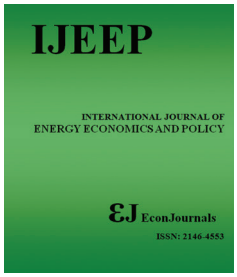

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How Effective is the Green Financing Framework for Renewable Energy? A Case Study of PT Pertamina Geothermal Energy in Indonesia

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ABSTRACT

This paper assesses the green financing framework for renewable energy in Indonesia, with a focus on PT pertamina geothermal energy (PGE) as a case study. PGE is a state-owned company and a significant producer of geothermal energy in Indonesia. The paper evaluates the strengths and weaknesses of PGE's green financing framework, including its reliance on government policy and regulation, the speed and efficiency of disbursement of funds, and the quality of project selection. The paper also examines PGE's intention to engage external auditors to verify its internal tracking method and allocation of funds, which aligns with global best practices in green financing. The involvement of external reviewers adds an extra layer of oversight and credibility to the process. Overall, the paper concludes that PGE has a strong framework in place for managing green financing, with several projects in various stages of implementation. However, there is room for improvement in terms of project selection criteria and impact reporting accuracy and reliability. In summary, this paper provides valuable insights into the green financing framework for renewable energy in Indonesia, with a specific focus on PGE as a case study.

Keywords: Green Financing Framework, Renewable Energy, Geothermal Energy, Indonesia, Sustainability, TOWS Analysis
JEL Classifications: Q42, Q56

1. INTRODUCTION

The ongoing quest to mitigate climate change and adopt more sustainable practices has galvanized global industries to reorient their focus towards green and renewable sources of energy (Fan and Nam, 2018; Hackstein and Madlener, 2021; Setiawan et al., 2021). In particular, the geothermal energy sector, characterized by its significant potential for growth and sustainability, is an area that has seen increased attention (Tirumala and Tiwari, 2023). Geothermal energy, unlike most renewable energy sources, offers the advantage of being both consistent and reliable, providing the necessary groundwork for a continuous supply of energy irrespective of seasonal changes. One of the countries boasting significant geothermal potential is Indonesia, which holds approximately 40% of the world's total geothermal resources. The exploitation and development of these resources have been largely overlooked, as only about 8.9% of its total potential has been tapped into thus far.

In this context, PT pertamina geothermal energy (PGE), a subsidiary of Indonesia's largest state-owned oil and gas company, PT Pertamina (Persero), plays a crucial role in Indonesia's green energy landscape (PGE Pertamina, 2023). Established in 2006, PGE is currently one of the largest geothermal energy producers in Indonesia, managing 82% of the country's geothermal installed capacity through both its operations and joint operation contracts. The company has been operational since 2007, with its first geothermal energy production facilitated by the 20MW PLTP Lahendong unit II (Darma et al., 2010). Ever since, PGE has continuously grown and expanded its asset portfolio of geothermal power plants, aligning with its ambitious vision to become a

world-class green energy company with the largest geothermal capacity globally.

PGE's commitment to expanding its geothermal capacity to 600 MW in the next five years necessitates a robust and efficient financing framework. Recognizing this, the company plans to issue green financing instruments under a specified Framework, facilitating the necessary capital for financing or refinancing its geothermal power projects and future endeavors. In this light, the study is aimed at analyzing and evaluating the effectiveness of this Green Financing Framework in promoting renewable energy projects.

Given the crucial role financing plays in the successful deployment of renewable energy projects, understanding the effectiveness of green financing frameworks is of paramount importance. Such frameworks are designed to facilitate access to funds, ensuring the efficient allocation of financial resources to enable the deployment, development, and scaling of renewable energy projects (Banani and Sunarko, 2022; Du et al., 2023). The effectiveness of these frameworks, therefore, largely determines the success and impact of the renewable energy projects they are designed to support.

Through a detailed examination of PGE's green financing framework, this study will provide insights into its effectiveness in promoting the development and expansion of renewable energy projects. This research could also offer potential strategies for improvement, thereby contributing to the broader objective of accelerating the transition towards a sustainable, low-carbon future (Kapa et al., 2022; Taridala et al., 2023; Yunus et al., 2023). This is not only relevant for PGE, but could also provide key learnings for other entities seeking to bolster their renewable energy portfolio, particularly in the geothermal space, and thus contribute to global efforts towards combating climate change and promoting sustainability (Tiawon and Miar, 2023).

This study will further our understanding of the role and impact of green financing in renewable energy development, contributing to the broader academic discourse on sustainable finance and energy transition. The findings could potentially inform policy decisions, corporate strategies, and investment choices, thereby playing a significant role in the broader transition to a sustainable, low-carbon economy.

2. METHODS

This research primarily focuses on the Green Financing Framework (GFF) of PGE. This study is conducted through a qualitative analysis, examining the alignment of PGE's GFF with international guidelines and standards. The research scrutinizes the allocation and management of funds for green projects, assessing the effectiveness and efficiency of the GFF (PGE, 2022). However, the research is inherently limited by the accuracy and comprehensiveness of the primary and secondary data available, which are predominantly derived from PGE's documentation and publicly accessible reports.

The primary data for the research is obtained from PGE's documented GFF, offering insights into the framework's intended application, use of proceeds, project evaluation and selection, management of proceeds, and reporting methods. Secondary data is collated from PGE's annual reports, sustainability reports, and Green Financing Impact Reports. Furthermore, public documents regarding ICMA Green Bond Principles, ASEAN Green Bond Standards, and Green Loan Principles are also scrutinized to understand the international standards adhered to by PGE (ICMA, 2021; ASEAN, 2021; GLP, 2021).

To provide a comprehensive analysis, the research includes a TOWS analysis. This strategic tool extends beyond the classic SWOT analysis, offering actionable insights based on the interaction of internal (strengths and weaknesses) and external (opportunities and threats) factors. Data for the TOWS analysis is derived from the same sources as the primary and secondary data, specifically focusing on the strengths, weaknesses, opportunities, and threats associated with PGE and its GFF.

The TOWS matrix formulated from the collected data visualizes how PGE's strengths and weaknesses interact with the opportunities and threats in its environment. The matrix is divided into four quadrants - Strengths/Opportunities (SO), Weaknesses/Opportunities (WO), Strengths/Threats (ST), and Weaknesses/Threats (WT). Each quadrant contains potential strategies that PGE could adopt, offering a structured approach to consider all strategic perspectives with corresponding action items.

The analysis and discussion stage involves interpreting the implications of the identified strengths, weaknesses, opportunities, and threats, and their interplay. This stage involves discussing how PGE can leverage its strengths to exploit opportunities (SO strategies) or to mitigate threats (ST strategies), overcome weaknesses to exploit opportunities (WO strategies), or minimize weaknesses and avoid threats (WT strategies). The TOWS matrix subsequently informs the recommendations of the study. These recommendations propose strategic actions that PGE could take to enhance its GFF and its alignment with international guidelines and standards. The recommendations are grounded in the interactions identified in the TOWS matrix (Weihrich, 1982).

3. RESULTS AND DISCUSSION

3.1. The Green Financing Framework for Renewable Energy in PT PGE in Indonesia

This paper presents an examination of the green financing framework (GFF) used by PT PGE, a prominent renewable energy company in Indonesia. This case study analysis will delve into the key aspects of the GFF as utilized by PGE, focusing on its goals, operation, eligibility criteria, exclusion criteria, and the potential improvements that can be adopted.

PGE's Green Financing Framework, as detailed in the provided document, aligns closely with several international guidelines and standards for Green Bonds, Green Loans, and Green Sukuks. These include the International Capital Markets Association (ICMA) Green Bond Principles (2021), ASEAN Green Bond Standards (ASEAN GBS), and the Loan Market Association (LMA), Asia Pacific Loan Market Association (APLMA), and

Loan Syndications and Trading Association (LSTA) Green Loan Principles (2021). This aligns it with global best practices.

1. Use of proceeds: In line with ICMA principles and ASEAN GBS, PGE commits to using the proceeds of their Green Financing Transactions (GFTs) for sustainable, environmentally beneficial projects. These primarily involve geothermal energy projects, contributing to the Sustainable Development Goals (SDGs) of renewable energy. The proceeds are clearly earmarked for green projects, such as geothermal energy production. The company also excludes financing any projects that involve fossil fuels, nuclear energy, or any activities deemed illegal, adhering to best practices in green financing. The exclusions criteria effectively avoid financing projects that are inconsistent with sustainable development goals, such as oil, gas, coal, and nuclear power plants.
2. Process for project evaluation and selection: Consistent with international guidelines, PGE has established a Green Financing Committee (GFC) consisting of key company officers, responsible for assessing potential projects based on clear eligibility criteria and ESG targets. This ensures a comprehensive review and decision-making process. Their responsibilities are clearly defined, which includes compliance monitoring and report preparation. This demonstrates a thorough and responsible selection process that aligns with global standards for green financing.
3. Management of proceeds: Again adhering to best practices, PGE aims to maintain full transparency and traceability of the use of the GFTs proceeds. They plan to establish a separate "green" bank account specifically for managing these proceeds, similar to the ring-fencing approach recommended by LMA, APLMA, and LSTA principles. The Treasury department of PGE manages the funds, which are deposited into a separate "green" bank account. A clear time frame (24 months) for full disbursement of the proceeds is also given. This enhances transparency and accountabilit (Banani and Sunarko, 2022).
4. Reporting: Consistent with ICMA Green Bond Principles, PGE commits to issue a dedicated impact report annually, outlining the allocation of net GFT proceeds and the environmental impacts of the eligible Green Projects. They promise to share this report with investors and make it publicly accessible on the company's website, aligning with the high transparency requirements of international green financing standards. A comprehensive reporting framework is in place, including allocation reporting and impact reporting. This enhances transparency and allows for effective monitoring of the project's progress.
5. External review: PGE's intention to engage external auditors to verify its internal tracking method and allocation of funds aligns with global best practices in green financing, as external reviews are integral to ensure credibility and trust in green financing transactions. The involvement of external reviewers adds an extra layer of oversight and credibility to the process.

PGE's Framework exhibits a strong alignment with international green financing standards and guidelines, reflecting a commitment to transparency, responsibility, and the promotion of sustainable projects. Their adherence to these principles not only ensures compliance with global standards but also positions the company as a responsible player in the global push for sustainable finance. The Framework also allows for future amendments, showing flexibility to incorporate further enhancements that may arise from evolving green financing best practices. By explicitly stating this, PGE ensures the Framework's continued alignment with the most current international standards and guidelines.

However, while the Framework aligns with these guidelines, it would be beneficial to see more specificity in the methodologies PGE will use to evaluate the environmental and social impacts of its projects. This would help in ensuring that the projects are contributing effectively towards sustainable development goals. Furthermore, although PGE aims to establish a separate account for managing the green financing proceeds, they could further improve by detailing the system they will use to track and manage these proceeds.

Potential weaknesses could include the speed and efficiency of disbursement of funds to eligible projects, the quality of project selection, and the accuracy and reliability of impact reporting. Additionally, the framework could potentially be more specific about the criteria it uses for project selection (Sinha et al., 2021). For example, it could provide more detailed criteria related to the environmental and social impacts of potential projects.

3.2. TOWS Analysis

TOWS analysis is a strategic tool often utilized to gauge the Threats, Opportunities, Weaknesses, and Strengths (TOWS) inherent in a project or business venture. This tool, extensively documented in academic literature, serves to identify internal and external factors that could impact an organization's achievement of its objectives (Weihrich, 1982). This paper will critically discuss a TOWS analysis for PT PGE, an Indonesian company specializing in geothermal energy production.

In evaluating PGE's strategic landscape, several threats are notable. Key among them is the high cost and risk associated with geothermal energy exploration and production (Gupta, 2015). Another threat stems from potential alterations in government policy or political instability, which could have profound implications for the renewable energy sector (Stadelmann et al., 2014; Hoang and Tuan, 2023). Furthermore, PGE faces competition from other renewable energy firms, a reflection of the increasing interest in this sector. Lastly, as PGE's operations are heavily reliant on technology, disruptions or technical issues could compromise project execution (Wüstenhagen and Menichetti, 2012).

Despite these threats, PGE has multiple opportunities. Firstly, the Indonesian government's commitment to enhancing the share of renewable energy within the nation's energy mix bodes well for PGE. Secondly, Indonesia's geothermal energy industry remains largely untapped, creating a significant opportunity for growth (Suryantoro et al., 2019). Additional opportunities include the global shift towards renewable energy sources, the potential to raise capital through green financing instruments, and the

continuous improvements and innovations in renewable energy technologies (Dereinda and Greenwood 2015; Rizzello, 2022).

However, PGE does have weaknesses. Its heavy reliance on government policy, high capital and operating investment requirements, and challenges related to the operational phases of geothermal energy production stand out (Yudistiro et al., 2020). Furthermore, PGE's primary focus on geothermal projects could limit its potential reach, and the process of project identification and evaluation could be complex and time-consuming.

Nonetheless, PGE boasts numerous strengths, such as being a significant geothermal energy producer in Indonesia, state-owned and backed by Pertamina, and an award-winning company for performance and environmental management. Furthermore, it has several projects in various stages of implementation and has a strong framework in place for managing green financing. Table 1 provides a detailed analysis of the interaction of PGE's strengths, weaknesses, opportunities, and threats.

From the TOWS analysis, we can derive some strategic insights for PGE. For example, to exploit the opportunity of growing awareness for sustainability (O), PGE could work on its weakness of limited scope (W) and consider expanding their portfolio to include other renewable energy sources. Similarly, PGE could use their strength of alignment with international standards (S) to counter the threat of market competition (T) by enhancing their reputation and credibility in the market. Table 2 provides a detailed The TOWS matrix provides strategic insights for PGE.

In light of the TOWS analysis, several recommendations can be put forth for PGE. by leveraging their strengths, addressing their weaknesses, exploiting opportunities, and mitigating threats, PGE can effectively navigate the renewable energy landscape in Indonesia and achieve a sustainable competitive advantage (Setiawan et al., 2021). Firstly, PGE needs to capitalize on the rising global awareness of sustainability and the strong commitment from the Indonesian government towards renewable energy (S1/O1, S2/O2, S3/O3). This can be achieved by continuing to emphasize their alignment with international standards and the transparency of their processes. Regular updates about their projects would also help in enhancing their credibility and attracting more investors (Rizzello, 2022; Yilan et al., 2023).

Secondly, PGE should consider diversifying their energy sources beyond geothermal, enabling them to adapt quickly to any legislative changes (W1/O1, W1/T1). This would reduce their reliance on government policy and regulations, and provide them with a competitive advantage over other renewable energy companies (Hoang and Tuan, 2023). Moreover, PGE should also invest in technological advancements to mitigate any tech-related challenges and streamline their project disbursement process (W3/O3, W2/T2). This will allow them to execute projects more

Table 1: TOWS analysis

Threats (T):
1. High cost and risk associated with the exploration and production of geothermal energy.
2. Potential changes in government policy or instability in the political environment. Any alteration in the legislative environment regarding renewable energy, green financing or environmental protection could affect the Framework. Changes in legislation might impact the implementation, investment, and the success of projects.
3. Market competition from other renewable energy companies. Given the increasing interest in green energy, PGE could face stiff competition in the market for both investors and projects.
4. As PGE's projects are heavily reliant on technology, any tech-related challenges or disruptions could threaten the successful execution of the projects.

Opportunities (O):
1. Strong government commitment to increase the share of renewable energy in the national energy mix. If the Indonesian government continues to promote renewable energy and green financing, PGE could leverage this support to their advantage.
2. Untapped geothermal energy industry potential in Indonesia.
3. Global shift towards renewable and clean energy sources.
4. Ability to raise capital through green financing instruments.
5. The increased global emphasis on sustainability presents an opportunity for PGE to attract more investors and engage in more projects.
6. Continuous improvements and innovations in renewable energy technologies could enable PGE to implement their projects more efficiently and cost-effectively.

Weaknesses (W):
1. Heavy reliance on government policy and regulation.
2. High capital and operating investment requirements.
3. Challenges associated with exploration and operational phases of geothermal energy production.
4. Currently, the Framework appears to focus primarily on geothermal projects, which might limit its reach and potential.
5. The process of identifying, evaluating, and selecting eligible projects could be a complicated and time-consuming task that requires specific expertise.
6. The specified disbursement period may pose a challenge if any unforeseen delays occur.

Strengths (S):
1. Large geothermal energy producer in Indonesia.
2. State-owned and backed by Pertamina, Indonesia's largest oil and gas company.
3. Multiple award-winning company in terms of performance excellence and environmental management.
4. Has a variety of geothermal projects in different stages, from commercial operations to exploration phases.
5. Long-term Power Purchase Agreement and Steam Sales Contract with PT PLN (Persero).
6. The Green Financing Framework is clearly defined with processes for evaluation, selection, and management of projects, which demonstrates a robust strategy.
7. The Framework is developed in alignment with multiple respected international standards, enhancing its credibility.
8. The intention to issue annual reports and provide comprehensive information about the projects is a significant strength, as it promotes trust among stakeholders.

Table 2: TOWS matrixs

	Strengths (S)	Weaknesses (W)
Opportunities (O)	S1/O1: Leverage growing awareness of sustainability by highlighting alignment with international standards and transparency. S2/O2: Use government support to promote projects aligned with global standards. S3/O3Leverage the position as a major geothermal energy producer and the support of Pertamina to capitalize on the government's commitment to renewable energy and the largely untapped geothermal potential.	W1/O1: Diversify energy sources beyond geothermal to capitalize on the sustainability trend. W5/O1: Develop expertise in green project evaluation and leverage government support. W3/O3: Streamline processes and adopt advanced technologies to make project disbursement more efficient. W2/O2: Use green financing instruments to overcome the high capital investment requirements and take advantage of the untapped geothermal energy industry in Indonesia.
Threats (T)	S1/T1: Emphasize the alignment with global standards to mitigate effects of legislative changes. S3/T2: Stay ahead of tech disruptions by maintaining transparency and regular updates. S1/T3: Leverage strong framework and transparency to compete in the market. Utilize the long-term Power Purchase S5/T1: Agreement and Steam Sales Contract with PT PLN (Persero) and the backing of Pertamina to mitigate the risks associated with geothermal energy exploration and production.	W1/T1: Prepare for legislative changes by broadening the scope of projects. W2/T2: Invest in technological upgradations to mitigate tech challenges. W3/T3: Differentiate from competitors by improving project selection and evaluation processes. W3/T2: To counter the potential changes in government policy or political instability, PGE can focus on enhancing its operational efficiency and diversify its energy portfolio to reduce reliance on government regulations.

efficiently and cost-effectively, even in the face of high capital and operational investment requirements (Hoan, 2022).

Finally, PGE should take steps to improve their project selection and evaluation processes. This will not only allow them to differentiate themselves from competitors (W3/T3), but also counter potential threats from changes in government policy or political instability (Yanto et al., 2021; Hoang and Tuan, 2023). By enhancing their operational efficiency and diversifying their energy portfolio, PGE can ensure a steady growth trajectory, even in a fluctuating political environment (W3/T2).

4. CONCLUSION

The paper provides an assessment of the Green Financing Framework (GFF) for renewable energy, with a focus on PT PGE in Indonesia. The research includes a case study with TOWS analysis, which extends beyond the classic SWOT analysis, offering actionable insights based on the interaction of internal (strengths and weaknesses) and external (opportunities and threats) factors. The TOWS matrix formulated from the collected data visualizes how PGE's strengths and weaknesses interact with the opportunities and threats in its environment. The matrix is divided into four quadrants -Strengths/Opportunities (SO), Weaknesses/Opportunities (WO), Strengths/Threats (ST), and Weaknesses/Threats (WT). Each quadrant contains potential strategies that PGE could adopt, offering a structured approach to consider all strategic perspectives with corresponding action items.

The paper highlights the challenges associated with exploration and operational phases of geothermal energy production, as well as the heavy reliance on government policy and regulation. PGE's Green Financing Framework is largely in line with the international guidelines, demonstrating a strong commitment to sustainable finance. With a few improvements to enhance transparency and effectiveness, PGE can fortify its position as a sustainable financing leader. The paper concludes that the GFF has the potential to support the development of renewable energy projects, but there are limitations that might limit its reach and potential. The process of identifying, evaluating, and selecting eligible projects could be a complicated and time-consuming task that requires specific expertise. The specified disbursement period may pose a challenge if any unforeseen delays occur.

This paper can be useful for policymakers, investors, and other stakeholders interested in renewable energy projects in Indonesia. It can help them understand the challenges and opportunities associated with geothermal energy production and the potential of the Green Financing Framework (GFF) to support the development of renewable energy projects. The paper also highlights the limitations of the GFF, which could be useful for policymakers and investors to consider when evaluating the feasibility of renewable energy projects.

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