

Is Green Finally Valuable? Study of Green Transition and Firm Value in Indonesian Energy Companies

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ABSTRACT

At a time when the corporate world is making an effort to ‘go green’, this research looks at the trend in a specific area, the Indonesian energy sector, and asks if going green is important to Indonesian energy firms. This study covers the years 2019-2025 and focuses specifically on green investments, carbon emission disclosures, environmental performance, capital structure, and firm value. A descriptive quantitative approach is used with firm data from 15 Indonesian energy companies. For this study, green transition is assessed with green investments, carbon disclosures, and PROPER with capital structure using the Debt to Equity Ratio (DER) and firm value assessed with Tobin’s Q. The study found that Indonesian energy companies greened business practices on a consistent basis. Green investments increased from 0.026 in 2019 to 0.105 in 2025, carbon emission disclosures increased from 0.512 to 0.967, and PROPER scores increased from 3.000 to 4.900. At the same time, DER had a downward trend from 1.321 to 0.691, indicating an improvement in the health of the capital structures, and Tobin’s Q had an upward trend from 1.088 to 1.949, indicating an improvement in the market’s perception of the value of the firms. These results show that the green transition in Indonesian energy firms is demonstrated in environmental efforts and disclosures and is also shown in the financial structure and the market’s response. This study attempts to document the green transition in the energy sector of Indonesia and shows the value of the firm. Other studies might be able to add value to this research and use regression, mediation, and moderation, or PLS-based frameworks to determine the relationship between green investments, carbon disclosures, environmental performance, leverage, and firm value.

Keywords: *Green Transition, Firm Value, Green Investment, Carbon Emission Disclosure.*

1. INTRODUCTION

The global energy market brought us the “green transition,” where a company's value can no longer be justified by their profits, their asset accumulation, or their production capacity. Companies are now judged by their diligence with environmental issues and their support of the green operations and their financial support and resilience when faced with the transition (Hart, 1995; Fatemi et al., 2018; Friede et al., 2015). The energy market is like a giant ship attempting to turn in the opposite direction of a storm: it needs to change the direction of the model, but it is still being weighted down by the old model.

Indonesia has pledged to be at net zero by 2060 and even sooner. This places the energy market in a delicate and critical position of the national agenda, given that energy is needed to develop a nation but it is almost always linked with emissions and environmental pressure (International Energy Agency, 2022). Because of this, it is important for everyone—including investors, managers, and regulators—to understand how energy companies are dealing with the green transition.

There are many ways to analyze the shift to a greener business model. The first is the green investments—a measure of the company's self-investment in environmental issues (Hart, 1995). The issuing of post corporate social responsibility reports is a measure of transparency with carbon and environmental issues. The PROPER rating measures the investment made to the environment through the SEM. Additionally, the debt to equity ratio and Tobin's Q are used to consider the financial risk of the firm and the market values the company (Brigham & Houston, 2019; Tobin, 1969).

These indicators are important because the green transition does not happen in a vacuum. A company may increase its environmental investment, but if such investment is not disclosed properly, stakeholders may not fully recognize it. A company may also communicate its carbon performance, but if its environmental performance remains weak, the

disclosure may be perceived as symbolic. This is closely related to stakeholder and legitimacy perspectives, which argue that companies need to respond to stakeholder expectations and maintain social acceptance through credible corporate behavior (Clarkson, 1995; Dowling & Pfeffer, 1975; Freeman, 1984; Suchman, 1995). Likewise, a firm may show strong environmental ambition, but high leverage can limit its ability to finance long-term transition. This is why green transition mapping should not only look at environmental indicators, but also consider financial structure and market valuation.

Previous studies have widely discussed environmental disclosure, corporate social responsibility, ESG, carbon emission disclosure, and firm value. For example, prior studies show that environmental and social disclosure may be linked with corporate financial performance, while carbon emissions and carbon disclosures may affect firm value (Matsumura et al., 2014; Plumlee et al., 2015; Qiu et al., 2016). Other studies also suggest that ESG performance and disclosure can influence firm value, while the broader literature shows a positive relationship between ESG and financial performance in many empirical studies (Fatemi et al., 2018; Friede et al., 2015). However, many of these studies tend to directly examine causal relationships, such as whether environmental disclosure affects firm value or whether leverage moderates the relationship between sustainability and financial performance. Such approaches are useful, but they often skip a basic yet essential question: what is actually happening to companies over time? Before asking whether green investment affects firm value, it is important to first understand whether companies are truly moving toward a greener direction.

This study addresses that gap by providing a descriptive map of the green transition of Indonesian energy companies from 2019 to 2025. Instead of directly focusing on causal testing, this research seeks to describe the trend and pattern of green investment, carbon emission disclosure, PROPER rating, DER, and Tobin's Q. In this sense, the study extends previous sustainability and firm-value discussions by first documenting the empirical landscape before testing causal mechanisms (Fatemi et al., 2018; Matsumura et al., 2014; Plumlee et al., 2015).

The novelty of this study lies in the integration of five indicators into one descriptive framework. Green investment represents environmental action, carbon emission disclosure represents environmental communication, PROPER represents institutional recognition, DER represents financial risk, and Tobin's Q represents market response. This integrated perspective is supported by stakeholder theory, legitimacy theory, signaling theory, and finance literature, which together suggest that environmental action, disclosure, financial condition, and market valuation should be read as connected dimensions rather than isolated variables (Brigham & Houston, 2019; Freeman, 1984; Spence, 1973; Suchman, 1995; Tobin, 1969). By combining these indicators, this study does not merely describe sustainability performance, but builds a broader map of green transition readiness in the Indonesian energy sector.

1.1. Green Investment

Green investment refers to investments made by companies to support environmentally friendly activities and sustainable development. Green investment may include investment in environmentally friendly technology, emission reduction, energy efficiency, and waste management. From the natural-resource-based view, environmental investment can become a strategic capability when it helps firms reduce environmental risk, improve resource efficiency, and build long-term competitiveness (Hart, 1995). Companies that engage in green investment tend to have a better image in the eyes of investors because they are perceived as having a strong commitment to long-term sustainability.

1.2. Carbon Emission Disclosure

Carbon emission disclosure refers to the disclosure of information regarding carbon emissions generated by a company. This disclosure is usually presented in the company's annual report or sustainability report. The broader the carbon emission disclosure provided by a company, the higher the level of corporate transparency regarding environmental issues. Carbon-related disclosure is important because it may reduce information asymmetry and provide a signal to investors regarding climate-related risk management (Luo et al., 2012; Spence, 1973). This can increase investor confidence and strengthen the company's reputation.

1.3. Debt to Equity Ratio

In this study, capital structure is proxied by the Debt to Equity Ratio (DER). DER shows the proportion of debt relative to equity and is commonly used to evaluate leverage and financial risk (Brigham & Houston, 2019). Effective capital structure management can help companies maintain financial stability and improve their ability to carry out operational activities and long-term investments.

1.4. Environmental Performance

In this study, sustainability performance is proxied by the PROPER score. The Program for Pollution Control, Evaluation, and Rating, commonly known as PROPER, is an assessment program conducted by the Ministry of Environment and Forestry of the Republic of Indonesia to evaluate companies' environmental performance. From the perspective of corporate social performance and legitimacy theory, environmental performance can be understood as part of a company's effort to respond to stakeholder expectations and maintain social approval (Clarkson, 1995; Dowling & Pfeffer, 1975; Suchman, 1995).

1.5. Firm Value

Firm value refers to investors' perception of a company's success, which is reflected in the company's stock price. In this study, firm value is proxied by Tobin's Q a market-based valuation indicator that compares market value with the replacement or book value of assets (Tobin, 1969). A higher Tobin's Q indicates that the company has good prospects and receives a positive response from the market. Prior studies also show that environmental disclosure and carbon-related information may influence firm value because investors increasingly consider sustainability information in valuation decisions (Fatemi et al., 2018; Matsumura et al., 2014; Plumlee et al., 2015).

2. RESEARCH METHODS

This study uses a descriptive quantitative approach. The purpose of the study is not to test causal relationships, but to describe the trend and pattern of green transition indicators among Indonesian energy companies during the 2019–2025 period. A descriptive method is appropriate because the study aims to map changes over time and identify the general direction of company behavior related to environmental and financial indicators (Fatemi et al., 2018; Friede et al., 2015; Matsumura et al., 2014). The research object consists of 15 Indonesian energy companies observed over seven years, from 2019 to 2025. Therefore, the study uses 105 firm-year observations. The companies included in the dataset are ADRO, MEDC, PGAS, PTBA, ITMG, INDY, AKRA, ELSA, PTRO, BUMI, DOID, HRUM, GEMS, ABMM, and UNTR. These companies represent major actors in Indonesia's energy-related business landscape.

The study uses five main variables. First, green investment measures the proportion of sustainability-oriented or environmentally related investment to total assets. Second, carbon emission disclosure measures the extent of carbon-related information disclosed by the company. Third, PROPER represents environmental performance based on rating categories. For analytical purposes, PROPER categories are converted into numerical scores, where Blue is coded as 3, Green as 4, and Gold as 5. For transitional categories such as Blue–Green or Green–Gold, the score is calculated using the average value of the two categories. Fourth, DER measures leverage by comparing total liabilities to total equity (Brigham & Houston, 2019). Fifth, Tobin's Q measures firm value and market valuation (Tobin, 1969).

The data analysis consists of several stages. First, the data were organized by company and year. Second, descriptive statistics were calculated for each variable. Third, yearly averages were calculated to identify trends from 2019 to 2025. Fourth, the study compared the beginning and ending values of each indicator to identify the direction and magnitude of change. Fifth, a descriptive green transition map was developed by interpreting the relationship between environmental action, disclosure, institutional recognition, leverage, and market valuation. Green Transition Map, green investment describes the company's environmental action, carbon disclosure describes transparency, PROPER describes environmental recognition, DER describes financial pressure, and Tobin's Q describes market response. This framework allows the study to present a more complete picture of how Indonesian energy companies move during the green transition period. Operationalization of research variables is shown at Table 1.

Table 1. Operationalization of Research Variables

Variable	Code	Measurement	Interpretation
Green Investment	GI	Green/sustainability investment divided by total assets	Higher value indicates stronger green investment intensity
Carbon Emission Disclosure	CED	Number of disclosed carbon items divided by total disclosure items	Higher value indicates stronger carbon transparency
Debt to Equity Ratio	DER	Total liabilities divided by total equity	Higher value indicates higher leverage/financial risk

Environmental Performance	PROPER	PROPER rating converted into score: Blue = 3, Green = 4, Gold = 5	Higher score indicates better environmental performance
Firm Value	Tobin's Q	Market-based firm value indicator	Higher value indicates stronger market valuation

3. RESULTS AND DISCUSSION

The descriptive results show that Indonesian energy companies experienced a clear movement toward greener business indicators during the 2019–2025 period. The average value of green investment increased from 0.026 in 2019 to 0.105 in 2025. This indicates that companies increasingly allocated resources to sustainability-oriented investment. Although the increase may look small in absolute numbers, the relative growth is substantial. It shows that environmental investment is becoming more visible in the financial orientation of energy companies. This finding is consistent with the natural-resource-based view, which emphasizes the role of environmental capability in long-term competitiveness (Hart, 1995).

Table 2. Average Trends of Green Transition Indicators, 2019–2025

Year	Green Investment	CED	DER	PROPER	Tobin's Q
2019	0.026	0.512	1.321	3.000	1.088
2020	0.033	0.570	1.253	3.067	1.129
2021	0.047	0.711	1.089	3.933	1.291
2022	0.063	0.811	0.983	4.000	1.471
2023	0.077	0.875	0.851	4.167	1.641
2024	0.091	0.933	0.767	4.533	1.793
2025	0.105	0.967	0.691	4.900	1.949

Carbon emission disclosure also increased significantly. The average CED score rose from 0.512 in 2019 to 0.967 in 2025. This indicates that companies became more transparent in disclosing carbon-related information. The increase in disclosure may reflect stronger regulatory pressure, investor expectations, and growing awareness of climate-related risks. It may also show that companies understand the importance of communication in the sustainability era. In other words, companies are not only trying to act greener, but also trying to tell the market that they are changing. This pattern is in line with prior studies suggesting that carbon disclosure can be driven by corporate incentives and can reduce information asymmetry for stakeholders (Luo et al., 2012; Matsumura et al., 2014).

The PROPER score also shows a strong improvement. The average PROPER score increased from 3.00 in 2019 to 4.90 in 2025. This movement suggests that many companies moved from basic compliance toward beyond-compliance environmental performance. In the Indonesian context, this finding is important because PROPER is not merely a voluntary disclosure indicator. It reflects institutional assessment of environmental management. Therefore, the improvement in PROPER indicates that the green transition is not only happening in corporate reports, but also appears in regulatory recognition. This supports legitimacy theory, which argues that companies seek social acceptance by aligning their actions with societal expectations (Dowling & Pfeffer, 1975; Suchman, 1995).

Meanwhile, DER decreased from 1.321 in 2019 to 0.691 in 2025. This finding shows that companies tended to reduce leverage over the observed period. The decline in DER is important because the green transition requires financial flexibility. Companies with lower leverage may have more capacity to finance long-term environmental investment. In contrast, high leverage can become a heavy chain that limits strategic movement. Therefore, the decreasing DER suggests that energy companies may be entering the transition period with healthier capital structures. This interpretation is consistent with financial management literature that views leverage as an important indicator of financial risk and capital structure quality (Brigham & Houston, 2019).

Tobin's Q increased from 1.088 in 2019 to 1.949 in 2025. This indicates that the market valuation of energy companies improved during the observed period. The increase in Tobin's Q, together with the increase in green investment, carbon disclosure, and PROPER, suggests that the market may increasingly appreciate companies that show stronger sustainability signals. Although this study does not test causality, the pattern provides an important descriptive indication: greener, more transparent, and financially healthier companies tend to be associated with higher market

valuation. This finding is consistent with previous research showing that ESG performance, carbon disclosure, and environmental disclosure quality may be related to firm value (Fatemi et al., 2018; Matsumura et al., 2014; Plumlee et al., 2015; Tobin, 1969).

The trend in Table 2 shows a consistent pattern. Green investment, CED, PROPER, and Tobin's Q move upward, while DER moves downward. This pattern suggests that the green transition of Indonesian energy companies is not isolated in one indicator. It appears as a combined movement involving investment, disclosure, environmental performance, financial structure, and market value. This combined movement is consistent with the idea that sustainability performance, disclosure, and financial outcomes should be examined as interconnected dimensions (Fatemi et al., 2018; Friede et al., 2015; Qiu et al., 2016).

Table 3. Comparison of Initial and Final Year

Indicator	2019	2025	Change	Growth	Meaning
Green Investment	0.026	0.105	+0.078	+296.2%	Companies increasingly allocate resources to green-oriented investment
CED	0.512	0.967	+0.455	+88.8%	Companies became more transparent in disclosing carbon-related information
DER	1.321	0.691	-0.630	-47.7%	Companies showed healthier capital structure
PROPER	3.000	4.900	+1.900	+63.3%	Companies moved from basic compliance toward beyond-compliance performance
Tobin's Q	1.088	1.949	+0.861	+79.1%	Market appears to appreciate the green transition signal

The descriptive results indicate that Indonesian energy companies experienced a consistent green transition during the 2019–2025 period. Green investment increased from 0.026 in 2019 to 0.105 in 2025, showing that companies increasingly allocated financial resources to sustainability-oriented activities. Carbon emission disclosure also increased from 0.512 to 0.967, indicating stronger transparency in communicating carbon-related information. In addition, the average PROPER score improved from 3.000 to 4.900, suggesting that companies gradually moved from basic compliance toward beyond-compliance environmental performance. At the same time, DER decreased from 1.321 to 0.691, indicating lower financial risk and healthier capital structures. Tobin's Q increased from 1.088 to 1.949, suggesting that the market valuation of Indonesian energy companies improved along with stronger environmental and financial indicators.

The strongest improvement can be seen in green investment (Table 3), which increased by approximately 296% from 2019 to 2025. This suggests that companies increasingly placed environmental investment as part of their strategic agenda. Carbon disclosure increased by approximately 89%, which indicates that transparency also improved. PROPER increased by approximately 63%, showing stronger environmental performance recognition. Tobin's Q increased by approximately 79%, while DER decreased by approximately 48%. Together, these changes show a transition pattern that is not only ecological but also financial. This supports the argument that environmental strategy can be linked to competitive advantage and market valuation (Hart, 1995; Fatemi et al., 2018).

From a stakeholder theory perspective, the results suggest that energy companies are responding to stakeholder pressure by increasing environmental investment and disclosure. Investors, regulators, communities, and customers increasingly demand companies to demonstrate environmental responsibility. The upward trend in CED and PROPER may indicate that companies are trying to maintain legitimacy in front of these stakeholders (Clarkson, 1995; Freeman, 1984).

From a legitimacy theory perspective, the improvement in PROPER and carbon disclosure can be interpreted as an effort to maintain social acceptance. Energy companies operate in a sector that is often criticized for its environmental impact. Therefore, improving environmental performance and transparency becomes a way to show that the company is adapting to social expectations. The green transition is not only about technology, but also about trust (Dowling & Pfeffer, 1975; Suchman, 1995).

From a signaling theory perspective, green investment and carbon disclosure can be understood as signals to the market. When companies invest in greener activities and disclose carbon information, they send a message that they are preparing for a low-carbon future. The increase in Tobin's Q may indicate that the market responds positively to such

signals. However, because this study is descriptive, the relationship should be interpreted carefully. The findings show association and pattern, not causal proof (Spence, 1973; Matsumura et al., 2014; Plumlee et al., 2015).

The decline in DER adds another important layer to the discussion. A greener company with high debt may still face market skepticism because investors may question whether the company has enough financial room to sustain the transition. In this study, the decline in DER suggests that companies are becoming financially healthier while also improving environmental indicators. This combination may strengthen market confidence because lower leverage can reduce financial risk and increase flexibility for long-term investment (Brigham & Houston, 2019).

Based on the descriptive pattern, Indonesian energy companies can be interpreted as moving through three stages of green transition. The first stage is basic compliance, reflected in the early period when PROPER scores were mostly around Blue and CED was relatively moderate. The second stage is transparency improvement, reflected in the rapid increase in carbon disclosure from 2021 onward. The third stage is green value recognition, reflected in the simultaneous improvement of PROPER and Tobin's Q toward 2025.

This transition does not mean that all companies have fully transformed into green companies. The energy sector still faces structural challenges, especially because many companies remain connected to fossil-based business models. However, the data indicate that the direction of movement is becoming clearer. The companies are not standing still. They are beginning to move, step by step, toward a greener and more transparent business model. This finding echoes the broader sustainability-finance literature, which suggests that environmental strategy and disclosure are increasingly relevant in explaining corporate value creation (Fatemi et al., 2018; Friede et al., 2015; Qiu et al., 2016).

Table 4. Green Transition Mapping

Category	Criteria	Companies
Green Value Leader	High environmental indicator, relatively low DER, and high Tobin's Q	UNTR, ADRO, PTBA, ITMG
Green Transition Performer	Good green indicators, improving market value, but still moderate financial pressure	INDY, MEDC, PTRO, PGAS, GEMS
Financially Constrained Green Mover	Green indicators improving, but DER remains relatively high	BUMI, DOID, ABMM
Efficient Green Adapter	DER low and market value relatively strong, although green indicators are moderate	AKRA, HRUM
Emerging Green Player	Environmental indicators improving, but market valuation still needs strengthening	ELSA

Overall, the results show that the green transition in Indonesian energy companies is not reflected in only one indicator. Rather, it appears as a combined movement involving environmental investment, carbon transparency, environmental recognition, financial structure, and market value. This pattern supports the idea that green transition should be understood as a multidimensional process, not merely as symbolic environmental communication.

4. CONCLUSION

This study maps the green transition of Indonesian energy companies during the 2019–2025 period using five indicators: green investment, carbon emission disclosure, PROPER, DER, and Tobin's Q. The findings show a consistent improvement in environmental and market-related indicators. Green investment increased from 0.026 in 2019 to 0.105 in 2025. Carbon disclosure increased from 0.512 to 0.967. PROPER improved from 3.00 to 4.90. Tobin's Q increased from 1.088 to 1.949. Meanwhile, DER decreased from 1.321 to 0.691. These findings are consistent with prior literature suggesting that environmental strategy, disclosure, and financial structure are increasingly relevant to corporate value creation (Brigham & Houston, 2019; Fatemi et al., 2018; Hart, 1995).

These findings suggest that Indonesian energy companies are gradually entering a green transition phase. The transition is reflected not only in environmental investment, but also in greater carbon transparency, stronger environmental performance recognition, healthier capital structures, and higher market valuation. The study shows that green transition should be understood as a multidimensional process involving environmental action, communication, recognition, financial strength, and market response.

The main contribution of this study is the development of an integrated descriptive map of the green transition in the Indonesian energy sector. Unlike studies that directly test causal relationships, this study first describes the direction and pattern of change. This descriptive foundation is important because it helps researchers, managers, investors, and regulators understand the current position of energy companies before conducting more advanced statistical analysis.

This study has limitations. First, the study uses a descriptive approach, so it cannot make causal claims. Second, the dataset is limited to 15 companies and seven years of observation. Third, the variables used are limited to green investment, CED, PROPER, DER, and Tobin's Q. Other important variables such as firm size, profitability, sales growth, ownership structure, and ESG score are not included. Future research can extend this study by applying panel regression to examine the effect of green investment, carbon disclosure, PROPER, and DER on Tobin's Q. Future studies may also use mediation or moderation models to examine whether carbon disclosure mediates the relationship between green investment and firm value, or whether DER weakens the green premium received by companies. In addition, PLS path modeling can be used to develop a green legitimacy model by connecting green investment, carbon disclosure, environmental performance, and firm value. Future research may also compare energy companies with other high-emission sectors, such as mining, manufacturing, and transportation, to obtain a broader picture of green transition in Indonesia.

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