells to expand and maintain its installed capacity. Based on the calculation, the capex of each well in 2022 is 6.708.000 USD and depends on the inflation rate for future years.

TABLE II: CAPEX PROJECTION

WKP	Project Scenario	CAPEX (in thousand USD)
Lumut Balai & Marga Bayur	Lumut Balai 2	310.301
	Low Pressure	74.883
	Binary Unit	119.093
	Lumut Balai 3	330.249
Hulu Lais	Flash Unit (2 units)	633.626
	Binary Unit	345.614
Ulubelu	Combined Cycle Unit	43.202
	Binary 1	42.314
	Binary 2	88.217
Lahendong (Tompaso)	Steam Generation Unit 7th unit	38.129
	Steam Generation Unit 8th unit	38.776
	Steam Generation Unit 9th unit	43.019
	Bottoming Cycle 7th & 8th unit	45.979
	Bottoming Cycle 9th unit	25.505

The opportunities of green financing give PGEO opportunities to raise cheap funds since green financing has lower interest rates than conventional loans. In the past, PGEO has already raised funds from the World Bank through the Clean Technology Fund Loan Agreement for Total Project Development in Ulubelu Units 3 and 4 and Lahendong Units 5 and 6, which has an interest rate of only 3% (World Bank, 2011). Green financing will become a preference for funding and/or refinancing geothermal project development.

TABLE III: FINANCIAL ASSUMPTION

Description	Value	Sources
Inflation Rate	4.15%	Average 10 Years Recorded inflation rate by Bank of Indonesia
Revenue Growth	4.44%	Company's processed data
Product Price	Calculated	Company's processed data
COGS, G&A, Expenses	Following inflation rate	Company's processed data
Tax Rate	34%	Company's processed data
Projection Duration	10 Years	Company's data with the assumption
IPO amount	606,287,196 USD (85% for project financing and 15% for debt payment)	Company's data
Risk-Free Rate	6.37%	10 Years Government Bond Yield by PHEI
Risk Premium	2.33%	Damodaran Country Risk Premium

Based on the sustainability report of PGEO in 2022, we can see that the carbon emission intensity is 41.9gCO₂/kWh, which, based on the project activity, will be eligible to receive green financing (PT Pertamina Geothermal Energy Tbk,

2023b). Green financing will become a preference for funding and/or refinancing geothermal project development (PT Pertamina Geothermal Energy Tbk, 2022). For refinancing activity, PGEO has been issued a green bond with a 5.15% p.a coupon rate and with a 5-year tenor (Suryahadi, 2023). The author also assumes the same rate and product that was issued for project financing and carbon credit revenue included in other income, the same as historical published data.

1) Financial Projection

To calculate the firm's required value, the author needs general information that becomes a calculation parameter. The author already gathered data that can be seen in the table, excluding parameters that have historical accounts on the PGEO Financial Statement.

There are several options for PGEO financing sources. Based on equity, it has its own retained earnings and right issue. Based on debt, it has conventional debt and ESG financing.

The first WACC option is calculated using the right issue option to fulfill the capex needed, the second WACC option is calculated using a conventional long-term bond, and the third WACC option is calculated using the same green bond rate used for refinancing while refinancing using a green bond with a rate of 5.15% (Suryahadi, 2023). The data for calculating PGEO cost of equity came from the published firm with common business. Those companies are DSSA, KEEN, and POWR. The levered beta of the common industry is below. Based on the Levered Beta, we determine the unlevered beta and cost of equity of PGEO based on its Debt-to-Equity Ratio (DER).

TABLE IV: LEVERED BETA VALUES

Firm	Pefindo Beta	DER
DSSA	0.982	82%
POWR	0.846	78%
KEEN	0.722	59%
Average levered beta industry	0.850	73%
Average unlevered beta industry	0.574	

The author determines PGEO's debt cost by calculating interest expense to total long-term debt value. After that, we calculate the cost of debt after tax. The cost of debt is the projection of interest expense to the total long-term debt value. By combining the cost of equity and debt, we can determine WACC.

TABLE V: PGEO WACC

Parameter	1 st Option	2 nd Option	3 rd Option
Long Term Debt (USD thousands)	670,087.25	5,630,118.40	2,300,849.58
Common Stock (USD thousands)	4,495,627.52	1,709,142.20	1,709,142.20
DER PGEO	14.91%	329.41%	134.62%
levered beta PGEO	0.630	1.821	1.242
COST OF EQUITY	7.84%	10.61%	9.26%
COST OF DEBT BEFORE TAX	6.95%	9.39%	5.38%
COST OF DEBT AFTER TAX	3.58%	7.06%	3.55%
WACC	7.42%	7.89%	5.83%

The author estimated the following account using historical data and assumptions of net sales, cost of goods sold (COGS), G&A expenses, provision expenses, interest income, interest

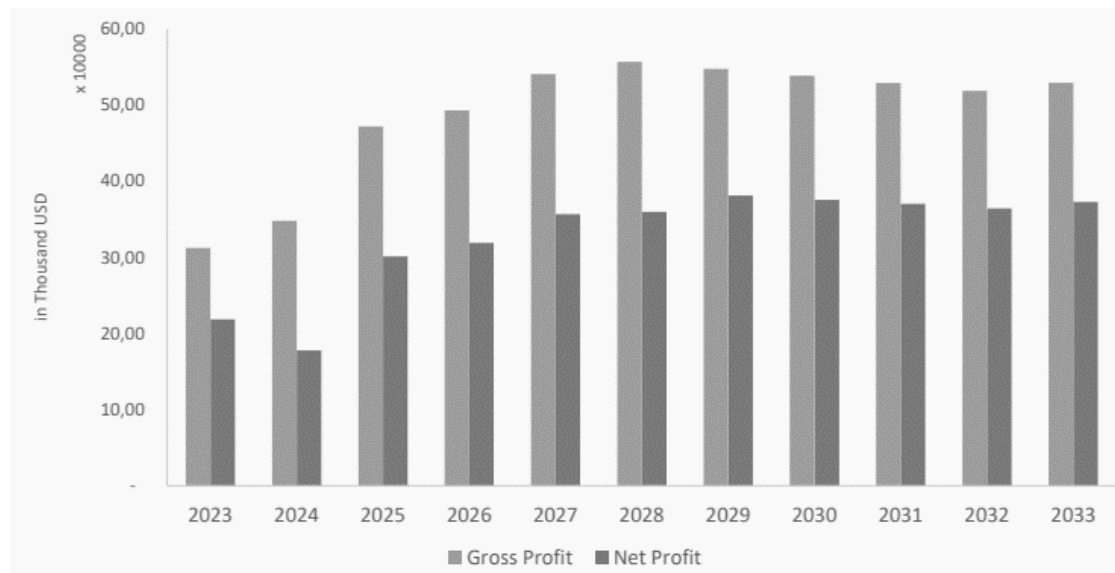


Fig. 1. Consolidated income statement projection.

expenses, and tax expenses for income statement projection. The author projected not only the income statement but also the balance sheet. The projections are made to forecast the assets, equity, and liability. The author estimated the following account using historical data and assumptions cash and cash equivalent, account receivable, inventories, fixed assets, accruals, short-term debt and current portion of long-term debt, account payable, long-term debt, net, and tax expenses.

The proposed option uses green bond financing, which will create a PGEO DER of 134.62%. This option makes PGEO more vulnerable to bankruptcy. On the other hand, the usage of DER to grow in the geothermal production business is quite common worldwide. Calpine published its 2019 full-year reports and showed that its DER is 392% (Calpine Corporation, 2020). So, the option that will increase DER is still acceptable.

On the other hand, since PGEO is a state-owned company, the dilution of ownership can be reduced. PT PPI as a subholding of PGEO has 69.01% as a start, but if using the right issue option (option 1), that amount is only the same as 26.24% from the total common stock. The reduction of national control in state-owned companies is avoided. PGEO may have received the money to grow using green bonds since it has experience issuing green bonds from the World Bank for similar project expansion, and there are no covenants or restrictions to it (World Bank, 2011).

2) Absolute Valuation

Determining the Free Cash Flow to the Firm (FCFF) is the first step of calculating absolute valuation. We should determine the perpetuity growth rate before calculating terminal value. The perpetuity growth rate is the same as the projected GDP growth of the power generation business in RUPTL, which is 4.9% (PT PLN Persero, 2021). The free cash flow to the firm and terminal value are translated into present value. The discount rate used for calculation is WACC; the result is in Table VI.

Based on the calculation result, the firm value is 35,007,963,612.84 USD. Based on the 2023 outstanding stock after IPO, we can get a stock price of Rp12,686.00. That

means the PGEO IPO price is still undervalued.

TABLE VI: PGEO FCFF NPV

Year	FCFF (USD thousands)	Terminal Value (USD thousands)	NPV (USD billions)
2023	65,774.68		0.06
2024	801,643.03		0.65
2025	230,956.96		0.46
2026	111,495.43		0.37
2027	420,199.65		0.05
2028	529,090.29		0.32
2029	537,448.99		0.68
2030	498,218.19		1.00
2031	525,614.31		1.32
2032	472,883.45		1.59
2033	546,015.26	61,771,243,745	35.01

3) Relative Valuation

DSSA, KEEN, and POWR are the comparable companies for PGEO. The author compares each company's price-to-earnings ratio (PER) to develop the relative value of PGEO. The result of the comparison is in Table VII.

TABLE VII: 17 PER COMPARISON

Parameter	Industry	DSSA	KEEN	POWR
PER	10.62	3.22	5.65	9.26

PGEO IPO's price is Rp875.00, its EPS is Rp46.135, and the PER is 18.97. Based on the PER comparison, the PGEO's value is overvalued. Based on the PER calculation, PGEO's price is relatively higher than other firms. Following the industry PER average, the target price of PGEO is Rp490.00.

4) Implementation Plan and Justification

Based on the firm's intrinsic value calculation, the current value is undervalued. In addition, the growth story of PGEO in the prospectus will be doubling its revenue. Accessing cheap funding based on ESG considerations and the low rate of geothermal utilization in Indonesia gives PGEO more flexibility to grow even more. The value per share is much higher than the price, so the author recommended purchasing this stock.

To measure the PGEO price relative to others using PER shows that the PGEO price is relatively higher than others. In the common industry, there are plenty of options, even

considering the potential growth of PGEO. Therefore, the author recommends not buying the stock, considering its relatively high price.

V. CONCLUSION AND RECOMMENDATIONS

A. Conclusion

It became one of the best ESG ratings in Indonesia PGEO, creating a grand entrance during its IPO. Owning the best rating on ESG based on sustainable Fitch during the increase of investor ESG awareness became a significant factor to consider. In addition, PGEO has a growth story that promises in its prospectus that it will double its revenue within ten years.

The author calculated the capex needed for the company's promised growth. Using historical published data, the author can determine that the IPO fund cannot fulfill the growth story. But on the other hand, companies have great flexibility using green bonds cheaper than any conventional debt. To meet project capex, PGEO must issue USD 1,588,612,527 green bonds.

The historical financial performance analysis of PGEO shows insight investors need to consider. From the profitability ratio, PGEO has more outstanding performance than its peers. GPM, OPM, and NPM of PGEO are superior to the average industry and its peers, but in terms of ROE and ROA, PGEO is lower than the average industry and its peers. In terms of liquidity, PGEO has a lower ratio, and for the solvability ratio, PGEO has a higher ratio than the average industry. Its peers become a factor that investors need to consider since it will show the risk for investors.

The valuation result shows that PGEO's share price is undervalued. The intrinsic value of PGEO per share is Rp12,686.00 from the discounted cash flow method using free cash flow to the firm. Compared to its price, the value is much greater. Based on relative valuation to its peers, the price of PGEO is overvalued. The share price of each share that par to the industry is Rp490.00. Compared to its peers and the industry average, PGEO is much appreciated by investors. Despite the PGEO price being relatively high, the fundamental value or intrinsic value of PGEO is higher than the price. The value received from absolute valuation will become the recommended value since it shows the condition of the future of investor investment.

B. Recommendations

1) Recommendations for Investors

Calculating PGEO intrinsic value using the discounted cash flow method shows that PGEO value is undervalued and at a discount. Even based on the relative valuation, PGEO's price is higher than its peers. The author recommends buying PGEO shares since it will give long-term prospects. However, investors should be watching PGEO closely since PGE promises tight project schedules.

2) Recommendations for Future Research

Based on the conclusions, implementation, and justification, some considerations are given for future research.

1) This research only compares PGEO with common industry companies. Since the published company

implements good ESG in Indonesia, the author can compare it to other firms that belong to the ESG index in the Indonesia stock market in the future.

2) This research uses prospectus data and first-year published data. The author recommends using more historical data to create a more comprehensive result.

3) Valuation methods vary. The author uses discounted cash flow for absolute valuation and PER for relative valuation in this research. The author suggests using another technique for further study.

3) Recommendations for PGEO

After analyzing PGEO's financial performance and valuation, the author gives recommendations as follows:

1) The profitability of PGEO is quite good, but the management effectiveness of PGEO is lower than its peers and the average industry. Based on that result, PGEO should increase its ROE and ROA by 2% each of them. There are several ways to increase it. The first is by reducing CAPEX. This method will directly affect new project development ROE and ROA but is quite hard since the challenge of this method is subsurface uncertainty. The second way is to increase its revenue using non-conventional geothermal utilization. As we can see today, PGEO utilization that creates income is still power generation. PGEO should aim to expand its business model since power generation will not increase if it does not build a new power plant.

2) ESG funding sources give the opportunity to PGEO to get cheap funds. The ESG rating that is owned by PGEO should be maintained well. Even though the PGEO has a renewable energy business as its core, the ESG factor concerns the environment, society, and governance. The fact that PGEO is a state-owned company with significant issues with authority. Historical results the auditor reviews must be maintained even though the PGEO has already become a published company. In terms of PGEO's effect on the environment and society, it has to carry its results even though the responsibility to create income for shareholders is more significant than before since not only the government has its shares.

3) Indonesia's power generation business has a single factor to deal with. This factor is the electricity transfer market structure, which is the monopoly. PT PLN (Persero) and PGEO have to create an electricity selling contract in which PT PLN (Persero) has a high bargaining position as a buyer. PGEO, which has an aggressive growth plan from a business point of view, should create a breakthrough to prevent the power-produced agreement from being kept at the same amount. To keep the valuation the same as in this study, PGEO should keep the electricity price at 0,079 USD/KWh.

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CONFLICT OF INTEREST

The authors declare that they do not have any conflict of interest.

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