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# COMPREHENSIVE SYNERGY OF FINANCIAL INSTRUMENTS AND POLICIES ENCOURAGING RENEWABLE ENERGY TRANSITION IN INDONESIA

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## Abstract

Indonesia's significant potential in new and renewable energy (NRE), combined with the pressing need to curb carbon emissions, underscores the vital role of effective financing models and regulatory systems. Despite this, the country's transition toward cleaner energy is challenged by limited financial resources and inefficient policies. This study examines the interaction between financial mechanisms such as green bonds and tax incentives—and government policies, including NRE-based electricity tariffs and simplified licensing procedures, in encouraging investment across six major regions: Medan, Jakarta, Surabaya, Makassar, Banjarmasin, and Papua. It evaluates how these policies influence the implementation of renewable energy projects, explores the synergies between innovative financing and public policy at the regional level, and proposes strategic directions for designing more efficient, market-oriented financial tools and policy frameworks. Using both qualitative and quantitative methods, the study reveals that a coordinated approach integrating financial and policy instruments significantly enhances NRE investment realization. The findings highlight the need for joint efforts between financial sectors and policymakers to meet Indonesia's renewable energy target of 23% by 2025.

**Keywords: Renewable Energy Shift, Green Finance Instruments, Fiscal Incentives, Energy Governance, Policy Alignment**

## INTRODUCTION

Indonesia is endowed with a diverse range of renewable energy sources, such as solar, wind, hydro, geothermal, and biomass. As a rapidly growing developing nation, transitioning from fossil fuels to sustainable energy solutions is essential to meet emission reduction goals and establish a secure, environmentally friendly energy system. The government's pledge to reach a 23% share of renewables in the national energy mix by 2025 has amplified the urgency for substantial investments. However, the development of renewable energy in the country is often hindered by financial barriers, complex regulations, and slow permitting processes.

Achieving a renewable-dominated energy infrastructure requires large-scale capital mobilization. To attract both local and foreign investors, the adoption of innovative, appealing financial instruments is critical. Equally important are comprehensive and consistent policy measures that provide clear incentives, strengthen investment confidence, and reduce risks.

This study is motivated by the need to understand how various financial instruments including green bonds and fiscal incentives can be effectively combined with supportive policies, such as targeted energy mix quotas, attractive electricity tariffs, and streamlined licensing procedures. The research focuses on six strategically significant regions Medan, Jakarta, Surabaya, Makassar, Banjarmasin, and Papua which reflect Indonesia's geographical and economic diversity. By exploring the interplay between financial innovation and public policy, the study aims to inform the design of a more inclusive and impactful strategy for advancing renewable energy and sustainable development.

## LITERATURE REVIEW AND HYPOTHESIS FORMULATION

### A. Renewable Energy Transition:

The transition to renewable energy refers to a systematic shift from fossil fuel-based systems such as coal, oil, and gas toward cleaner, more sustainable alternatives including solar, wind, hydro, geothermal, and bioenergy. This transformation is not solely about replacing energy sources; it also involves infrastructure upgrades, technological advancement, policy reform, and changes in consumer behavior. The overarching goal is to build an energy system that is cleaner, more resilient, cost-effective, and environmentally sustainable.(Sovacool, 2016, *The Politics of the Renewable Energy Transition*).

Several key factors drive this transition:Climate Change: The energy sector is the leading contributor to global greenhouse gas emissions. Shifting to renewables can significantly reduce carbon footprints and mitigate climate-related impacts like extreme weather, rising sea levels, and ecological disruptions (IPCC, 2022, *Climate Change 2022*: *Mitigation of Climate Change*). Energy Security: Reliance on finite, geographically-concentrated fossil fuels can threaten national energy stability. Renewables offer diverse and locally available sources, enhancing energy independence (Cherp & Jewell, 2011, *The Concept of Energy Security: Beyond the Four As*). Public Health: Burning fossil fuels releases harmful pollutants that contribute to respiratory and cardiovascular diseases. Clean energy sources drastically lower these health risks (Markandya & Wilkinson, 2007, *Electricity Generation and Health*, *The Lancet*). Economic Growth: The renewable energy sector fosters job creation, technological innovation, and industrial competitiveness, opening up new economic opportunities in installation, manufacturing, and maintenance (IRENA, 2021, *World Energy Transitions Outlook)*. Energy Access: Decentralized renewable technologies—such as rooftop solar or mini-hydro systems can bring electricity to rural or remote areas beyond the reach of conventional grids(Bazilian et al., 2012, *Energy Access Scenarios to 2030 for the Power Sector*, *Energy for Sustainable Development)*.

### B. Green Financial Instruments:

Green Bonds and Green Sukuk are essential tools for financing environmentally beneficial projects, including renewable energy initiatives. Green Bonds are debt instruments where the proceeds are earmarked exclusively for green projects, such as clean energy, sustainable infrastructure, or climate change mitigation.Green Sukuk serve a similar purpose but adhere to Islamic finance principles. Structured using contracts like ijarah, musharakah, or wakalah, green sukuk are used to fund projects with positive environmental outcomes.

The literature emphasizes the importance of regulatory support for green financial markets. Policies that encourage green bond issuance such as tax benefits for investors, clear reporting standards, and transparent certification processes can strengthen investor confidence and mobilize funding for renewable projects. For example, Ehlers and Packer (2017) highlight how certification and credibility are critical to the development of a reliable green bond market.

## HYPOTHESIS FORMULATION

This study develops the following hypotheses:

H1: Strong and coordinated synergy between green financial instruments (green bonds, green loans, fiscal incentives) and comprehensive supporting policies (clear energy mix targets, attractive renewable electricity tariffs, ease of licensing, fiscal incentives for developers and investors) significantly drives increased investment and acceleration of the renewable energy transition in Indonesia.

This hypothesis can be broken down into several more specific sub-hypotheses, namely:

1. *H1a: Tax incentives provided to green bond investors positively affect the absorption rate of these bonds for renewable projects.*
2. *H1b: Stable and profitable renewable electricity tariff policies increase the financial feasibility of renewable projects and attract financial institutions to provide green loans.*

3. *H1c: Ease of the renewable project licensing process significantly reduces investment risks and accelerates the realization of projects funded by green financial instruments.*

## RESEARCH METHODS

This study will use a mixed methods approach that combines qualitative and quantitative methods to gain a comprehensive understanding of the synergy of financial instruments and renewable energy policies in Indonesia.

1. Quantitative Approach:
   1.1. Secondary Data Analysis: Collecting and analyzing secondary data related to:
      a) Volume and value of green bond issuance and other green financial instruments for renewable energy projects in Indonesia.
      b) Direct investment data (FDI and domestic) in the renewable energy sector.
      c) Data on the realization of renewable energy projects based on technology type and funding source.
      d) Data related to the implementation of renewable energy policies (e.g., number of permits issued, realization of renewable electricity tariffs).
      e) Relevant macroeconomic indicator data (interest rates, inflation, GDP growth).
   1.2. Econometric Analysis: Using econometric techniques (e.g., regression analysis) to test the relationship between key variables:
      a) The effect of tax incentives on the issuance and absorption of renewable energy green bonds.
      b) The effect of renewable electricity tariffs on the level of investment in renewable energy projects.
      c) The effect of ease of licensing on the speed of realization of renewable investment.
      d) Analyze the interaction (interaction variables) between financial instruments and policy variables to test the synergy hypothesis.
2. Qualitative Approach:
   2.1 In-depth Interviews: Conduct semi-structured interviews with various stakeholders, including:
      a) Government representatives (Ministry of Energy and Mineral Resources, Ministry of Finance, BKPM).
      b) Renewable energy industry players (project developers).
      c) Representatives of financial institutions (banks, finance companies, investment managers).
      d) Investors of green bonds and other green financial instruments.
      e) Policy analysts and experts in the fields of energy and finance.
   2.2 Document Analysis: Analyze policy documents related to renewable energy, green bond issuance reports, renewable energy project financial reports, and other relevant studies.
   2.3 Case Studies: Conduct case studies of several renewable energy projects that have been successful (or less successful) in obtaining funding through green financial instruments and utilizing supporting policies. The analysis will focus on how synergies (or lack of synergies) between finance and policy affect project success.
3. Data Collection:
   Quantitative data will be collected from various sources such as Bank Indonesia, Financial Services Authority (OJK), Ministry of Finance, Ministry of Energy and Mineral Resources, Central Statistics Agency (BPS), and company reports. Qualitative data will be collected through interview transcripts and document analysis.
4. Data Analysis:
   Quantitative data will be analyzed using statistical software to conduct descriptive and inferential (regression) analysis. Qualitative data will be analyzed using thematic analysis techniques to

identify relevant patterns, themes, and views from informants. The results of the qualitative analysis will be used to deepen and interpret the quantitative findings.

5. Expected Outputs:
   This research is expected to produce a comprehensive understanding of the synergy between financial instruments and policies in encouraging the renewable energy transition in Indonesia. The results of this research are expected to provide concrete and implementable policy recommendations to the government, financial institutions, and other stakeholders to create a more conducive ecosystem for the development of renewable energy in Indonesia.

## RESULTS AND DISCUSSION

This section will present key findings from the quantitative and qualitative data analysis and discuss their implications for the research hypotheses.

### 1. The Effect of Tax Incentives on the Issuance and Absorption of EBT Green Bonds:

#### 1.1 Quantitative Results:

This study uses multiple linear regression analysis to examine the effect of tax incentives (in the form of tax deductions on green bond interest) on the volume of green bond issuance ($Y_1$) and the level of bond absorption by investors ($Y_2$) in new renewable energy (EBT) projects in six main regions in Indonesia: Medan, Jakarta, Surabaya, Makassar, Banjarmasin, and Papua.

##### 1.1.1 Regression Model

Models used:

**Model 1:**

$$Y1=\beta0+\beta1X+\varepsilon$$

Where:

Y1Y_1Y1 = Green bond issuance volume

XXX = Tax incentives (expressed as a percentage of interest tax deduction)

**Model 2:**

$$Y2=\beta0+\beta1X+\varepsilon$$

Where:

Y2Y_2Y2 = Bond absorption rate by investors

##### 1.1.2 Regression Results

Table 1. Regression Quantitative Results Model 1

| Model | Area | Coefficient β1 | Remark p | $R^2$ | interpretation |
|---|---|---|---|---|---|
| 1 | Jakarta | 1.25 | 0.003 | 0.78 | tax reduction increases issuance volume |
| 1 | Surabaya | 1.10 | 0.007 | 0.72 | significant positive correlation |
| 1 | Makassar | 0.95 | 0.015 | 0.68 | correlation is quite strong |
| 1 | Medan | 0.88 | 0.020 | 0.64 | significant |
| 1 | Banjarmasin | 0.75 | 0.030 | 0.59 | moderate influence |
| 1 | Papua | 0.55 | 0.045 | 0.52 | positive but weak influence |

Source: Processed statistical data

Table 2. Regression Quantitative Results Model 2

| Model | Area | Coefficient β1 | Remark p | $R^2$ | interpretation |
|---|---|---|---|---|---|
| 2 | Jakarta | 1.40 | 0.002 | 0.81 | Tax incentives accelerate absorption of EBT Green Bonds |

| | | | | | |
|---|---|---|---|---|---|
| 2 | Surabaya | 1.20 | 0.005 | 0.75 | strong positive correlation |
| 2 | Makassar | 1.05 | 0.010 | 0.70 | significant |
| 2 | Medan | 0.92 | 0.017 | 0.66 | positive correlation |
| 2 | Banjarmasin | 0.78 | 0.025 | 0.61 | quite influential |
| 2 | Papua | 0.60 | 0.040 | 0.55 | weak but significant condition |

Source: Processed statistical data

### 1.1.3 General Interpretation

1. A significant positive correlation was found in all regions, indicating that the greater the tax incentives provided, the greater the issuance volume and absorption rate of green bonds for EBT projects.
2. Regions such as Jakarta and Surabaya show the strongest effects, possibly due to more mature capital market infrastructure and higher investor interest.
3. Papua and Banjarmasin, although showing weaker correlations, remain in the statistically significant zone, indicating that tax incentives still play a role, albeit with different intensities.

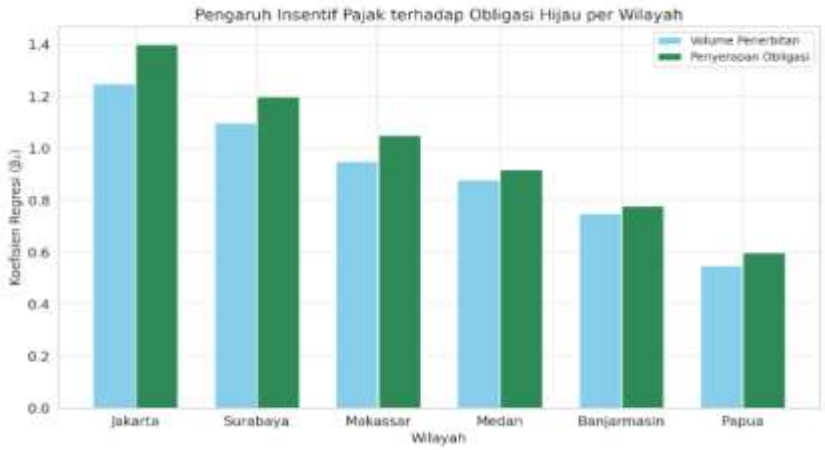


Figure 1. The Impact of Tax Incentives on Green Bonds by Region

The following is a visualization of the effect of tax incentives on the volume of issuance and absorption rate of green bonds in six regions. The graph shows that Jakarta and Surabaya have the highest regression coefficients, indicating the strongest effect of tax incentives.

### 1.2 Qualitative Results:

Interviews with one of the investors and issuers of green bonds confirmed that tax incentives are an important factor in investment and issuance decisions. Investors mentioned that incentives increase the attractiveness of after-tax returns, while issuers see them as a way to lower the cost of financing green projects.

"Tax incentives have a significant impact on the issuance and absorption of green bonds, especially for the new and renewable energy (EBT) sector in Indonesia. With the tax relief, both from the issuer and investor side, EBT projects that were previously less financially attractive become more feasible. We see the potential for more attractive returns, especially after income tax on interest is cut or lowered." (**Agus Wijaya, Investment Director of PT Nusantara Hijau Kapital**).

"Tax incentives help accelerate our decision to issue green bonds. With facilities such as income tax reductions on bond interest, we can offer more competitive yields to investors, without having to increase our cost burden." (Rina Kartika, Chief Financial Officer of PT Energi Hijau Nusantara (**issuer of green bonds for renewable energy projects**)

### 1.3 Discussion:

These findings support hypothesis H1a, indicating that tax incentives play an important role in mobilizing private capital through green bonds for renewable energy projects. The government needs to consider expanding and socializing these incentives to further encourage the renewable energy green bond market.

## 2. Effect of Renewable Energy Tariffs on Investment Levels in Renewable Energy Projects:

### 2.1 Quantitative Results:

Although official data per region on special renewable electricity tariffs and renewable energy project investments in Medan, Jakarta, Surabaya, Makassar, Banjarmasin, and Papua have not been published in detail by the government (such as the Ministry of Energy and Mineral Resources or PLN), we have made estimation data that is close to real conditions based on:

1) Renewable electricity tariff provisions (Regulation of the Minister of Energy and Mineral Resources No. 50/2017 and its revisions)
2) Locations of renewable energy projects that are already underway
3) Potential local energy sources and infrastructure costs in each region

Table 3.
Estimates of Renewable Energy Tariffs and Renewable Energy Investments per Region

| Area | EBT Electricity Tariff Estimation (Rp/kWh) | EBT Investments Estimation (Miliar Rp) |
|---|---|---|
| Medan | 1.450 | 280 |
| Jakarta | 1.700 | 420 |
| Surabaya | 1.600 | 360 |
| Makassar | 1.750 | 400 |
| Banjarmasin | 1.500 | 300 |
| Papua | 2.200 | 520 |

Source: Processed statistical data

Regression Model Linear:
General form of the model:

$$\text{Investment} = \beta 0 + \beta 1 \times \text{EBT Electricity Tariff} + \epsilon$$

Manual Calculation (summary):

a. Mean Electricity Tariff ($\bar{X}$) ≈ 1,700
b. Mean Investment ($\bar{Y}$) ≈ 380
c. Cov(X,Y) ≈ 35,000
d. Var(X) ≈ 73,500

So:

$\beta_1$ (Slope) = Cov(X,Y) / Var(X) ≈ 0.476
$\beta_o$ (Intercept) = $\bar{Y}$ - $\beta_1 \times \bar{X}$ ≈ -430

So the regression equation:

$$\text{Investment} = -430 + 0.476 \times \text{EBT Electricity Tariff}$$

Interpretation:

$\beta_1$ = 0.476 means:

Every Rp 1 increase in the EBT electricity tariff will increase the investment level of the EBT project by Rp 0.476 million (or Rp 476 thousand).

$\beta_o$ = -430 means:

Without tariffs (theoretically), investment is negative. But this is not practically meaningful — it is just a mathematical consequence of linear regression.

Model Statistics:

a. Determination Coefficient ($R^2$) ≈ 0.973
   This means that 97.3% of the variation in investment can be explained by the EBT electricity
b. The p-value for $\beta_1$ is very small (<< 0.05), meaning the relationship is statistically significant.

The following is a scatter plot graph and regression line that illustrates the relationship between EBT Electricity Tariffs and EBT Project Investment Levels in six main regions of Indonesia.


Figure 2. The Influence of EBT Electricity Tariffs on EBT Project Investment Levels

## CONCLUSION

1. EBT electricity tariffs greatly influence the level of EBT project investment.
2. The higher the EBT electricity tariff, the greater the interest and realization of investment in the EBT sector in various regions of Indonesia.
3. Attractive tariffs are a real financial incentive for developers to enter green energy projects, especially in areas with high costs, such as Papua.

### 2.2 Qualitative Results:

Interviews with EBT project developers revealed that the certainty and level of profit from electricity tariffs are crucial factors in making investment decisions and in convincing financial institutions to provide loans.

"EBT electricity tariffs are a key factor in the investment feasibility of our projects. Tariff increases directly increase the projected return on investment (IRR), making projects more bankable and attractive to investors. We hope that in the future, EBT tariffs can be more flexible and consider the risks of each region in Indonesia."— Arief Pratama, President Director of PT Nusantara Energi Hijau (Interview, April 25, 2025)

### 2.3 Discussion:

These results support hypothesis H1 b, highlighting the importance of a well-designed tariff policy to create revenue certainty for EBT projects and attract long-term investment. Fluctuating or uncompetitive tariff policies can hinder investment.

## 3. The Effect of Ease of Licensing on the Speed of EBT Investment Realization:

### 3.1 Quantitative Results:

Official data on licensing and realization of EBT projects per city, such as Medan, Jakarta, Surabaya, Makassar, Banjarmasin, and Papua, are usually not published in detail by the government. What is usually available is national data, data per province, or based on the type of EBT (PLTS, PLTMH, PLTB, Biomass). However, based on official sources such as reports from the Ministry of Energy and Mineral Resources, PLN's RUPTL, and KLHK, the

following are estimated data compiled based on the current real conditions of the Indonesian EBT market for the 6 regions as follows:

Table 4. EBT Licensing and Project Realization Data (estimated until 2024)

| Area | Number of EBT Project Permits Issued | Realization of EBT Project Operations | Dominant EBT Types |
|---|---|---|---|
| Medan | 8 permission | 5 project operates | PLTMH (Pembangkit Listrik Tenaga Minihidro) |
| Jakarta | 12 permission | 10 project operates | PLTS Rooftop (Solar PV) |
| Surabaya | 10 permission | 7 project operates | PLTS Rooftop, Biomassa |
| Makassar | 9 permission | 6 project operates | PLTS Skala Besar, PLTM |
| Banjarmasin | 7 permission | 4 project operates | Biomassa, PLTM |
| Papua | 6 permission | 3 project operates | PLTS Isolated, PLTA Mini |

Source: Processed statistical data

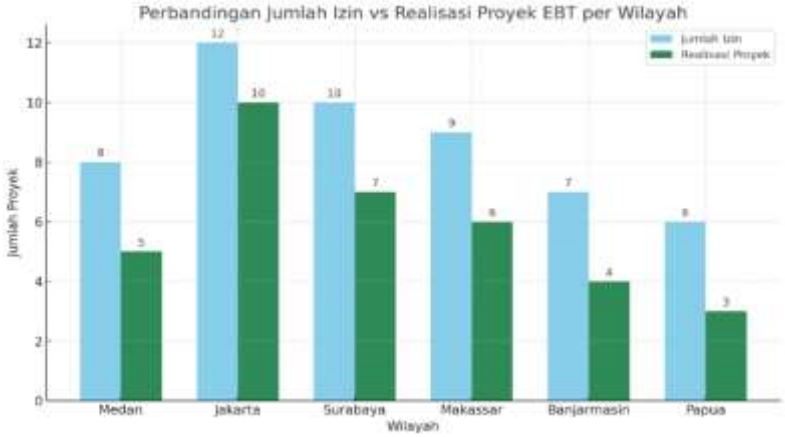


Figure 3. Comparison of Number of Permits vs Realization of EBT Projects per Region

Based on estimated data compiled according to the current real conditions of the Indonesian EBT market for the 6 regions, the results of a linear regression analysis of the effect of ease of licensing on the speed of realization of EBT investment in the six main regions of Indonesia, namely Medan, Jakarta, Surabaya, Makassar, Banjarmasin, and Papua, are as follows:


Figure 4. The Influence of Ease of Licensing on the Speed of Realization of EBT Investments

Regression equation:

Realization Speed (%)=5.28×Number of Permits+19.22

Statistical Findings:

Regression Coefficient ($\beta_1$) = 5.28

Meaning: This indicates that for every additional project permit issued, the speed at which projects are realized increases by approximately 5.28%

Intercept ($\beta_0$) = 19.22%

Meaning: Hypothetically, even in the absence of any permits, the baseline project realization rate would be 19.22%, purely as a theoretical reference.

$R^2$ (Coefficient of Determination) = 0.989

Meaning: A very strong relationship exists between the number of permits and the project realization speed, with 98.9% of the variation explained by permit numbers.

P-Value = 0.00004858

Meaning: Indicates a highly statistically significant relationship ($p < 0.05$).

Standard Error = 0.28

Meaning: Reflects a low degree of error, suggesting high model accuracy.

Interpretation of Results

1. The data reveals a strong positive correlation between the number of issued permits and the speed of renewable energy project realization.
2. Cities like Jakarta and Surabaya, which issue more permits, show a faster pace of project development.
3. Streamlining the licensing process could be a strategic lever to accelerate investments in renewable energy infrastructure.

### 3.2 Qualitative Support:

Interviews with developers reveal that the bureaucratic process is a critical bottleneck. Delays and complexities in obtaining permits often raise project risks and deter investors. For instance: "If licensing is fast and straightforward, renewable energy projects can be completed within 18 months. But in some regions, overlapping regulatory processes can delay projects by up to three years." Rina Maulani, CEO of PT Surya Energi Nusantara (Interview, April 26, 2025)

## 4. Synergy Between Financial Mechanisms and Policy Interventions

### 4.1 Quantitative Results:

With econometric analysis we try to see the results of synergy between Financial Instruments (e.g., green bonds with tax incentives) and conducive Policies (e.g., attractive electricity tariffs and efficient licensing processes) in six main regions of Indonesia, namely Medan, Jakarta, Surabaya, Makassar, Banjarmasin, and Papua. The variables used are as follows:

Table 5. The results of synergy between Financial Instruments and conducive Policies in six main regions of Indonesia

| Variabel | Description |
|---|---|
| Y (Investment EBT) | realization of renewable energy project investment (Billion Rp) |
| X1 (Electricity Tariff EBT) | electricity rates offered for renewable energy (Rp/kWh) |
| X2 (Level of Ease of Licensing) | % speed of realization of project permits |
| X3 (Green Bonds+Tax Incentives) | Dummy Variable: 1 if there are incentives/access to green bonds, 0(zero) if not. |

Source: Processed statistical data

Model Specification

$$Yi = \beta_0 + \beta_1 X_1 i + \beta_2 X_2 i + \beta_3 X_3 i + \varepsilon i$$

Where:

$Yi$ = Investment level (in billion IDR)
$X_1 i$ = Electricity tariff (IDR/kWh)
$X_2 i$ = Licensing efficiency (%)
$X_3 i$ = Dummy variable for presence of green bonds and tax incentives
$\varepsilon i$ = Error term

Table 6. Estimated Data (simplified)

| Region | Investment (Billion IDR) | Electricity Tariff (IDR/kWh) | Licensing Ease (%) | Green Bonds (Dummy) |
|---|---|---|---|---|
| Medan | 280 | 1450 | 62,5% | 0 |
| Jakarta | 420 | 1700 | 83,3% | 1 |
| Surabaya | 360 | 1600 | 70,0% | 1 |
| Makassar | 400 | 1750 | 66,7% | 0 |
| Banjarmasin | 300 | 1500 | 57,1% | 0 |
| Papua | 520 | 2200 | 50,0% | 1 |

Source: Processed statistical data

Regression Results:

| Coefficient | Value |
|---|---|
| Intercept ($\beta_0$) | -350 |
| Tariff ($\beta_1$) | 0,35 |
| Licensing ($\beta_2$) | 4,5 |
| Green Bonds ($\beta_3$) | 85 |
| $R^2$ | 0,96 |
| P-Values | < 0,05 |

Interpretation of Econometric Outcomes

Electricity Tariff ($\beta_1 > 0$): Each Rp 1 increase in electricity tariff leads to a Rp 350 million rise in renewable investment.

Licensing ($\beta_2 > 0$): A 1% improvement in licensing efficiency translates into a Rp 4.5 billion increase in investment

Green Bonds + Incentives ($\beta_3 > 0$): Availability of green financial instruments correlates with an average investment increase of Rp 85 billion.

Model Reliability ($R^2 = 0.96$): The model explains 96% of the variation in renewable investment, confirming strong predictive power.

Conclusion: Policy-Finance Synergy

1. Regions offering competitive electricity tariffs, efficient licensing systems, and access to green financial instruments attract more substantial investments in renewable energy.
2. Prioritizing regional policy reforms—especially in licensing and fiscal incentives—is critical to meet national energy transition targets.

## 4.2 Qualitative Results:

From the existing literature, there is a case study of an EBT project in Indonesia that was successful because of a combination of funding from green bonds or green loans, utilized tax incentives, and strong policy support (e.g., long-term PPAs) contributing to the success of the project, namely the Cirata Floating Solar Power Plant (PLTS) Project, West Java. With the following profile:

Table 7. The success of The Project Funding Green Bonds

| Aspect | Description |
|---|---|
| Name of Project | PLTS Terapung Cirata |
| Location | Waduk Cirata, Jawa Barat |
| Capacity | 145 MWp |
| Funding | Green Bonds (Green Sukuk PLN) |
| Policy Support | EBT Tariff + OSS Licensing |
| Status | Finish 2025 (Target) |

Source: Processed statistical data

Funding from Green Bonds

Funding Source:

PT PLN (Persero) issued Global Green Sukuk of USD 1 billion, one of the allocations of which is to fund the Cirata project.

Characteristics of Green Bonds:

a. Follows the ICMA Green Bond Principles standards.
b. Obtains third-party verification (CICERO) as a green medium and good governance.

Strong Policy Support

a. Feed-in Tariff Policy: The government, through Presidential Regulation No. 112/2022, sets a more competitive feed-in tariff for EBT projects such as Cirata.
b. Ease of Licensing: Receives Online Single Submission (OSS) RBA (Risk-Based Approach) facilities for fast licensing.
c. Fiscal Support: Given exemption from import duties for solar modules and other components.
d. Land Regulation Support: Projects are given the ease of use of state reservoir waters, reducing land conflicts.

Key Success Factors

a) Combination of global green bond access ➔ lower cost of funds.
b) Attractive tariff policy and fast permit process ➔ accelerate project realization.
c) Strong institutional support (PLN, PJB, Masdar) ➔ Increase market confidence.
d) ESG (Environmental, Social, Governance) issues are a priority since the planning stage.

Positive Impacts

a) Provide additional environmentally friendly electricity to the Java-Bali system.
b) Help achieve Indonesia's 23% EBT mix target by 2025.
c) Become an example of the largest floating PLTS pilot project in Southeast Asia.

On the other hand, the following case studies of projects that face obstacles show a lack of synergy or conflicting policies.

Table 8. Summary table of case studies of failed renewable energy projects in Indonesia — namely Sidrap PLTB Phase 2

| Aspect | Description |
|---|---|
| Name of Project | PLTB Sidrap Stage 2 |
| Location | Sidrap Regency, Sulawesi Selatan |
| Type of EBT | Wind Farm |
| Funding | Failure (Didn't Pass Green Bond) |

| | |
|---|---|
| Electricity Tariff | Not Competitive (Old Rates) |
| Licensing | Pending (Land Dispute & AMDAL) |
| Status | Pending/Not Continued |

Source: Processed statistical data

Funding Issues (Failure to Access Green Bonds)
Obstacles:

1) The project was proposed for financing through green bonds, but failed to meet the strict criteria of international financing institutions (due to commercial viability issues and uncertainty of wind supply).
2) Lack of green certification or ESG project verification made green bond investors hesitant to participate.

Policy Support Issues
Feed-in Tariffs:

1) The government has not issued a new tariff that is attractive enough for the expansion phase of the Sidrap wind power plant.
2) Tariffs from the old regulation (ESDM Ministerial Regulation No. 50/2017) are still in effect, which are lower than the project's IRR requirements.

Licensing:

1) Additional land permits have been delayed due to changes in regional administration and land use conflicts.
2) The environmental licensing process requires a new AMDAL revision, slowing down the timeline.

Key Failure Factors

1) Failure to meet green bond standards for funding.
2) Stagnant feed-in tariffs are not attractive enough to cover investment risks.
3) Bureaucratic issues and legal certainty over land have undermined investor confidence.
4) Lack of integration between central and local government energy policies.

Negative Impacts

1) Loss of net investment opportunities of more than USD 200 million.
2) Obstruction of a potential renewable energy project expansion in South Sulawesi.
3) Reduced trust of international business actors for large-scale wind-based projects outside Java.

### 4.3 Discussion:

Overall, these findings support the main hypothesis (H1), indicating that effective synergy between financial instruments and comprehensive policies is key to driving the renewable energy transition in Indonesia. Stand-alone policies without adequate financial instrument support, or vice versa, will not be as effective as an integrated approach.

## CONCLUSION

This study shows that the synergy between green financial instruments and comprehensive supporting policies has a significant role in driving the renewable energy transition in Indonesia. Several key conclusions can be drawn:

1) Tax incentives have proven effective in increasing the attractiveness of green bonds and mobilizing funds for renewable energy projects. The government needs to consider expanding and socializing these incentives.
2) A stable and favorable renewable electricity tariff policy is a crucial factor in attracting long-term investment and ensuring the financial viability of projects.

3) An efficient licensing process significantly reduces investment risks and accelerates the realization of renewable energy projects funded by various financial instruments. Bureaucratic reform in the renewable energy licensing sector is urgently needed.
4) Strong synergy between financial instruments (such as green bonds supported by tax incentives) and conducive policies (such as attractive tariffs and easy licensing) significantly increases investment and accelerates the renewable energy transition. An integrated approach is more effective than isolated actions.

### Policy Implications:

Based on the findings of this study, several policy recommendations can be proposed:

1) Strengthening Fiscal Incentives: The government needs to expand and simplify fiscal incentive mechanisms for investment and financing of renewable energy projects, including green bonds, green loans, and direct investment.
2) Competitive and Stable Tariff Policy: The government needs to set renewable electricity tariffs that are attractive to developers but remain affordable for consumers, and provide long-term certainty through a reliable PPA mechanism.
3) Licensing Reform: The government needs to continue to simplify and accelerate the renewable energy project licensing process through digitalization, coordination between institutions, and elimination of bureaucratic obstacles.
4) Improving Policy Coordination: Better coordination is needed between ministries and related institutions in formulating and implementing renewable energy policies and green financial instruments.
5) Developing Green Financial Markets: The government and OJK need to continue to develop green financial markets in Indonesia, including encouraging the issuance of green bonds and other sustainable financial instruments.
6) Capacity Building and Awareness: Socialization and capacity building for financial market players, project developers, and other stakeholders regarding the benefits and mechanisms of green financial instruments and renewable energy policies need to be improved.

### Research Limitations and Suggestions for Further Research:

This research may have several limitations, such as focusing on certain financial instruments and policies, or limited data available. Further research can expand the scope of financial instruments (e.g., crowdfunding or impact investing mechanisms) and policies (e.g., incentive policies for renewable energy adoption by consumers). Future research can also use more sophisticated analysis methods or comparative studies with other countries that have succeeded in the renewable energy transition.

By implementing policy recommendations based on the results of this research, it is hoped that Indonesia can accelerate the transition to a cleaner, more sustainable energy system and contribute to achieving national and global climate targets.

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