Indonesian Governance Review
Volume 4, Number 2, 2025

Indonesia's Energy Transition with a Focus on Renewable Energy Policy Challenges and Strategies

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Abstract

Article history:
Received: August 11, 2025
Revised: September 28, 2025
Accepted: October 17, 2025
Published: December 30, 2025

Keywords:
Energy policy,
Energy Transition,
Indonesia,
Renewable Energy,
RUEN.

Identifier:
Zera Open
Page: 94–113
https://zeraopen.com/journal/igr

The energy transition in Indonesia represents a strategic agenda to achieve sustainable development while fulfilling global commitments to reduce carbon emissions. The Government of Indonesia has set ambitious targets in the National Energy General Plan (RUEN), aiming to achieve 23% renewable energy in the national energy mix and increasing to 31% by 2050. This effort is supported by several key policies, including Law Number 30 of 2007 on Energy, Presidential Regulation Number 22 of 2017 on RUEN, and Presidential Regulation Number 112 of 2022 on accelerating renewable energy development. However, the actual share of renewable energy in the national mix reached only around 12–15% by 2023, indicating a significant gap compared to the targets. The main challenges include limited infrastructure, regulatory uncertainty, financing constraints, and regional disparities. Therefore, accelerating strategies such as simplifying licensing, providing fiscal incentives, strengthening human resource capacity, and enhancing cross-sector collaboration are essential to achieve the national energy transition effectively and sustainably.

1. Introduction

The global energy transition today has become one of the strategic issues that is highly regarded by various countries around the world. The paradigm shift from dependence on fossil fuels to the use of renewable energy is not only driven by the need to maintain energy availability in the future, but also as a concrete step in curbing greenhouse gas emissions which are the main cause of climate change.[1] International commitments such as the Paris Agreement and the net-zero emission target by the middle of this century have become the main foundation that strengthens the direction of energy transition policies in many countries. In line with this, the utilization of renewable energy sources such as solar, wind, hydro, and geothermal energy continues to increase rapidly. However, in practice, a number of complex obstacles are still encountered, ranging from inconsistent regulatory aspects, limited financing mechanisms, to inadequate infrastructure.[2]

In the context of Indonesia, the issue of energy transition is very important because the country is known as one of the owners of the largest renewable energy potential in the world. Indonesia's geographical location on the equator allows the country to receive high solar radiation intensity throughout the year, which strongly supports the development of solar energy.[3] In addition, Indonesia's geothermal reserves are recorded as one of the largest globally, making Indonesia a potential

[1] Hosam M Saleh and Amal I. Hassan. "The challenges of sustainable energy transition: A focus on renewable energy." *Applied Chemical Engineering* 7, no. 2 (2024): 2084.

[2] Ryan Wong and Aninda Dewayanti. "Indonesia's energy transition: Dependency, subsidies and renewables." *Asia & the Pacific Policy Studies* 11, no. 2 (2024): 1-22.

[3] Silalahi, David Firnando, Andrew Blakers, Matthew Stocks, Bin Lu, Cheng Cheng, and Liam Hayes. "Indonesia's vast solar energy potential." *Energies* 14, no. 17 (2021): 5424.

leader in geothermal energy. Other energy sources such as hydro, biomass, and wind are also abundant. However, the reality on the ground shows that the utilization of this renewable energy is still far from optimal. Prominent inhibiting factors include limited continuous policy support, low investment in the green energy sector, and still limited mastery of relevant technology.[4]

To overcome this, the Indonesian government has set the direction for energy transition policy through the National General Energy Plan (RUEN). This strategic document contains a target of a 23% new and renewable energy (EBT) mix, and will be increased to 31% by 2050. In addition, RUEN also targets a primary energy availability of 400 million TOE and 1000 million TOE by 2050. Along with this, the electrification ratio is targeted to reach almost 100% so that all communities can enjoy access to modern energy. However, current achievements still show a wide gap between the targets formulated in RUEN and the implementation reality on the ground.[5]

Legally, energy regulation in Indonesia is governed by Law No. 30 of 2007 concerning Energy, which is the main basis for national energy management. The law emphasizes the principles of sustainability, efficiency, and environmental preservation, and gave birth to the National Energy Council (DEN) as an institution that has a role in formulating energy policies. However, in its implementation,

[4] Ian Kurniawan, Reisya Ichwani, Richa Fionasari, Aryansyah Batubara, and Adri Huda. "Indonesia's renewable energy outlook: what to expect in the future renewable energy of Indonesia. a brief review." *Elkawnie: Journal of Islamic Science and Technology* 8, no. 2 (2022): 298-313.

[5] Ariana Soemanto, Ervan Mohi, and Yohanes Gunawan. "The role of oil fuels on the energy transition toward net zero emissions in indonesia: a policy review." (2023): 2074-2083.

various obstacles are still encountered, for example, overlapping regulations, limited quality of human resources, and minimal funding support which directly slow down the development of renewable energy.[6] In addition to domestic obstacles, global energy dynamics also influence the direction of Indonesia's energy transition. The recent global energy crisis has encouraged every country to strengthen its domestic energy security.

In this condition, Indonesia must be able to balance national interests in guaranteeing energy supply and international commitments in reducing carbon emissions.[7] Thus, the urgency of research on Indonesia's energy transition does not only stem from the fact that the country has very large but untapped renewable energy potential, but also from the importance of assessing the extent to which policies, regulations, and the role of related institutions are able to answer the various challenges that exist. This study will utilize relevant literature to outline the obstacles as well as opportunities for energy transition, and present a mapping of policy implementation strategies towards more sustainable energy development in the future.

[6] Adji Annisa Rahmadina. "Energy Policy and Climate Crisis: an Evaluation of the Adequacy of Energy Laws in Supporting the Transition to Clean and Sustainable Energy." *Protection: Journal Of Land And Environmental Law* 2, no. 3 (2024): 117-121.

[7] Kenneth Ifeanyi Ibekwe, Emmanuel Augustine Etukudoh, Zamathula Queen Sikhakhane Nwokediegwu, Aniekan Akpan Umoh, Adedayo Adefemi, and Valentine Ikenna Ilojianya. "Energy security in the global context: A comprehensive review of geopolitical dynamics and policies." *Engineering Science & Technology Journal* 5, no. 1 (2024): 152-168.

2. Literature Review

The literature review on energy transition in Indonesia shows a fairly complex dynamic between the abundant potential of energy resources, the policy framework designed by the government, and the implementation reality that is still not optimal. RUEN, as the main energy planning instrument at the national level, has set a significant target for increasing the renewable energy mix. However, a number of empirical data actually show a wide gap between the target set and the actual achievement on the ground. For example, the contribution of solar energy, which in projections should provide a significant portion, is still at a relatively low level. The dominant inhibiting factors include high investment costs, limited electricity grid infrastructure, and regulations that do not yet fully support the acceleration of solar energy utilization.[8]

In the policy dimension, various academic studies emphasize the importance of regulatory harmonization so that the energy transition can take place more effectively. Energy policy analysis found that although Law No. 30 of 2007 has provided a clear legal framework, its implementation often faces overlapping regulations between the central government, regional governments, and other related institutions. This condition ultimately slows down the acceleration process of renewable energy development.[9] In addition, uncertainty regarding incentives and

[8] Ariana Soemanto, Ervan Mohi, and Yohanes Gunawan. "The role of oil fuels on the energy transition toward net zero emissions in indonesia: a policy review." (2023): 2074-2083

[9] Seger Santoso, Eka Wahyu Kasih, and R. M. Saputra. "Analysis of implemented policy strategies and innovations in legal management of natural resources and renewable energy in Indonesia." *Jurnal Riset dan Inovasi Manajemen* 1, no. 4 (2023): 306-320.

subsidy schemes further widens the gap between the great potential of renewable energy and the reality of its utilization.[10]

Not only regulatory factors, the geopolitical dimension of energy also puts great pressure on the national energy transition strategy. The global energy crisis that has occurred in recent years shows how dependence on fossil fuel imports has the potential to threaten Indonesia's energy security. Thus, the development of renewable energy is not only seen as an environmental issue, but also as a geopolitical strategy to strengthen national energy independence.[11] Other literature emphasizes the importance of adaptive governance through mechanisms such as the Just Energy Transition Partnership (JETP). This approach is considered capable of integrating the dimensions of social justice, environmental sustainability, and economic stability in the energy transition process.[12] Within this framework, the participation of multiple parties, including the government, the private sector, and the community, is a key factor for success.

In addition, other challenges that are widely highlighted are limited institutional capacity and financing aspects. Kurniawan et al.[13] confirm that although

[10] Ryan Wong and Aninda Dewayanti. "Indonesia's energy transition: Dependency, subsidies and renewables." *Asia & the Pacific Policy Studies* 11, no. 2 (2024): 1-22.

[11] Kenneth Ifeanyi Ibekwe, Emmanuel Augustine Etukudoh, Zamathula Queen Sikhakhane Nwokediegwu, Aniekan Akpan Umoh, Adedayo Adefemi, and Valentine Ikenna Ilojianya. "Energy security in the global context: A comprehensive review of geopolitical dynamics and policies." *Engineering Science & Technology Journal* 5, no. 1 (2024): 152-168.

[12] A. R., P. Aji Wardhana, K. Prasetyo, W. H. Ma'rifatullah, and R. Budiarto. "Breakthrough on Indonesia's Energy Policy: Adaptive Governance Perspective for Just Energy Transition Partnership (JETP)." In *Journal of Physics: Conference Series*, vol. 2828, no. 1, p. 012001. IOP Publishing, (2024):1-16.

[13] Ian Kurniawan, Reisya Ichwani, Richa Fionasari, Aryansyah Batubara, and Adri Huda. "Indonesia's renewable energy outlook: what to expect in the future renewable energy of Indonesia. a brief review." *Elkawnie: Journal of Islamic Science and Technology* 8, no. 2 (2022): 298-313.

Indonesia's renewable energy reserves are very large, obstacles in the form of limited human resources and minimal access to green financing are still a serious problem that hinders the implementation of renewable energy projects. This gap has implications for the slow transformation of the national energy system towards a more sustainable energy mix. Thus, contemporary literature concludes that the energy transition in Indonesia is a multidimensional issue that is not only related to the potential of resources, but also closely related to policy, governance, geopolitical factors, and economic conditions.

3. Method

This study uses a literature review method that focuses on the review of academic literature, regulations, and policy documents related to energy transition in Indonesia. The literature review was chosen because it is able to provide a comprehensive picture of the dynamics, challenges, and opportunities in the implementation of renewable energy policies, while also allowing researchers to review various perspectives that have been written before. The main literature sources come from scientific journal articles published and available, reports from international institutions, and national legal and policy documents such as RUEN and Law No. 30 of 2007 on Energy.

The first stage in this literature review is the identification of relevant literature through scientific databases and reputable journals that discuss energy transition in Indonesia. The criteria for selecting the literature include recency, direct connection to energy policy and renewable energy, and relevance to the Indonesian context.

Through this process, articles were obtained that discuss the aspects of regulation, geopolitics, financing, the role of institutions, and challenges of implementing renewable energy.[14] The second stage is content analysis, where the selected literature is read in depth to identify the main themes related to the research objectives. These themes include the potential of Indonesia's renewable energy, the underlying policies and regulations, implementation obstacles, and strategies for accelerating the energy transition.

This analysis allows researchers to construct an argumentative synthesis from various sources, not just a summary, but also a strengthening of findings across the literature. The third stage is the synthesis of information, where data and ideas from various sources are combined to provide a complete picture. For example, the findings regarding the overlapping of energy regulations by Santoso et al.[15] are combined with a study on the importance of adaptive governance in the Just Energy Transition Partnership (JETP) mechanism.[16] This approach emphasizes that the issue of energy transition is not only technical, but also institutional, political, and social. With the literature review method, this study does not produce primary data in the form of interviews or surveys, but provides a contribution in the form of theoretical and conceptual analysis supported by empirical evidence from previous

[14] Ryan Wong and Aninda Dewayanti. "Indonesia's energy transition: Dependency, subsidies and renewables." *Asia & the Pacific Policy Studies* 11, no. 2 (2024): 1-22.

[15] Seger Santoso, Eka Wahyu Kasih, and R. M. Saputra. "Analysis of implemented policy strategies and innovations in legal management of natural resources and renewable energy in Indonesia." *Jurnal Riset dan Inovasi Manajemen* 1, no. 4 (2023): 306-320.

[16] A. R., P. Aji Wardhana, K. Prasetyo, W. H. Ma'rifatullah, and R. Budiarto. "Breakthrough on Indonesia's Energy Policy: Adaptive Governance Perspective for Just Energy Transition Partnership (JETP)." In *Journal of Physics: Conference Series*, vol. 2828, no. 1, p. 012001. IOP Publishing, (2024):1-16.

studies. This is important because the energy transition in Indonesia is a multidimensional issue that requires an integrative approach across the literature. Thus, this literature review serves as an academic basis for understanding the policy context, identifying obstacles, and formulating opportunities to accelerate the energy transition in Indonesia.

4. Results

4.1. Potential and Opportunities for Energy Transition in Indonesia

Indonesia is one of the countries with the largest renewable energy reserves in the world, thus occupying a strategic position on the global energy transition map. The potential of solar energy is estimated to exceed 200 GW, a very high number when compared to many other countries. This is possible because Indonesia is on the equator, which guarantees consistent sun exposure almost all year round. In addition, Indonesia also has a very large geothermal potential, which is about 40% of the total world reserves. This fact makes Indonesia the owner of the largest geothermal capacity in the world, although until now its utilization is still not optimal.[17] The potential of other renewable energy is also no less important, such as hydro energy spread across a number of regions, as well as biomass that can be obtained from agricultural and forestry waste.

[17] Ian Kurniawan, Reisya Ichwani, Richa Fionasari, Aryansyah Batubara, and Adri Huda. "Indonesia's renewable energy outlook: what to expect in the future renewable energy of Indonesia. a brief review." *Elkawnie: Journal of Islamic Science and Technology* 8, no. 2 (2022): 298-313.

To optimize this potential, the Indonesian government through the National General Energy Plan (RUEN) has set a new and renewable energy mix target of 23%, which will then be increased to 31% by 2050. This target is not only part of the national strategy in securing future energy needs, but also a form of Indonesia's commitment to the Paris Agreement and the global net-zero emission target. Furthermore, renewable energy has a great opportunity to expand access to clean energy to remote areas and small islands that are not yet reached by the PLN electricity grid. Solar and biomass energy are seen as the main solutions to increase the national electrification ratio to almost 100%.[18]

In addition to the strength of domestic resources, other opportunities arise from the global trend that encourages massive investment in clean energy. The cost of renewable energy technology, especially solar panels and wind turbines, has experienced a drastic decrease in the last decade. This trend makes renewable energy projects increasingly economical and competitive when compared to fossil energy. Some studies confirm that the price of energy from renewable sources is already close to, and in certain conditions exceeds, the competitiveness of fossil energy.[19] Furthermore, international funding support through the Just Energy Transition Partnership (JETP) scheme is also an important opportunity. Through this mechanism, Indonesia has the potential to obtain financial assistance, technology

[18] Ariana Soemanto, Ervan Mohi, and Yohanes Gunawan. "The role of oil fuels on the energy transition toward net zero emissions in indonesia: a policy review." (2023): 2074-2083

[19] Jose Antonio Ordonez, Marek Fritz, and Johannes Eckstein. "Coal vs. renewables: Least-cost optimization of the Indonesian power sector." *Energy for Sustainable Development* 68 (2022): 350-363.

transfer, and increased institutional capacity in encouraging the acceleration of the energy transition.[20]

The potential for renewable energy development is also in line with the goal of strengthening national energy security. So far, Indonesia's dependence on fossil fuel imports, especially oil, has caused various vulnerabilities, both due to fluctuations in international prices and unpredictable geopolitical risks. By increasing the utilization of domestic renewable-based energy, Indonesia will not only be able to strengthen energy independence, but also open up opportunities for the creation of new jobs in the green sector. This can encourage economic growth while contributing to sustainable development.

However, to ensure that these opportunities are truly realized, an integrative strategy is needed. Synergy between the central government, regional governments, private sector players, and community involvement is very necessary so that the policies designed can run effectively. Energy policies must also be designed adaptively, so that they are able to follow global dynamics while adjusting to domestic conditions. Thus, Indonesia will not only be able to achieve the RUEN targets, but also play a significant role in supporting the achievement of global targets for reducing greenhouse gas emissions.

[20] A. R., P. Aji Wardhana, K. Prasetyo, W. H. Ma'rifatullah, and R. Budiarto. "Breakthrough on Indonesia's Energy Policy: Adaptive Governance Perspective for Just Energy Transition Partnership (JETP)." In *Journal of Physics: Conference Series*, vol. 2828, no. 1, p. 012001. IOP Publishing, (2024):1-16.

4.2. Obstacles and Challenges of Energy Transition in Indonesia

Although Indonesia has a very large renewable energy potential, in reality the energy transition process still faces various obstacles that are structural, regulatory, and financial. The main obstacle lies in the regulatory aspects that are often overlapping and the bureaucracy that tends to be long and convoluted. It is not uncommon for policies issued by the central government to not be fully in line with policies at the regional level, thus creating a lack of synchronization in the implementation of renewable energy projects. Law No. 30 of 2007 has indeed provided a comprehensive legal framework for national energy management, but in its implementation, disharmony is still found between derivative regulations and the real needs of the renewable energy market.[21]

In addition to regulations, infrastructure limitations are also a no less important challenge. Another power quality problem that affects the integration of new and renewable energy is disruption to the electricity grid.[22] The national electricity grid system that currently exists is not yet fully able to accommodate the integration of intermittent renewable energy sources, such as solar and wind power. This condition is exacerbated by the development gap between regions. Many remote areas that actually have great renewable energy potential, but do not have adequate access to the electricity grid or modern energy storage technology needed

[21] Seger Santoso, Eka Wahyu Kasih, and R. M. Saputra. "Analysis of implemented policy strategies and innovations in legal management of natural resources and renewable energy in Indonesia." *Jurnal Riset dan Inovasi Manajemen* 1, no. 4 (2023): 306-320.

[22] Fadil Muhammad Noor, and Adrian Fauzan Rahman. "Studi Penerapan Integrasi Sumber Energi Baru Terbarukan dengan Smart grid dan Sistem Pengendalian SCADA." In *Prosiding Industrial Research Workshop and National Seminar*, vol. 14, no. 1, pp. 526-532. 2023.

so that the energy can be utilized optimally. From the financial side, obstacles are also very prominent. Renewable energy projects generally require large initial capital, while access to green financing instruments in Indonesia is still very limited. This condition is exacerbated by the lack of subsidy support for renewable energy, unlike fossil energy which still receives large subsidies from the government. As a result, renewable energy developers face difficulties in competing in terms of price and investment with fossil energy-based projects.[23]

Not only that, the limitation of human resources (*Sumber Daya Manusia*/SDM) is also a significant inhibiting factor. The development of renewable energy requires experts in the fields of technology, planning, and project management. However, the number of skilled workers with these skills is still very limited in Indonesia. This gap makes some renewable energy projects dependent on foreign labor and technology, which in turn adds to the burden of investment costs.[24] Outside of domestic factors, global energy geopolitics also provides additional pressure. When the price of fossil energy declines on the world market, the competitiveness of renewable energy weakens so that investors tend to postpone or even cancel investments in this sector. This shows the importance of national policies that are able to provide strong incentives so that renewable energy remains attractive to investors, even when global market conditions are unstable.[25]

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[23] Ryan Wong and Aninda Dewayanti. "Indonesia's energy transition: Dependency, subsidies and renewables." *Asia & the Pacific Policy Studies* 11, no. 2 (2024): 1-22.

[24] Adji Annisa Rahmadina. "Energy Policy and Climate Crisis: an Evaluation of the Adequacy of Energy Laws in Supporting the Transition to Clean and Sustainable Energy." *Protection: Journal Of Land And Environmental Law* 2, no. 3 (2024): 117-121.

[25] Kenneth Ifeanyi Ibekwe, Emmanuel Augustine Etukudoh, Zamathula Queen Sikhakhane Nwokediegwu, Aniekan Akpan Umoh, Adedayo Adefemi, and Valentine Ikenna Ilojianya. "Energy security in the global context: A

Based on these various obstacles, it can be understood that the energy transition in Indonesia is not just a technical issue, but is also closely related to aspects of governance, politics, and economic dynamics. To overcome these multidimensional challenges, consistent policy reform, massive infrastructure and human resource investment strengthening, and cross-sector and multi-party collaboration are needed. Without concrete and measurable steps, the RUEN targets have the potential to be difficult to achieve, so Indonesia risks being left behind from the global energy transition momentum which is currently taking place rapidly.

5. Discussion

The results of the study show that the energy transition in Indonesia has two sides, namely abundant potential and fairly complex obstacles. Solar, geothermal, hydro, and biomass energy have great potential to make Indonesia a regional leader in renewable energy. However, the utilization of this potential is still hampered by issues of regulation, limited infrastructure, minimal financing support, inter-regional disparities, and limited human resources. This condition shows a mismatch between the ambitious targets set out in RUEN and the reality of implementation on the ground.

One of the fundamental problems lies in regulatory disharmony. Although Law No. 30 of 2007 has provided a legal framework for energy, the overlapping of implementing regulations at the central and regional levels often becomes an

comprehensive review of geopolitical dynamics and policies." *Engineering Science & Technology Journal* 5, no. 1 (2024): 152-168.

obstacle to the development of renewable energy. Regulatory uncertainty also adds risk for investors, thus reducing their interest in investing capital. Recent research confirms that adaptive governance mechanisms, such as those offered in the Just Energy Transition Partnership (JETP), can be a solution by involving multiple parties in a more participatory manner.[26]

In addition to regulations, economic factors also play an important role. The large subsidies for fossil energy cause price distortions and reduce the competitiveness of clean energy. In fact, many studies show that the cost of renewable energy technology has decreased significantly at the global level.[27] Therefore, reforming energy subsidy policies is an urgent matter, for example by diverting some of the fossil subsidy funds to support renewable energy. This policy will not only accelerate the integration of clean energy, but also strengthen national energy security. The geopolitical dimension also plays a role in complicating the situation. The global energy crisis triggered by conflicts and the rise and fall of international oil and gas prices shows the vulnerability of countries that are still dependent on fossil fuel imports.

Within this framework, the energy transition is not only related to the environment, but also a geopolitical strategy to reduce external dependence and strengthen domestic energy independence.[28]

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[26] A. R., P. Aji Wardhana, K. Prasetyo, W. H. Ma'rifatullah, and R. Budiarto. "Breakthrough on Indonesia's Energy Policy: Adaptive Governance Perspective for Just Energy Transition Partnership (JETP)." In *Journal of Physics: Conference Series*, vol. 2828, no. 1, p. 012001. IOP Publishing, (2024):1-16.

[27] Jose Antonio Ordonez, Marek Fritz, and Johannes Eckstein. "Coal vs. renewables: Least-cost optimization of the Indonesian power sector." *Energy for Sustainable Development* 68 (2022): 350-363.

[28] Kenneth Ifeanyi Ibekwe, Emmanuel Augustine Etukudoh, Zamathula Queen Sikhakhane Nwokediegwu, Aniekan Akpan Umoh, Adedayo Adefemi, and Valentine Ikenna Ilojianya. "Energy security in the global context: A

The next obstacle is in the aspect of electricity grid infrastructure which is still limited in supporting the integration of renewable energy to the maximum. The intermittent nature of solar and wind energy demands the availability of energy storage technology and smart grid systems. Without adequate infrastructure, it is difficult for renewable energy to make a large contribution to the national energy mix.[29] In addition to technical factors, social aspects must also be considered in the energy transition process. The transformation of the energy system needs to take into account social justice so as not to cause harm to certain groups, such as workers in the coal sector or communities living in fossil energy-producing areas.

Therefore, a just transition approach is needed so that the energy transition is not only oriented towards the environment, but is also fair from a social and economic side.[30] Therefore, the energy transition in Indonesia requires a comprehensive strategy that includes regulatory reform, increased infrastructure investment, strengthening human resource capacity, and cross-sector collaboration. Synergy between the government, the private sector, financial institutions, academics, and the community is a key factor so that the energy transition process can run effectively and sustainably. If these strategic steps are carried out

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[29] Christina E Hoicka, Jens Lowitzsch, Marie Claire Brisbois, Ankit Kumar, and Luis Ramirez Camargo. "Implementing a just renewable energy transition: Policy advice for transposing the new European rules for renewable energy communities." *Energy Policy* 156 (2021): 112435.

[30] Adji Annisa Rahmadina. "Energy Policy and Climate Crisis: an Evaluation of the Adequacy of Energy Laws in Supporting the Transition to Clean and Sustainable Energy." *Protection: Journal Of Land And Environmental Law* 2, no. 3 (2024): 117-121.

consistently, Indonesia will not only be able to meet the RUEN targets, but also make a real contribution to achieving the global goal of emission reduction.

6. Conclusion

The energy transition in Indonesia is a strategic agenda that has great relevance to the issues of climate change, energy security, and sustainable development. This study shows that Indonesia has abundant renewable energy potential, ranging from solar, geothermal, hydro, to biomass. However, the reality of its utilization still faces various obstacles, including overlapping regulations, limited infrastructure, minimal financing, inter-regional disparities, and limited human resources. RUEN as a national energy planning instrument has set an ambitious target, namely a 23% new and renewable energy mix and 31% by 2050. However, current achievements are still far from expectations. More consistent policy reform, strengthening adaptive governance, and a conducive regulatory framework are urgent needs.

In addition, international mechanisms such as the Just Energy Transition Partnership (JETP) can be utilized as an opportunity to obtain financial and technological support in accelerating the energy transformation. From a geopolitical perspective, the energy transition also plays an important role in reducing dependence on fossil fuel imports and strengthening national energy independence. A just transition approach needs to be applied so that the energy transformation is not only oriented towards environmental aspects, but also ensures social justice and community welfare. Thus, the energy transition in Indonesia requires cross-sector

synergy and multi-party collaboration. If the obstacles can be overcome with strategic steps, Indonesia has the potential to become an example of a developing country that has successfully realized a sustainable energy transition while contributing to the global target of emission reduction.

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