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Evaluating Indonesia's Renewable Energy Transition Strategy: Policy Implementation Challenges Toward Net-Zero Emission Target 2060

Evaluasi Strategi Transisi Energi Terbarukan Indonesia: Tantangan Implementasi Kebijakan Menuju Target Net-Zero Emission 2060

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Abstract

Indonesia, as the world's largest archipelagic nation, faces complex challenges in achieving its net-zero emission target by 2060. This research analyzes the implementation of Indonesia's new and renewable energy (NRE) policies through a comprehensive literature study approach. Despite having strong legal foundations through Law No. 30/2007 and Government Regulation No. 79/2014, along with ambitious targets of 23% renewable energy by 2025, implementation realization still encounters significant obstacles. National Energy Council data shows that renewable energy share has only reached 15%, far from the established targets. Analysis of three projection scenarios from the Ministry of Energy and Mineral Resources - Business as Usual (BaU), Sustainable Development (SD), and Low Carbon (LC) - indicates that the SD scenario can achieve the 23% target by 2025 and even exceed the 31% target by 2050. Research findings demonstrate that although Indonesia possesses abundant renewable energy resource potential and clear political commitment, strengthening law enforcement, infrastructure investment, and inter-stakeholder coordination are required to realize sustainable energy transition toward net-zero emission.

Keywords: Energy Transition, Policy Implementation, Renewable Energy, Net-zero Emission, Sustainable Development.

Abstrak

Indonesia sebagai negara kepulauan terbesar di dunia menghadapi tantangan kompleks dalam mencapai target net-zero emission pada 2060. Penelitian ini menganalisis implementasi kebijakan energi baru dan terbarukan (EBT) Indonesia melalui pendekatan studi literatur komprehensif. Meskipun memiliki landasan hukum yang kuat melalui UU No. 30 Tahun 2007 dan PP No. 79 Tahun 2014, serta target ambisius 23% energi terbarukan pada 2025, realisasi implementasi masih menghadapi kendala signifikan. Data Dewan Energi Nasional menunjukkan pangsa energi terbarukan baru mencapai 15%, jauh dari target yang ditetapkan. Analisis tiga skenario proyeksi Kementerian ESDM - Business as Usual (BaU), Pembangunan Berkelanjutan (PB), dan Rendah Karbon (RK) - mengindikasikan bahwa skenario

PB dapat mencapai target 23% pada 2025 dan bahkan melampaui target 31% pada 2050. Temuan penelitian menunjukkan bahwa meskipun Indonesia memiliki potensi sumber daya energi terbarukan yang melimpah dan komitmen politik yang jelas, diperlukan penguatan penegakan hukum, investasi infrastruktur, dan koordinasi antar-stakeholder untuk merealisasikan transisi energi yang berkelanjutan menuju net-zero emission.

Kata Kunci: Transisi Energi, Kebijakan Implementasi, Energi Terbarukan, Net-zero Emission, Pembangunan Bberklanjutan.

INTRODUCTION

Indonesia, as the world's largest archipelagic nation with a population exceeding 270 million people, faces unprecedented challenges in meeting its growing energy demands while simultaneously addressing global climate commitments. The country's heavy reliance on non-renewable fossil fuel sources, particularly coal and oil, continues to dominate the national energy mix, creating both environmental and economic sustainability concerns (Rahayu & Windarta, 2022). This dependency on fossil fuels not only contributes significantly to greenhouse gas emissions but also poses long-term energy security risks as these finite resources become increasingly scarce and environmentally problematic.

The emergence of new and renewable energy (NRE) technologies presents a promising pathway toward sustainable energy transformation. The implementation of comprehensive NRE policies holds the potential to reduce Indonesia's fossil fuel dependency while supporting the development of clean and environmentally friendly energy systems (Wulandari et al., 2019). This transition is grounded in fundamental principles of equity, sustainability, legal certainty, participation, and accountability, all of which are essential for ensuring policy effectiveness and maximizing societal benefits. These principles align with the constitutional mandate of the 1945 Constitution, which emphasizes the state's responsibility for managing and developing natural resources for the greatest prosperity of the people (Rahayu & Windarta, 2022).

The Indonesian government has established several strategic frameworks to harness the country's abundant renewable energy resources, most notably through the National General Energy Plan (RUEN). RUEN has successfully identified and accommodated various energy diversification opportunities across the Indonesian archipelago (Canton, 2021). This framework is further strengthened by Law No. 30 of 2007 concerning Energy and Government Regulation No. 79 of 2014 on National Energy Policy, which collectively establish Indonesia's ambitious target of achieving 23% renewable energy in the national energy mix by 2025.

However, the implementation trajectory has encountered significant obstacles, particularly in the wake of the COVID-19 pandemic. The global health crisis has delayed numerous renewable energy projects scheduled for implementation during 2020-2021, creating additional challenges for achieving the established renewable energy targets. Current data indicates that Indonesia's renewable energy share remains at approximately 15%, substantially below the projected milestones (Kurniawan et al., 2022). The nation's primary energy sources continue to be dominated by coal, petroleum, and natural gas, highlighting the persistent gap between policy aspirations and implementation realities.

Global climate pressures have intensified the urgency for Indonesia's energy transformation. At the 26th Conference of the Parties (COP26) held in Scotland, Indonesia committed to achieving net-zero emissions by 2060 through its updated Nationally Determined Contribution (NDC) (Cadman, 2018). This commitment represents a significant policy shift, though questions remain regarding the feasibility and specific pathways for achieving this ambitious target. The announcement necessitates a comprehensive reevaluation of Indonesia's energy sustainability strategies and climate change mitigation approaches.

In the broader global context, the urgency for NRE development stems not only from the imperative to reduce greenhouse gas emissions but also from the strategic need to enhance energy security and independence. Indonesia possesses exceptional natural resource potential and significant opportunities to assume a leadership role in renewable energy development within the Southeast Asian region (Rahayu

& Windarta, 2022). The country's geographical advantages, including abundant solar radiation, geothermal resources, hydroelectric potential, and biomass availability, position it uniquely to become a regional renewable energy hub.

Despite these favorable conditions and policy commitments, substantial implementation gaps persist between national energy policy objectives and actual renewable energy deployment. The International Energy Agency (Canton, 2021) identified Indonesia as one of the world's largest coal producers and consumers, as well as a major carbon emitter, underscoring the contradictions between international climate commitments and domestic energy practices. This dichotomy highlights the complexity of balancing economic development needs, energy security concerns, and environmental sustainability objectives.

The purpose of this research is to develop a comprehensive understanding of Indonesia's new and renewable energy policies and to critically evaluate the implementation mechanisms, challenges, and opportunities within the context of achieving net-zero emission targets by 2060. Through systematic analysis of policy frameworks, implementation strategies, and projected scenarios, this study aims to identify key factors that influence the success or failure of renewable energy transitions in developing nations, with specific focus on the Indonesian experience as a case study for emerging economies facing similar energy transformation challenges.

METHODS

This research employed a comprehensive literature review methodology to analyze the implementation of Indonesia's new and renewable energy policies in achieving net-zero emission targets. The study utilized a systematic approach to examine secondary data sources, including government documents, academic journals, policy reports, official statistics, and credible online resources related to Indonesia's renewable energy policy implementation and net-zero emission strategies (Azhar & Satriawan, 2018). The literature review methodology was selected as the most appropriate approach for this research due to the need to synthesize extensive policy information, analyze long-term trends, and evaluate the effectiveness of various policy instruments across multiple time periods and governmental administrations.

The data collection process involved systematic identification and selection of relevant sources spanning from 2007 to 2024, covering the period from the enactment of Law No. 30/2007 concerning Energy to the most recent policy developments and implementation reports. Primary sources included official government publications from the Ministry of Energy and Mineral Resources (KESDM), National Energy Council reports, updated Nationally Determined Contributions (NDC) documents, and strategic planning documents such as the National General Energy Plan (RUEN) and the National Medium-Term Development Plan (RPJMN). Secondary sources comprised peer-reviewed academic articles, international energy agency reports, policy analysis studies, and comparative research on renewable energy transitions in developing countries. The research also incorporated relevant data from international organizations including the International Energy Agency (IEA), United Nations Framework Convention on Climate Change (UNFCCC), and regional energy cooperation bodies to provide broader contextual analysis and benchmarking opportunities.

The analytical framework involved systematic content analysis and policy evaluation techniques to assess the coherence, consistency, and effectiveness of Indonesia's renewable energy policy implementation. The analysis focused on identifying key policy instruments, examining implementation mechanisms, evaluating target achievements against actual performance, and assessing the alignment between national policies and international climate commitments. Particular attention was given to analyzing the three projection scenarios developed by the Ministry of Energy and Mineral Resources: Business as Usual (BaU), Sustainable Development (PB), and Low Carbon (RK) scenarios, which serve as critical tools for understanding potential pathways toward net-zero emission targets. The research employed comparative analysis techniques to evaluate the assumptions, targets, and projected outcomes of each scenario, while also examining the policy interventions and implementation strategies required to achieve the respective targets.

Data synthesis and interpretation involved triangulation of information from multiple sources to ensure reliability and validity of findings. The research examined both quantitative indicators such as renewable energy capacity additions, energy mix percentages, emission reduction projections, and investment flows, as well as qualitative factors including policy coherence, institutional coordination, stakeholder engagement, and implementation challenges. The analysis also incorporated assessment of external factors that influence policy implementation, including economic conditions, technological developments, international cooperation mechanisms, and socio-political dynamics that affect renewable energy deployment in Indonesia. Through this comprehensive analytical approach, the research aimed to provide a holistic understanding of Indonesia's renewable energy policy landscape and its potential for achieving net-zero emission objectives by 2060.

RESULTS AND DISCUSSION

Results

This comprehensive literature review examines Indonesia's renewable energy policy implementation through analysis of government documents, policy frameworks, and projection scenarios developed by the Ministry of Energy and Mineral Resources. The findings are organized into five key areas: Indonesia's global positioning and climate commitments, the evolution of national energy policy frameworks, current energy mix performance, projection scenario analysis toward net-zero emission targets, and emission reduction trajectories. The results provide empirical evidence regarding the gaps between policy aspirations and implementation realities in Indonesia's renewable energy transition.

Indonesia’s Global Position and Climate Commitments

The analysis reveals that Indonesia has established itself as an emerging global leader through active participation in international forums, including its role as a non-permanent member of the UN Security Council and hosting the G20 summit in 2022 (Suoneto & Paramitha, 2021). However, this global leadership ambition contrasts sharply with its climate and energy performance. According to the International Energy Agency (Canton, 2021), Indonesia remains one of the world's largest coal producers and importers, as well as a significant carbon emitter, highlighting the gap between international commitments and domestic implementation practices.

Evolution of National Energy Policy Framework

The chronological analysis of Indonesia's energy policy development demonstrates a systematic evolution from the initial General Energy Policy (KUBE) in 1981 through multiple iterations. The framework underwent significant updates in 1987, 1991, and 1998, with increasing emphasis on environmental considerations and energy pricing mechanisms (Listrik, 2021). The establishment of Law No. 30/2007 concerning Energy and the formation of the National Energy Council (DEN) marked crucial milestones in creating institutional frameworks for energy governance. The current policy landscape is anchored by Government Regulation No. 79/2014 on National Energy Policy and Presidential Regulation No. 22/2017 on the National General Energy Plan (RUEN), which provides strategic direction for Indonesia's energy development until 2050.

Current Energy Mix and Renewable Energy Performance

Analysis of Indonesia's current energy profile reveals significant challenges in renewable energy deployment. Despite ambitious policy targets, the National Energy Council (2020) reported that renewable energy's share in the national energy mix remains below 15%, substantially short of the mandated 23% target for 2025. The energy mix continues to be dominated by fossil fuels, with coal, petroleum, and natural gas constituting the majority of primary energy consumption. This performance gap indicates the need for stronger regulatory enforcement and accelerated implementation mechanisms to achieve carbon emission targets.

Projection Scenarios and Target Achievement Analysis

The Ministry of Energy and Mineral Resources has developed three comprehensive scenarios for energy transition analysis: Business as Usual (BaU), Sustainable Development (PB), and Low Carbon (RK). Table 1 presents the detailed assumptions for each scenario toward achieving net-zero emission targets.

Table 1. Scenario Assumptions Toward Net-Zero Emission

Assumption	BaU	PB	RK
Economic Growth	5.6% (Based on 2045 Indonesian Vision-Bappenas)	5.6% (Based on 2045 Indonesian Vision-Bappenas)	5.6% (Based on 2045 Indonesian Vision-Bappenas)
Population Growth	0.7% (Based on Statistics Indonesian-Bappenas 2045)	0.7% (Based on Statistics Indonesian-Bappenas 2045)	0.7% (Based on Statistics Indonesian-Bappenas 2045)
Biodiesel Target	2025: 20% 2050: 30%	2025: 30% 2050: 30%	2025: 30% 2050: 100%
Biothanol Target	2025: 5%	2025: 20% 2050: 50%	2025: 20% 2050: 85%
City Gas Development	2025: 4.7 million household connections	Development of 1 million household connections/year starting from 2020	Development of >1 million household connections/year starting from 2020
LPG to Induction	2025: 0.5%	2025: 1% 2050: 2%	2025: 2% 2050: 5%
Electric Car Target	2025: 0.01% 2050: 0.07%	2025: 0.01% 2050: 0.24%	2025: 0.5% 2050: 1.18%
Electric Motorcycle Target	2025: 1.38% 2030: 1.5%	2025: 1.44% 2030: 1.7%	2025: 1.18% 2030: 3%
Power Plant Strategy	RUPTL	RUEN Switching 10% capacity of Steam PP to Biomass PP 25% of luxury houses use Rooftop Solar	Emission reduction > RUEN Switching 30% capacity of Steam PP to Biomass PP 30% of luxury houses use Rooftop Solar

Source: National Energy Council of Indonesia, 2020.

The projection results indicate distinct pathways for renewable energy development. Under the BaU scenario, the primary energy mix for 2025 would comprise 21% renewable energy, 24% gas, 34% coal, and 21% oil, falling short of the National Energy Policy targets. The PB scenario demonstrates more promising results, with renewable energy reaching 23% by 2025 and 32% by 2050, successfully meeting and exceeding the National Energy Policy mandates. The RK scenario presents the most ambitious trajectory, projecting 36% renewable energy by 2025 and 58% by 2050, significantly surpassing national policy targets (Abyan, 2025).

Emission Reduction Projections

Based on IPCC calculation methodologies, the total CO_2 emission projections for 2030 are estimated at 912 million tons CO_2-eq (BaU), 813 million tons CO_2-eq (PB), and 667 million tons CO_2-eq (RK). Notably, all three scenarios project emissions below the energy sector NDC emission targets, suggesting that Indonesia's current trajectory may be compatible with its international climate commitments (Kurniawan et al., 2022).

Policy Implementation Roadmap

The Ministry of Energy and Mineral Resources has established a comprehensive roadmap toward net-zero emission, targeting progressive increases in renewable energy share: 23% by 2025 (primarily solar energy), 42% by 2030, 71% by 2040, and ultimately achieving 100% renewable energy by 2060. The roadmap includes the commissioning of Indonesia's first nuclear power plant by 2045 and reaching 87% renewable energy by 2050.

Discussion

Policy Framework Effectiveness and Implementation Challenges

The analysis of Indonesia's renewable energy policy framework reveals a comprehensive legal and institutional structure that provides a solid foundation for energy transition. However, the substantial gap between policy targets and actual implementation outcomes highlights critical challenges in policy execution. The discrepancy between the mandated 23% renewable energy target for 2025 and the current 15% achievement rate suggests that policy formulation alone is insufficient without robust implementation mechanisms and enforcement strategies (Norlyanti, 2018). This finding aligns with policy implementation theory, which emphasizes the importance of translating policy intentions into concrete actions through effective institutional coordination and resource allocation.

The evolution of Indonesia's energy policy from KUBE (1981) to the current RUEN framework demonstrates institutional learning and adaptation to changing global energy landscapes. However, the persistent dominance of fossil fuels in the energy mix, despite decades of policy development, indicates structural barriers that extend beyond policy design to include economic interests, technological limitations, and implementation capacity constraints. The influence of economic, social, and political environments on policy implementation success, as highlighted by Febryano et al (2021), is particularly relevant in understanding Indonesia's renewable energy deployment challenges.

Scenarion Analysis and Pathway Viability

The three projection scenarios developed by the Ministry of Energy and Mineral Resources provide valuable insights into potential pathways for achieving net-zero emission targets. The Sustainable Development (PB) scenario emerges as the most realistic pathway, balancing ambitious renewable energy targets with feasible implementation assumptions. This scenario's ability to meet the 2025 target of 23% renewable energy and exceed the 2050 target of 31% demonstrates that Indonesia's net-zero emission goals are achievable with appropriate policy interventions and sustained implementation efforts (Muhammad et al., 2023).

The contrasting assumptions between scenarios highlight critical policy levers for accelerating renewable energy transition. The RK scenario's emphasis on aggressive biofuel integration, electric vehicle adoption, and power plant conversion strategies provides a roadmap for maximum emission reduction. However, the feasibility of achieving such ambitious targets requires substantial investment in infrastructure, technology development, and behavioral change initiatives. The gap between BaU and RK scenarios underscores the importance of proactive government intervention rather than relying on market-driven transitions alone.

Economic and Technical Implementation Barriers

The COVID-19 pandemic's impact on renewable energy project delays reveals the vulnerability of Indonesia's energy transition to external shocks and economic disruptions. This experience highlights the need for resilient implementation strategies that can maintain momentum despite unforeseen circumstances. The analysis suggests that Indonesia's renewable energy sector requires not only policy support but also economic incentives, technological capacity building, and international cooperation to overcome implementation barriers (Bakri et al., 2024).

The dominance of coal in Indonesia's energy mix presents both economic and technical challenges for rapid renewable energy deployment. As one of the world's largest coal producers and exporters, Indonesia faces significant economic considerations in transitioning away from coal-dependent energy systems (Canton, 2021). The policy framework must address these economic realities while creating incentives for renewable energy investment and development.

International Commitments vs. Domestic Implementation

Indonesia's commitment to achieve net-zero emission by 2060, as announced at COP26, represents a significant policy shift that requires alignment between international pledges and domestic implementation strategies (Hayden, 2002). The analysis reveals potential contradictions between Indonesia's global climate leadership aspirations and its continued reliance on fossil fuel-intensive energy systems. This disconnect suggests the need for more coherent policy integration across different government levels and sectors.

The updated NDC targets for 26% emission reduction by 2020 and 41% by 2030 provide measurable benchmarks for policy effectiveness. However, the achievement of these targets depends not only on renewable energy deployment but also on broader economic transformation, forest conservation, and industrial emission reduction strategies. The interconnected nature of these challenges requires comprehensive policy coordination beyond the energy sector alone (Haryanto et al., 2024).

Regional Leadership Opportunities and Constraints

Indonesia's potential to assume regional leadership in renewable energy development, as noted by Rahayu & Windarta (2022), presents both opportunities and responsibilities. The country's abundant natural resources, including geothermal, solar, hydroelectric, and biomass potential, position it uniquely to become a renewable energy hub for Southeast Asia. However, realizing this potential requires overcoming domestic implementation challenges while developing export capabilities and regional cooperation mechanisms (Indonesia, 2014).

The analysis suggests that Indonesia's renewable energy transition should be viewed not only as a domestic policy challenge but also as a strategic opportunity for regional economic integration and technological leadership. Success in domestic renewable energy deployment could create spillover effects, including technology transfer, investment attraction, and regional cooperation in clean energy development.

Policy Recommendations for Enhanced Implementation

Based on the analysis, several critical areas require strengthened policy attention. First, enforcement mechanisms must be enhanced to ensure compliance with renewable energy targets and emission reduction commitments. Second, investment incentives and financing mechanisms should be expanded to attract private sector participation in renewable energy development. Third, institutional coordination between national and regional governments must be improved to ensure consistent policy implementation across Indonesia's diverse regional contexts.

The scenario analysis indicates that achieving Indonesia's net-zero emission targets is technically feasible but requires sustained political commitment, adequate resource allocation, and effective implementation strategies. The success of the PB scenario depends on specific policy interventions, including biofuel development, energy efficiency improvements, and power plant conversion programs, all of which require coordinated government action and stakeholder engagement.

CONCLUSION

Conclusion

This comprehensive analysis of Indonesia's new and renewable energy policy implementation toward achieving net-zero emission targets reveals a complex landscape of ambitious policy frameworks coupled with significant implementation challenges. Indonesia has demonstrated substantial commitment to global climate leadership through its participation in international forums and the establishment of comprehensive legal frameworks, including Law No. 30/2007 concerning Energy and Government Regulation No. 79/2014 on National Energy Policy. However, the persistent gap between policy aspirations and actual implementation outcomes underscores the multifaceted nature of energy transition challenges in developing countries.

The evolution of Indonesia's energy policy from the 1980s to the present demonstrates institutional learning and adaptation to changing global energy paradigms. Yet, the dominance of fossil fuels in the

current energy mix, particularly coal and petroleum, continues to present substantial obstacles to renewable energy deployment. The National Energy Council's report indicating that renewable energy accounts for only 15% of the national energy mix, significantly below the mandated 23% target for 2025, highlights the urgent need for enhanced implementation mechanisms and stronger regulatory enforcement.

The scenario analysis conducted by the Ministry of Energy and Mineral Resources provides valuable insights into potential pathways for achieving Indonesia's net-zero emission commitment by 2060. The Sustainable Development scenario emerges as the most realistic and achievable pathway, demonstrating that the 2025 renewable energy target can be met and the 2050 target exceeded through appropriate policy interventions and sustained implementation efforts. This finding suggests that Indonesia's net-zero emission goals are technically feasible but require coordinated government action, adequate resource allocation, and effective stakeholder engagement.

The research findings indicate that external factors, including the COVID-19 pandemic, have significantly impacted renewable energy project implementation, revealing the vulnerability of Indonesia's energy transition to economic disruptions and external shocks. This experience emphasizes the importance of developing resilient implementation strategies that can maintain momentum despite unforeseen circumstances while addressing the economic realities of transitioning away from coal-dependent energy systems.

Indonesia's potential for regional leadership in renewable energy development presents both opportunities and responsibilities. The country's abundant natural resources, including geothermal, solar, hydroelectric, and biomass potential, position it strategically to become a renewable energy hub for Southeast Asia. However, realizing this potential requires overcoming domestic implementation challenges while developing export capabilities and fostering regional cooperation mechanisms in clean energy development.

Recommendation

The achievement of Indonesia's ambitious net-zero emission target by 2060 requires comprehensive policy reforms and enhanced implementation strategies that address both institutional and economic barriers to renewable energy deployment. The government must prioritize the development of robust enforcement mechanisms that ensure compliance with renewable energy targets and emission reduction commitments across all sectors and administrative levels. This enforcement framework should include clear penalties for non-compliance, regular monitoring and evaluation systems, and transparent reporting mechanisms that enable public accountability and stakeholder engagement in the energy transition process.

Investment incentives and innovative financing mechanisms represent critical enablers for accelerating renewable energy development in Indonesia. The government should establish comprehensive financial instruments, including green bonds, concessional lending programs, and public-private partnership frameworks that attract both domestic and international investment in renewable energy projects. These mechanisms should be designed to address the specific challenges of renewable energy deployment in Indonesia's archipelagic geography while providing long-term financial certainty for investors and developers.

Institutional coordination between national, provincial, and local governments must be significantly strengthened to ensure consistent policy implementation across Indonesia's diverse regional contexts. This coordination should involve the establishment of clear roles and responsibilities for different government levels, regular inter-governmental consultation mechanisms, and standardized implementation procedures that account for regional variations in resource availability and development priorities. The National Energy Council should be empowered with stronger coordination authority and adequate resources to oversee implementation across different administrative levels.

Technology transfer and capacity building initiatives should be prioritized to develop domestic expertise in renewable energy technologies and reduce dependence on imported equipment and technical knowledge. The government should establish partnerships with international technology providers, research institutions, and development organizations to facilitate knowledge transfer while building local manufacturing capabilities for renewable energy components. These initiatives should be

coupled with educational and training programs that develop the skilled workforce necessary for renewable energy sector growth.

The integration of renewable energy targets with broader economic development strategies requires careful attention to social and economic impacts of energy transition, particularly in coal-dependent regions and communities. The government should develop comprehensive just transition programs that provide alternative livelihood opportunities for workers and communities affected by the phase-out of fossil fuel industries while ensuring that renewable energy development contributes to inclusive economic growth and poverty reduction objectives.

Regional cooperation mechanisms should be leveraged to position Indonesia as a leader in Southeast Asian renewable energy development while creating opportunities for technology sharing, joint project development, and regional clean energy trade. This regional approach should include the development of cross-border renewable energy infrastructure, harmonized technical standards, and collaborative research and development initiatives that maximize the benefits of renewable energy deployment across the region.

REFERENCES

Abyan, N. (2025). Transition towards a Green Economy in Sustainable Growth: an Analysis of Regulation and Practice in Indonesia. *Clean and Sustainability Business*, *1*(1), 16–28.

Azhar, M., & Satriawan, D. A. (2018). Implementasi kebijakan energi baru dan energi terbarukan dalam rangka ketahanan energi nasional. *Administrative Law and Governance Journal*, *1*(4), 398–412.

Bakri, S., Yuwono, S. D., Sulistiowati, R., Septyastuti, S., Nurhaida, I., & Kurniasari, N. (2024). Can the Application of Agroforestry at Monocultural Food Crop Areas Support Manufacturer Chemical Fertilizer Reduction Programs without Sacrificing Farmers'income? *The American Journal of Social Science and Education Innovations*, *6*(05), 101–114.

Cadman, T. (2018). The United Nations framework convention on climate change. In *The Palgrave handbook of contemporary international political economy* (pp. 359–375). Springer.

Canton, H. (2021). International energy agency—IEA. In *The europa directory of international organizations 2021* (pp. 684–686). Routledge.

Febryano, I. G., Hardian, D., Supono, S., Damai, A. A., Widiastuti, E. L., & Novriyanti, N. (2021). Perception of Fisherman and Government Officer on Policy Implementation of Cantrang Prohibition in Lampung Bay. *International Conference on Sustainable Biomass (ICSB 2019)*, 54–58.

Haryanto, B., Supriatna, J., Nurlambang, T., & Marsum. (2024). Status of Nationally Determined Contributions in Indonesia: A Review on Climate Change Health Impacts. *Climate Change and Human Health Scenarios: International Case Studies*, 115–128.

Hayden, F. G. (2002). Policymaking network of the iron-triangle subgovernment for licensing hazardous waste facilities. *Journal of Economic Issues*, *36*(2), 477–484.

Indonesia, R. (2014). Peraturan Pemerintah Republik Indonesia No. 79 Tahun 2014 tentang Kebijakan Energi Nasional. *Lembaran Negara RI Tahun*, *300*.

Kurniawan, I., Ichwani, R., Fionasari, R., Batubara, A., & Huda, A. (2022). 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*(2), 298–313.

Listrik, R. (2021). Rencana Usaha Penyediaan Tenaga Listrik (RUPTL) PT. *PLN (Persero)*, *2030*, 13–14.

Muhammad, A. C., Santoso, H., Purnama, Y. A., Parenden, D., Dewadi, F. M., Dewi, R. P., Winardi, B., & Lillahulhaq, Z. (2023). Konversi Energi. *Global Eksekutif Teknologi*.

Norlyanti, N. (2018). 24. Indonesia Non-Permanent Member of United Nations Security Council. *5th International Conference on Social and Political Sciences (IcoSaPS 2018)*, 120–125.

Rahayu, L. N., & Windarta, J. (2022). Tinjauan potensi dan kebijakan pengembangan PLTA dan PLTMH di Indonesia. *Jurnal Energi Baru Dan Terbarukan*, *3*(2), 88–98.

Suoneto, N., & Paramitha, G. (2021). Indonesia's Participation at COP26. *The Diplomat*.

Wulandari, C., Budiono, P., & Ekayani, M. (2019). Impacts of the new decentralization law 23/2014 to the implementation of community based forest management in Lampung Province, Indonesia. *IOP Conference Series: Earth and Environmental Science*, *285*(1), 012006.