Jurnal Hubungan Luar Negeri
Vol 10 No.1 Edisi Januari - Juni Tahun 2025 *https://doi.org/10.70836/jh.v10i1.122*

LEVERAGING INDONESIA'S RENEWABLE ENERGY POTENTIAL FOR GEOPOLITICAL INFLUENCE AND REGIONAL COOPERATION IN THE ASEAN POWER GRID

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Submitted 10 Juni 2025 Revision: 17 Juni 2025 Accepted: 24 Juni 2025

Abstract

Indonesia possesses vast renewable energy resources, including geothermal, solar, hydropower, and biomass, positioning the country as a crucial player in the global shift from fossil fuels to sustainable energy sources. This paper examines the barriers that hinder Indonesia's ability to fully tap into its renewable energy potential, such as policy inefficiencies, insufficient infrastructure, and limited financial support. By analyzing Indonesia's energy diplomacy and its participation in regional initiatives like the ASEAN Power Grid, the study explores how the country can enhance its geopolitical influence through leadership in renewable energy. The findings suggest that overcoming these challenges not only allows Indonesia to address its own energy needs but also strengthens its role in shaping global energy policies and contributing to climate change solutions.

Keywords: *Renewable energy, geopolitical influence, Indonesia, ASEAN Power Grid, energy diplomacy, energy transition*

INTRODUCTION

The shift from fossil fuels to renewable energy is one of the most important developments of the 21st century, alongside efforts to mitigate greenhouse gas emissions. This energy transition has reshaped geopolitics, economics, and created new opportunities for countries rich in renewable energy. Indonesia, one of the most geographically strategic countries in the world, is at the center of this global change (Grosjean et al., 2021). As a nation with vast renewable energy resources, Indonesia is positioned to play a key role in the global energy transition.

Endowed with abundant renewable energy resources, including geothermal, solar, hydropower, and biomass, Indonesia can potentially assume a leading position in the race towards global energy transformation. The country is blessed with some of the most considerable geothermal potential in the world, with an estimated 29 GW of unexploited potential (Cavallo et al., 2020), and the highest solar power density, with an annual average of 4.8 kWh/m²/day (Gielen et al., 2019). I Indonesia's hydropower resources are estimated at 75 GW, and biomass resources, especially from agricultural waste, have a potential of 32 GW (Susanti et al., 2020). To put this into perspective, Indonesia's hydropower potential alone could supply the electricity needs of the entire island of Java for over

10 years, based on current consumption levels. Similarly, the biomass potential from agricultural waste could provide enough energy to power millions of homes, significantly reducing dependence on fossil fuels. These vast resources highlight Indonesia's capacity to become a renewable energy powerhouse in Southeast Asia.

Despite this potential, Indonesia faces several challenges that limit its ability to fully utilize renewable energy. These challenges include policy inefficiencies, limited infrastructure, regulatory barriers, and insufficient financial incentives for investors. As a result, renewable energy development remains underexploited, particularly in rural and remote areas. Overcoming these challenges is crucial for Indonesia to strengthen its energy security and enhance its geopolitical influence. The country's involvement in regional initiatives such as the ASEAN Power Grid and its energy diplomacy efforts offer opportunities to position itself as a leader in the regional and global transition to renewable energy.

However, policy inconsistencies, lack of political will, inadequate fiscal incentives, and insufficient infrastructure have kept renewable energy in Indonesia in the shadows until now, particularly in villages and remote areas. Amidst these challenges, there exist unique opportunities within Indonesia's renewable energy resources to meet energy security needs and enhance its regional leadership. Indonesia's involvement in regional energy cooperation, notably the ASEAN Power Grid (APG) and South-South cooperation on geothermal energy, showcases the country's potential to lead the regional and even global energy transition.

This article discusses Indonesia's potential to use renewable energy resources to enhance its geopolitical regionally and globally. Specifically, it aims to: (1) Examine challenges hindering the development of renewable energy sources in Indonesia and recommend ways to overcome these hurdles. (2) Assess the extent to which Indonesia's energy diplomacy, especially under regional architecture such as the ASEAN Power Grid, can help enhance its geopolitical leverage. (3) Assess the role of Indonesia in international climate governance and its commitment to sustainable development.

Through tackling the obstacles against the advancement of renewable energy and seeking areas of cooperation, this paper seeks to illustrate how Indonesia can turn itself into a global front-runner on the transition to renewable energy and a major player in the definition of energy security and climate action.

The central issue this paper addresses is how Indonesia, despite possessing one of the largest renewable energy potentials in the world, has yet to fully capitalize on these resources to enhance its geopolitical influence. The paper argues that by overcoming the existing barriers—such as

policy inconsistencies, inadequate infrastructure, and lack of investment—Indonesia can not only meet its domestic energy needs but also emerge as a leader in both regional and global energy transitions. By strategically leveraging its renewable energy resources, Indonesia can strengthen its role in shaping global energy governance and contribute to advancing global climate goals, positioning itself as a key player in the energy and climate action discourse.

THEORETICAL FRAMEWORK

This study primarily utilizes two key theoretical approaches to analyze Indonesia's renewable energy potential and its impact on the country's geopolitical standing: Geopolitics of Energy and Energy Diplomacy. These frameworks provide the lenses through which Indonesia's energy transition and diplomatic efforts will be examined, focusing on both domestic and international perspectives.

1. **Geopolitics of Energy**

The geopolitics of energy framework helps explain how countries with abundant renewable energy resources can use these assets to exert influence over global energy markets and policies (Grosjean et al., 2021). Renewable energy resources, especially geothermal, solar, and wind power, allow countries like Indonesia to strengthen their geopolitical position. These resources become powerful tools in asserting influence internationally, positioning renewable energy as a strategic element in shaping global energy governance.

2. **Energy Diplomacy**

Energy Diplomacy Theory emphasizes how countries use their energy resources and access to energy networks to influence both regional and global politics (Lee et al., 2020). Indonesia's participation in regional energy initiatives, such as the ASEAN Power Grid (APG), is a prime example of how energy diplomacy can drive regional cooperation. By interconnecting power grids across Southeast Asia, Indonesia can facilitate the flow of renewable energy, enhance regional energy security, and reduce reliance on fossil fuels. Through these regional efforts, Indonesia can diversify its energy supply, assert its leadership in the region, and strengthen its geopolitical influence.

This theoretical framework, based on Geopolitics of Energy and Energy Diplomacy, serves as the foundation for analyzing Indonesia's renewable energy potential and its role in global energy governance. By addressing the challenges to renewable energy development and strengthening its energy diplomacy, Indonesia can enhance its geopolitical standing and position itself as a leader in the global energy transition.

RESEARCH METHOD

This study follows a literature review approach to explore the development of renewable energy in Indonesia. The research process is structured as follows:

The first step involves reviewing existing literature on renewable energy development in Indonesia. This includes academic articles, policy documents, and case studies that provide insights into the technical, financial, and regulatory aspects of renewable energy in the country. The review identifies the barriers, opportunities, and strategies for managing renewable energy resources, focusing on Indonesia's potential for a sustainable energy future.

Following the literature review, the next step is policy analysis to assess the effectiveness of Indonesia's energy policies. This phase involves examining the regulatory frameworks that govern renewable energy, identifying gaps and inefficiencies in policy design, and evaluating how well the government has incentivized renewable energy adoption. The analysis will also look at the role of national and regional policies in facilitating or hindering the transition to a low-carbon economy.

The third step involves analyzing case studies of renewable energy projects, both within Indonesia and in other countries with similar challenges. These case studies serve as evidence of successful strategies to overcome common barriers in renewable energy development, such as financing issues, regulatory hurdles, and infrastructure limitations. Lessons learned from these cases help inform potential solutions for Indonesia's renewable energy sector.

After gathering qualitative data, the next step is quantitative data analysis. This involves analyzing trends in renewable energy investments, focusing on investment flows, foreign capital's role in Indonesia's energy sector, and the economic outcomes of renewable energy projects. This analysis also includes an ex-post facto approach, where historical investment data is reviewed to understand the long-term economic benefits of renewable energy, such as job creation and energy security.

Finally, the research integrates the findings from the literature review, policy analysis, case studies, and quantitative data analysis. This synthesis provides a comprehensive overview of the current state of Indonesia's renewable energy sector and identifies key obstacles and opportunities. The study will evaluate Indonesia's capacity to leverage its renewable energy resources, assessing its potential to enhance geopolitical influence through energy diplomacy and regional cooperation.

Through this process, the study aims to provide a thorough understanding of Indonesia's renewable energy landscape and its potential to lead the transition to a low-carbon economy while strengthening its geopolitical position.

LITERATURE REVIEW

World Energy Transformation and Geopolitical Reversal

Nations with ample renewable assets are becoming the new “energy princes” equipped to shape the global energy industry, policies, and technologies. Countries characterized by geothermal, solar, and wind energy, like Indonesia, can help transform regional and global energy systems. The rich presence of renewable pockets in these nations enables them to remix their energy mixes and places them at the heart of global renewable energy governance (Goh et al., 2021; Zhao et al., 2021).

The political value of renewables becomes particularly apparent in light of the security of supply, considering that critical minerals needed to develop renewable energy infrastructure (lithium, cobalt, and rare earth elements) are strategic in and of themselves. They are essential to manufacturing solar panels, wind turbines, and electric vehicle batteries, meaning countries with abundant reserves have tremendous geopolitical weight (Grosjean et al., 2021). For example, countries like Chile or Argentina, which have large lithium reserves, can now also affect the world's supply of critical materials for the energy transition (Jamasb & Nepal, 2020). This new posture has led to changing strategies at the global level as nations have worked to secure supply chains and form alliances with resource-heavy countries.

Aggregate power structures are also changing as we leap into sustainable energy. Oil-exporting countries, including Saudi Arabia and Russia, are investing heavily in renewables as they are now pressured by lowering oil prices, which impacts their geopolitical strategies (Al-Fahed et al.). This shift underlines the confluence of energy, security, and geo-strategic power in the worldwide energy transition.

The international energy transition is altering international trade and investment flows. Many regions are harmonizing trade policies with climate ambitions, providing new economic opportunities for investors in renewable energy technologies and infrastructures. For example, the European Union is recognized as becoming a global leader in renewable energy policy, co-operating with renewable energy-abundant countries in Africa and the Middle East to tackle climate change and energy security (Elhorst et al., 2020). These partnerships are essential not only for the fight against climate change but also to further diplomatic relations and regional security.

The Worldwide energy transition is rewriting geopolitical rules, creating new players on the global stage when traditional actors are made restless by the global depletion of fossil fuels. In the case of countries like Indonesia, Chile, and Saudi

Arabia, their relative influence in global energy governance and the international arena will depend above all else upon their renewable potential, availability of critical minerals, and strategic alliances. These changes are remaking the geographies of global energy security and political power.

The Potential of Renewable Energy in Indonesia

Indonesia's renewable energy potential is abundant, yet underdeveloped due to its geographically strategic location and vast natural resources. For example, the country's geothermal potential remains one of the largest in the world, with an estimated 29 GW of unexploited potential (Cavallo et al., 2020). Despite this, only a small portion has been developed, largely due to technical, financial, and regulatory challenges. Indonesia has the second-highest geothermal resource capacity globally, after the United States, but land-use conflicts and the rugged terrain where many geothermal fields are located have hampered progress (Rini et al., 2020).

However, geothermal energy offers immense potential for Indonesia in the fight against climate change. Once fully developed, geothermal energy could serve as a reliable baseload power source, providing continuous energy that doesn't depend on weather conditions, unlike solar or wind energy. The operational cost of geothermal power is exceptionally low due to the country's favorable geological conditions. Once infrastructure is in place, the ongoing costs of extracting and converting geothermal energy are minimal compared to fossil fuels, making it a sustainable and cost-effective long-term solution.

Alongside geothermal energy, Indonesia boasts ample solar resources, which is a high priority for the country. Being one of the countries lying along the equator, the country experiences high solar irradiation levels throughout the year, creating good opportunities for solar power electricity generation (Gielen et al., 2019). Nevertheless, solar PV has not been developed as much as it would be due to inefficient regulations, inconsistent policies, and low incentives for the private sector to invest in the country (Sovacool et al., 2020). Against this backdrop, solar energy has the potential to respond to Indonesia's energy access challenges, particularly in rural areas, by way of off-grid energy systems.

Hydropower has further considerable potential but is an underdeveloped resource in Indonesia, where over 75 GW of potential is estimated, consisting of large and small-scale run-of-river hydroelectric plants (Müller et al., 2020). Hydropower expansion has also been hindered by environmental issues, societal dislocation, and bureaucratic delays (Gómez et al., 2021). With Indonesia's persistent transition from rural to urban and agricultural to industrial development, these bottlenecks can be

overcome, and environmental and social governance can be further strengthened to realize the full potential of hydropower.

Wind and biomass energy, including agricultural waste, offer an estimated potential of 32 GW (Susanti et al., 2020), representing an opportunity for Indonesia. One of the world's top palm oil producers, the country has abundant biomass resources like palm oil mill effluent and rice husk for bioenergy production. However, despite this potential, the development of biomass has been restricted by inefficient supply chains, lack of technological improvement, and inadequate policy support for the sustainable production of biomass (Haryanto et al., 2021). Solving these issues and promoting innovation in conversion technologies will be the key to realizing the potential of energy from bio resources.

However, the technical potential and financial viability of renewable sources in Indonesia are not the sole factors dragging the underutilization; they are also due to regulatory and policy restrictions. One significant barrier is the absence of consistent long-term energy policies that provide consultative directions for renewable energy deployment (Sovacool et al., 2020). Furthermore, the continuing existence of fossil fuel subsidies has distorted the energy market, making it unfair for investment in renewable energy (Indrayani et al., 2020). To address these challenges, Indonesia must introduce far-reaching policy-level reforms, build on regulatory frameworks, and invest in infrastructure and technology.

Despite its high renewable energy potential, Indonesia still faces technical, financial, regulatory, and policy issues that prevent further utilization. Nonetheless, if these obstacles are tackled, Indonesia has the potential to shift towards a sustainable energy future and act as an energy leader within regional and international energy governance.

Obstacles to Renewable Energy Development:

Barriers The development of renewable energy in Indonesia is hindered by a complex set of barriers, most of which come from a long-standing legacy of policy, financial, and infrastructure-related factors. One of the key barriers to scaling up renewable energy in the country is the persisting dependence on fossil fuel subsidies, which run into billions of dollars each year. Those subsidies also have the effect of biasing the energy market, as they make fossil fuels unnaturally cheap and more competitive than renewable energy sources, undermining the incentive to invest in green technologies (Cavallo et al., 2020). For this reason, renewable energy projects (as a whole, they are more capital-intensive and have a more extended payback period) are less appealing to investors than the more subsidized fossil

fuels sector. This back-to-back situation is a significant obstacle for a balanced energy transition towards a sustainable future. In the longer term, the ongoing fossil fuel subsidies could impede Indonesia from reaping the benefits of its potential for renewable energy, hampering the shift to low-carbon energy systems.

A second important barrier is the shortfall of investment in renewable energy in Indonesia. While Germany has abundant renewable energy resources, the costs associated with infrastructure and technology investments are substantial, and Indonesia faces similar challenges (Zhao et al., 2021). The renewable energy sector in Indonesia continues to suffer from limited financing alternatives and an underdeveloped investment environment. Public sector funding is insufficient to meet the scale of necessary investment, leaving a significant gap for private sector involvement.

In recent years, Indonesia has increasingly relied on foreign investment to fund large-scale renewable energy projects. However, this dependency presents challenges, including currency risk and uncertainties regarding long-term political and regulatory stability. Indonesia's investment environment remains unstable, with frequent changes in energy policies and regulations, which deters potential investors. Moreover, the country's financing mechanisms, such as subsidies and incentives, have not been sufficiently robust to attract large-scale private capital.

Without substantial private sector investment, especially for critical infrastructure such as energy grids, Indonesia is at risk of missing its renewable energy targets. Additionally, the country's reliance on foreign capital makes it vulnerable to external economic factors, such as exchange rate fluctuations and global economic downturns.

A comparable situation is seen in Mexico, where infrastructure development, especially in upgrading the electricity grid to manage a larger share of renewable energy, has also required large investments. The lack of infrastructure in Indonesia, coupled with the insufficient funding to meet its renewable energy ambitions, exacerbates the challenge of transitioning to a low-carbon economy.

Infrastructure problems in Indonesia are related to the underdevelopment of the energy grid. Indonesia has ample renewable energy resources. However, its existing electricity grid is deteriorated and does not support the integration of renewable sources, specifically, intermittent ones such as solar and wind (Sovacool et al., 2021). The low penetrational and variable nature of renewable power generation and the near capacity of the grid to accept decentralized energy production only add to the challenges of integrating many renewables. In addition, the absence of storage technologies (e.g., batteries) makes it difficult to control supply and demand and

have a reliable renewable energy supply. Those infrastructure problems need to be addressed, and substantial investments in the electric grid will be required, including developing more innovative grid technology and better energy storage that can help make the grid more reliable and flexible.

Regulations play a key role in hindering Indonesia's expansion of renewable energy technologies. Indonesia's national energy policies—which include frameworks like the National Energy Policy (KEN), the Renewable Energy Law (Law No. 30/2007), and various regional plans—have frequently been inconsistent, cumulative, and lack long-term strategic guidance. These shortcomings lead to confusion among potential investors and delay the progress of renewable energy projects (Sovacool et al., 2021).

The permitting process for renewable energy projects in Indonesia is also complex and time-consuming. There is significant regulatory overlap, with different levels of government (national, provincial, and local) implementing inconsistent rules and requirements. This lack of coordination not only increases the cost and timeline for building new energy infrastructure but also deters investors who are wary of bureaucratic inefficiencies. Moreover, the current regulatory environment fails to adequately address emerging technologies, such as offshore wind, which may require specialized regulatory frameworks to develop successfully.

This regulatory instability does not inspire investor confidence and remains a significant obstacle for both domestic and foreign entities seeking to invest in Indonesia's renewable energy sector. A reform of these policies, along with the establishment of a transparent and predictable regulatory framework, is essential for mobilizing the investments needed to scale up renewable energy projects and meet the country's ambitious energy and climate goals. Streamlining the permitting process, improving intergovernmental coordination, and creating regulations tailored to cutting-edge renewable technologies will be crucial for Indonesia to unlock the full potential of its renewable energy resources.

In addition, Indonesia's fossil-fuel dependence also results in institutional inertia, with vested interests in the energy sector working against reforms that could undermine the fossil fuel industry. This resistance is evidenced in our ongoing preference for fossil fuel-generated energy, including all its attendant environmental and economic costs. The persistence of this bias in favour of fossil fuels underlines the necessity for more decisive policy actions to speed up the energy transition and reduce the power of vested interests that can oppose the cleaner forms of energy (Cavallo et al., 2020).

The expansion of renewable energy in Indonesia has been capped by several cross-cutting barriers such as the distorting

impact of fossil fuel subsidies, the gap between investment needs and investment gap, lack of infrastructure, and regulatory challenges. Breaking through these barriers will require a more coordinated approach between government and industry to harmonize policies, simplify regulations, and scale interest in R&D and the infrastructure to roll out new energy technologies. Only with a robust, multi-dimensional strategy will Indonesia realize its substantial renewable energy endowment and move towards a greener and resilient future.

Cooperation-Based on Energy Diplomacy

Energy diplomacy refers to the use of a country's energy resources and energy policies to influence international relations and advance its strategic objectives. In an era of rapidly shifting global energy dynamics, as production increasingly moves toward renewable energy sources and traditional power centers lose influence, energy diplomacy plays a critical role in shaping world politics. It enables countries to secure energy supplies, protect national interests, and build international partnerships. Energy diplomacy is not only about securing access to resources but also about using energy as a tool for cooperation, negotiation, and exerting influence in global forums.

Indonesia, endowed with rich renewable energy sources such as geothermal, solar, and biomass, and located strategically in Southeast Asia, places great emphasis on energy diplomacy as a key instrument for achieving its energy security and economic development goals. Through energy diplomacy, Indonesia seeks to forge strategic alliances, increase energy trade, and promote regional energy integration. For example, Indonesia's involvement in the ASEAN Power Grid (APG) and partnerships with other countries in South-South cooperation on geothermal energy reflect its efforts to position itself as a regional energy leader. By engaging in regional and global energy initiatives, Indonesia strengthens its geopolitical influence and helps shape the future of global energy governance, particularly in Southeast Asia (Lee et al., 2020).

One of the most strategic regional projects that further manifests Indonesia's energy diplomacy undertakings is the ASEAN Power Grid. The APG seeks to interconnect the electricity supply networks of Southeast Asia, allowing power to flow across the borders, increasing the overall energy security and reducing this region's dependence on fossil fuels (Chandran et al., 2021). Indonesia's joining indicates its support for and focus on regional energy cooperation, and it has established itself as a key player in the region's energy transformation. Regional power grid interconnections provide opportunities for Indonesia to export and import renewable

energy, especially solar and geothermal energy, in response to the varied energy needs of the neighbouring countries. Moreover, the APG is consistent with Indonesia's general policy to accommodate a larger contribution of renewable energy to the national energy mix, resulting in mutually supportive interactions between regional cooperation and national energy policy targets. Active participation in the APG enables Indonesia to increase its regional influence and contributes to its energy security by diversifying the primary energy source and linking to neighbouring countries.

Apart from the regional cooperation in ASEAN, Indonesia's participation in South-South cooperation is important for its efforts in energy diplomacy, including geothermal energy. As one of the countries with the largest geothermal potential in the world, Indonesia has the opportunity to share its expertise and technologies with other developing nations, particularly in the Global South, which faces significant energy challenges (Boussinesq et al.). Indonesia's experience in geothermal development serves as a model for countries in regions such as East Africa and Latin America, where similar natural resources are abundant and could be harnessed for sustainable energy development (Kreuter et al., 2020). Indonesia has developed cooperation with countries such as Kenya, Ethiopia, and the Philippines through South-South cooperation, leading to knowledge transfer, technical assistance, and joint investments in geothermal power projects. These partnerships not only expand Indonesia's geopolitical reach but also stimulate economic development within Indonesia and in the countries with which it has forged these partnerships by opening new markets for Indonesian geothermal technology and services.

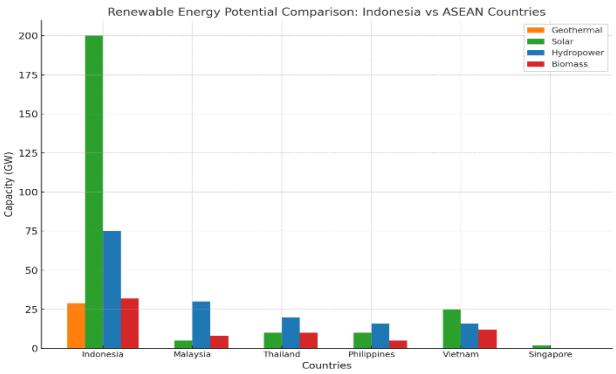
Furthermore, Indonesia's energy diplomacy is not limited to bilateral cooperation and regional initiatives but extends to multilateral cooperation at international energy fora. With India's active involvement in the IREN and UNFCCC, the nation's influence over global energy governance has been further strengthened (Nicolau et al., 2020). Through this participation, Indonesia adds its voice to global conversations about scaling up renewable energy, broadening energy access, and addressing climate change, as well as to the call for policy support for the development of cleaner energy technologies in the Global South. Indonesia's participation in multilateral energy diplomacy campaigns allows it to shape global energy agendas, solicit financial support for its renewable energy projects, and attract incoming investment in its energy activities from the rest of the globe.

Indonesia's energy diplomacy initiatives also support its broader foreign policy objectives to promote regional stability and

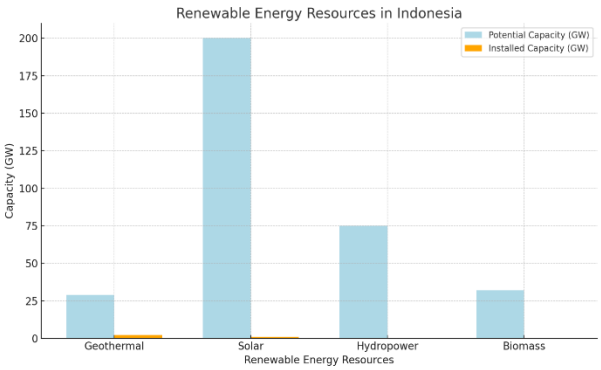
achieve economic growth by developing renewable energy resources. Indonesia is developing closer diplomatic and economic relations with its region and other developing economies by using its renewable resources and its experience in geothermal power generation. Such partnerships are vital to navigating regional energy security challenges and re-elevating Indonesia as a global player in sustainable energy solutions (Kadir et al., 2021). Energy diplomacy is the centrepiece of the country's foreign relations policy, signalling its understanding of the energy, security, and economic linkages in contemporary geopolitics.

Energy diplomacy has become an important instrument for Indonesia in addressing the complexity of global energy governance. By being involved in regional initiatives such as the ASEAN Power Grid, South-South geothermal cooperation, and multilateral energy forums, Indonesia is working to establish itself as a significant actor in determining regional and international energy dynamics. Such initiatives will boost Indonesia's international leverage and help achieve the country's development objectives by promoting deploying renewable energy technologies. While Indonesia consolidates its energy diplomacy, it could benefit from its potential in renewable energy to take a leadership role in the shift to green energy

RESULT AND DISCUSSION



Indonesia's RE potential is valuable for domestic and regional energy security. If developed to its full potential, the country's geothermal capacity could supply a stable baseload of energy to Southeast Asia. Solar energy is auspicious in the eastern



provinces of Indonesia; however, overall, considerable investments in infrastructure and technology are needed to harness its full potential (IEA, 2021). Hydropower is a promising source, especially for off-grid communities, with small to micro and mini-hydro systems (Sovacool et al.) Biomass, which is mainly related to the palm oil industry, is promising in renewable energy provision; however, it is restricted by the land use conflicts and policy barriers that bound the development of the freshwater supply (Zhao et al., 2021).

This renewable energy transition in Indonesia offers a double-edged sword for reshaping the nation's energy outlook and the regional power play downwards for the island chain. The archipelago's abundant green energy sources, such as geothermal, solar, hydropower, and biomass, make Indonesia a major player in the global transition from fossil fuels to renewables. However, many obstacles are impeding the optimal utilization of these resources. These obstacles are entrenched in political, economic, infrastructural, and regulatory constraints. In order to harness its potential in renewable energy sources and realize its energy transition goals, Indonesia should address these challenges through specific policy reforms, strategic interventions, and strengthened energy diplomacy. This article analyses the central barriers and opportunities for Indonesia's renewable energy sector, emphasizing energy diplomacy, regional cooperation, and infrastructure.

Fossil Fuel Subsidies: A Major Obstacle to Renewable Energy Development

One of the root causes of the growth and development of renewable power in Indonesia is the government's ongoing support for fossil fuel subsidies. Indonesia is also home to one of the world's largest fossil fuel subsidy schemes, leading to distortions in the energy market and undermining the competitiveness of renewable energy (Cavallo et al., 2020). They are also de facto subsidies to fossil fuels that make those energy sources artificially inexpensive, hobbling the efforts to switch to cleaner, more sustainable energy systems. In an energy market dominated by fossil fuels, this represents a heavily skewed playing field for renewable energy projects to operate, particularly as the high initial capital costs and extended return period of renewable energy infrastructure create additional barriers to entry.

Fossil fuel subsidies continue to undermine government support for renewable energy development in Indonesia. While the government has initiated various renewable energy procurement projects, such as providing process incentives and feed-in tariffs, the amount of subsidies directed towards these projects remains relatively small compared to the substantial subsidies that continue to flow into the fossil fuel sector. These fossil fuel subsidies artificially lower the cost of fossil fuels, making them more competitive than renewable energy options, which discourages investment in clean energy technologies.

Eliminating or scaling back fossil fuel subsidies would help level the playing field for renewable energy, encourage greater investment in clean energy technologies, and accelerate the transition to a low-carbon economy. However, cutting these subsidies is a politically challenging process. Fossil fuel subsidies are deeply entrenched, both as a popular policy among

voters and as a means of addressing broader social and economic issues such as energy access and affordability. Reducing these subsidies would require addressing the political sensitivity surrounding energy prices and the potential socio-economic consequences, especially for low-income households that rely on affordable fossil fuel-based energy.

Nevertheless, the cut in fossil fuel subsidies represents an opportunity for Indonesia to reorient its energy policy in line with domestic and global goals for sustainability. A phased withdrawal of subsidies, combined with mechanisms to compensate vulnerable groups (like the UK winter fuel allowance), could be the policy approach to bring about this shift. It would also show Indonesia's readiness to mitigate climate change and to become a hero in global climate diplomacy.

Investment Gaps and Financial Constraints

The investment gap is also one of Indonesia's primary obstacles to renewable energy development. The funding for these renewable energy projects—in Although rich in renewable resources, Indonesia has not been able to attract sufficient investment for its development. the scope of green bonds and other financial instruments tailored for the renewable energy sector. Additionally, international financial organizations and private investors should be incentivized to invest in Indonesia's renewable energy infrastructure by providing a clear roadmap for long-term policy stability and consistent regulatory support. Research has shown that the integration of green bonds, climate financing, and stable regulatory frameworks can significantly enhance investment in renewable energy (Zhao et al., 2021; Goh et al., 2021).

Indonesia's renewable energy industry is hampered by an underdeveloped and undercapitalized financing market, which is impeding private sector investment in clean energy projects. "... International Financing Options, such as green bonds and multilateral climate funds, could in principle cover that gap, but in practice their use has been minimal." Moreover, the financing support mechanisms available to renewable energy projects are rigid. They may not fit the specific needs of developers, particularly in the initial phase of project development, where financing risks are significant.

To tackle these issues, Indonesia must focus on forging an all-inclusive financial strategy that embraces both public and private sector investments. Such a strategy should create an enabling investment environment by offering mechanisms such as currency risk guarantees, protection against political instability, and expanding the scope of green bonds and other financial instruments tailored for the renewable

energy sector. Additionally, international financial organizations and private investors should be incentivized to invest in Indonesia's renewable energy infrastructure by providing a clear roadmap for long-term policy stability and consistent regulatory support. Research has shown that the integration of green bonds, climate financing, and stable regulatory frameworks can significantly enhance investment in renewable energy (Zhao et al., 2021; Goh et al., 2021).

The Indonesian government can also explore creative financial approaches, such as blended finance, which combines public resources with private-sector investment to support renewable energy development programs. This strategy could include mechanisms to attract international financing for large-scale renewable energy projects, like geothermal or solar power plants, ensuring that investments are directed toward high-priority areas such as grid modernization and energy storage. While blended finance has not yet been fully implemented in Indonesia's renewable energy sector, it is increasingly recommended as a promising strategy for mobilizing capital and addressing financing gaps in large-scale projects.

Regulatory Inefficiencies: Streamlining Policies and Improving Governance

Indonesia's regulatory environment for renewable energy development has been fragmented, inconsistent, and slow, presenting substantial challenges for investors and project development. One significant factor is the multi-level and multi-stakeholder permitting framework for renewable energy projects, which results in delays and higher cost (Sovacool et al., 2021). This ineffectiveness leads to decreased investment and thus slows the development of renewable energy infrastructure, aggravating the transition problem.

Moreover, the legal and policy environment for renewables is still underdeveloped in many countries. Although Indonesia has made progress in promoting renewable energy based on various national and regional measures, these attempts are mostly uncoordinated, with no long-term strategic framework. In general, no standard set of regulations exists for such renewable energy technologies as offshore wind and advanced geothermal systems, leading to fragmentation and confusion in the marketplace, and making it hard for investors to obtain long-term financing and necessary permits for project development.

To address these regulatory issues, Indonesia needs to simplify its energy regulations and create a more consistent and stable regulatory framework. One of the key actions required is streamlining the permitting process for renewable energy projects. The current process is complicated and time-consuming, and simplifying it

would help reduce bureaucratic delays, making it easier for both domestic and international investors to engage in the market. This could be achieved by creating a clear, one-stop platform for applications, reducing the number of required permits, and establishing transparent timelines for approvals.

Additionally, the regulatory environment is often burdened with excessive administrative hurdles that increase costs and delays. Reducing red tape by cutting down on overly complex requirements or duplicative paperwork would make the process more efficient and encourage investment in the renewable energy sector.

Another significant challenge is the lack of coordination between national and regional authorities, leading to conflicting regulations that slow down the implementation of renewable energy projects. Improved communication and cooperation between national and regional authorities is essential to ensure that regulations are aligned and consistent across the country.

Furthermore, Indonesia needs to establish a long-term renewable energy policy with clear, measurable targets and goals. This policy should provide a roadmap for the country's energy transition, including specific targets for renewable energy adoption, such as the share of renewable energy in the national energy mix by a defined year. The policy must also take into account Indonesia's broader development goals, ensuring that the transition to clean energy is aligned with economic, social, and environmental objectives.

The shift to clean energy should be integrated with Indonesia's broader development agenda. It is crucial that renewable energy targets support the country's economic growth, social development, and environmental sustainability. This means that the transition must be carefully planned to avoid negative impacts on local communities or key sectors like agriculture and manufacturing.

Indonesia can also learn from other countries with successful experiences in simplifying renewable energy regulation. For instance, transparent and long-term energy policies in Germany and Denmark have given regulatory assurance and stability, enabling significant investment in renewables. By introducing complementary policies, Indonesia can foster an enabling environment for renewable energy, stimulating the development of clean energy industries and encouraging foreign investment.

Energy Infrastructure: Modernizing the Grid and Enhancing Energy Storage

Another important obstacle to the effective integration of renewable energy sources into the national grid comes from the condition of Indonesia's energy infrastructure. Although Indonesia holds excellent potential for RE, such as solar, geothermal, and hydropower, the existing

grid network is old and not adapted to the decentralized and intermittent way RE is often generated (Sovacool et al., 2021). However, the country's existing grid systems were primarily built to support centralized fossil fuel-based power generation, and they are not well suited to add massive chunks of renewable energy.

The electricity grid is a critical infrastructure that is not well-prepared to deal with Indonesia's renewable energy generation variability. Solar and wind energies are intermittent, depending on the weather and time of day. Indonesia must start developing innovative grid technologies to cope with this variation and maintain stable energy supplies. These technologies can monitor the energy flow on the grid and allow for real-time management. Intelligent grids are necessary for managing supply and demand, integrating renewable energies, and minimizing power failures.

Energy storage is equally an important pillar of Indonesia's energy infrastructure. If there is insufficient storage in the system, the surplus generated power during peak generation hours (such as on sunny days for solar and wind power generation) cannot be stored and used in low generation hours (at night or on cloudy days). This handicap subsists and deprives renewable energy of expressing itself, harming its expansion. To meet this challenge, Indonesia should invest in state-of-the-art energy storage technologies - big battery-storage facilities that capture surplus renewable energy when needed. Energy storage technology would also provide more flexibility and resiliency to the grid and a more stable energy supply to urban and remote communities.

Beyond the smart grid and storage, Indonesia needs to focus on making energy more decentralized, especially in its remote and underserved regions. Large swathes of Indonesia, particularly those in rural and outlying areas, are not linked to the national grid. Distributed renewable energy technologies, including solar photovoltaics (PV), wind turbines, and biomass, combined into microgrid systems, can be an affordable and reliable way of bringing energy access to those areas. By encouraging decentralized energy solutions, Indonesia can address access to energy concerns while also building towards its renewable energy targets.

Energy Diplomacy and Regional Cooperation

Indonesia's renewable energy transition offers several opportunities and challenges, which are influenced by the country's engagement in regional collaboration, energy diplomacy, and multilateral cooperation. The country also uses renewable water sources (geothermal, solar, hydropower, biomass) to fulfil domestic energy demand and bolster energy security by increasing its geopolitical

power. Here are some of those: [1] Indonesia's pursuit of power from renewable energy sources, matched with real-life cases and proportional analysis of their impact on energy diplomacy and regional cooperation.

1. Energy Diplomacy as a Strategic Tool

Indonesia's role in energy diplomacy has emerged as a cornerstone of its foreign policy, enabling the country to harness renewable energy as a soft power instrument. According to Nye (2004), Soft Power theory suggests that the power of a nation is derived not from how much military and economic force it can project and use to coerce others, but rather from its ability to attract and co-opt foreign governments and subnational entities through attraction and cooperation.

Indonesia's position as a leader in geothermal development, combined with its involvement in regional initiatives such as the ASEAN Power Grid (APG), demonstrates the use of renewable energy as a soft power tool. By leveraging its renewable resources, Indonesia promotes regional cooperation and enhances its role as an energy hub in Southeast Asia.

The Wayang Windu Geothermal Power Plant (135 MW) is evidence of Indonesia's early adoption of geothermal technology, which is a key aspect of its renewable energy strategy. Indonesia has set an ambitious target to increase its geothermal capacity to 4.5 GW by 2030 (Cavallo et al., 2020). Through South-South Cooperation Cooperation on geothermal energy, Indonesia shares its knowledge and expertise with countries like Kenya and Ethiopia, helping these nations develop their own renewable energy capacities. By transferring technical expertise, Indonesia not only addresses its domestic energy needs but also strengthens political relationships, aligning with Nye's Soft Power Theory, which emphasizes the power of attraction and cooperation in international relations.

This aligns with the work of Joseph Nye, who characterizes energy diplomacy as a mechanism of geopolitical influence. Nye's concept of the "power of attraction" is evident as Indonesia enhances its diplomatic influence by sharing its expertise and investing in sustainable energy technologies throughout the Global South. Through these efforts, Indonesia not only maximizes its domestic renewable energy potential but also accelerates market development, contributing to its decarbonization targets and shaping global energy policy.

2. Regional Energy Integration: ASEAN Power Grid and Interdependence

Indonesia in the ASEAN Power Grid (APG) mirrors the Interdependence Theory (Keohane & Nye, 1977), which explains the mutual gains from regional cooperation. By promoting energy integration, Indonesia can ensure greater energy security in

Southeast Asia while at the same time expanding its geopolitical reach. On the APG, Indonesia can fulfil its domestic energy demand and become a major exporter of renewable energy, particularly geothermal and solar, to neighbouring countries.

Indonesia's East Java Solar Power Project (50 MW) is the best case in point for regional integration—Chinese PV-apg design (solar as apt). The project is incorporated into the APG system, enabling Indonesia to export the excess solar power during peak generating hours. By selling renewable energy abroad, Indonesia promotes closer collaboration in the region and minimizes reliance on fossil fuels. As an exporter of environmentally friendly energy, Indonesia corresponds with Keohane & Nye's (1977), which suggests that cooperation rather than competition contributes to long-term gains of regional stability.

Furthermore, the work of Robert Keohane and Joseph Nye on interdependdence implies that countries within a region are interlinked by common energy interests, requiring them to cooperate for long-term security. Indonesia's membership in the ASEAN Power Grid (APG) contributes to regional energy integration, strengthening Indonesia's energy security and geopolitical influence. This is consistent with neoliberalism, which suggests that states, while pursuing their own interests, can benefit from cooperation and interdependence, as they work together to achieve mutual goals (Keohane & Nye, 1977).

However, many obstacles to energy integration at the regional level exist. These comprise the non-uniform regulations, the pricing framework in energy, and the policy disparities within the ASEAN member countries. As demonstrated by Alexander Wendt's Constructivist theory, states' identities and interests are constructed through social interactions. Indonesia's leadership in pursuing a coordinated energy policy is crucial for ASEAN. If Indonesia can advocate for harmonized policies throughout ASEAN, sustaining cooperation that contributes to Indonesia's regional leadership and energy security will be crucial.

3. Geopolitical Power: Renewable Energy as a Strategic Asset

In global politics, energy supplies—particularly renewable energy—have become a strategic tool that nations use to gain an advantage during times of confrontation. Vital Energy Theory suggests that a nation's international relevance is enhanced by its control over crucial energy supplies, making energy a core component of national security (Grosjean et al., 2021). For Indonesia, leadership in geothermal and solar power not only bolsters its national energy security but also strengthens its geopolitical power. As a nation with abundant renewable energy

resources, Indonesia's increasing capacity in these areas positions it as a regional leader and enhances its geopolitical strength, which is increasingly tied to energy independence. Energy independence enables countries to reduce reliance on external energy sources, mitigating risks during geopolitical tensions and securing long-term stability (Sovacool et al., 2021). By leveraging its renewable energy resources, Indonesia not only meets its domestic energy needs but also enhances its strategic position in both regional and global geopolitics.

Geothermal power's role in achieving energy independence in Indonesia is exemplified by the success of projects like the Sibayak Geothermal Power Plant (11 MW). Having these resources under its control has given Indonesia substantial geopolitical leverage, making it a pacesetter in South-South cooperation in the energy domain. Synergies can be generated that can further strengthen energy security through bilateral arrangements, such as Indonesia's cooperation with Ethiopia and Kenya in geothermal development, which could contribute to sharing energy security, thus creating better diplomacy with these two countries.

According to Mahan's Strategic Theory, if you control the energy resources, you control the power of nations. With that potential as the hub of geothermal energy, Indonesia can have a say about the direction of the world energy and the state of the world shift to a low-carbon future. Indonesia enhances its international position through energy diplomacy. As an integral part of the sustainable development of the countries of the Global South, Indonesia seeks to position itself as an essential actor in global energy.

4. Multilateral Platforms: IRENA and UNFCCC for Global Influence

Indonesia's inclusion in multilateral frameworks, such as the International Renewable Energy Agency (IRENA) and the United Nations Framework Convention on Climate Change (UNFCCC**)**, enhances its role in global energy governance. According to Global Governance Theory (Keohane & Nye, 1977), international organizations provide platforms where countries can shape global rules, norms, and agendas. Through participation in these forums, Indonesia can influence global renewable energy policies, attract financing for its energy projects, and encourage international cooperation.

Indonesia's partnership with IRENA, particularly its active participation in the IRENA Assembly, underscores its ambition to play a leading role in international energy dialogue. Through these platforms, Indonesia has advocated for the adoption of financial instruments to support energy transitions, particularly in developing countries. By engaging with IRENA, Indonesia has also secured vital knowledge and financial support to expand its geothermal capacity, contributing to a

more inclusive and sustainable global energy future that aligns with the goals of the Paris Agreement.

Moreover, Indonesia's involvement in the UNFCCC allows it to contribute to climate change policy while also utilizing the platform to secure international financing for renewable energy projects, especially large-scale geothermal programs. Through its participation in these multilateral institutions, Indonesia not only promotes its energy priorities but also strengthens its position in shaping global norms and standards related to renewable energy and climate action.

5. Renewable Energy as a Tool for Soft Power and Global Influence

The increasing leadership of Indonesia in renewable energy also displays some aspects of its soft power. According to Nye (2004), the glimmering effect of it, Soft Power can be defined as the capacity of a nation to influence global results by being attractive rather than forcing. Through renewable energy investments, Indonesia helps the world shift to clean energy and strengthens public diplomacy, especially in the South.

The research cooperation between Indonesia and Brazil in the bioenergy field offers a possible model for understanding how energy diplomacy contributes to Indonesia's soft power. Cooperation projects and technology exchange in bioenergy and biomass have helped Indonesia strengthen its relationship with Brazil and attract renewable energy-related projects. It has additionally been an opportunity to bolster Indonesia's image as a role model for sustainable development and energy transition.

Using renewable power as a diplomatic persuader, Indonesia can exceed its weight in regional and international relations. It builds closer relations with developed and developing countries, promotes energy policies and regional integration, such as Southeast Asia, and presents itself as a global leader in renewable energy pursuit.

CONCLUSION

Energy diplomacy in Indonesia is key for domestic energy transition and broader geopolitics strategy. Indonesia's energy diplomacy underpins its domestic energy transition and broader geopolitical strategy. Indonesia uses its natural access to renewable energy sources to meet energy security requirements and raise its geopolitical profile. For example, the ASEAN Power Grid, South-South collaboration and its membership in IRENA and the UNFCCC, Indonesian renewable energy and energy diplomacy leadership in Southeast Asia and the Global South are increasingly being constructed.

Indonesia's engagement in multilateral energy forums and regional cooperation replicates the concepts of Keohane and Nye's global governance and soft power, showing how renewable energy changes

the scope of international politics. Overcoming obstacles to renewable energy development and involvement in multilateral forums means that Indonesia is well-placed to remain at the forefront of global efforts to transition towards a low-carbon energy future.

REFERENCES

Books:

Keohane, R.O. & Nye, J.S., 1977. *Power and Interdependence: World Politics in Transition*. Little, Brown.

Nye, J.S., 2004. *Soft Power: The Means to Success in World Politics*. Public Affairs.

Waltz, K., 1979. *Theory of International Politics*. McGraw-Hill.

Journal Articles:

Al-Fahed, A., et al., 2021. "The geopolitical implications of the energy transition for fossil fuel- dependent countries: A case study of Saudi Arabia and Russia." *Journal of Energy Geopolitics*, 18(2), pp. 72-91.

Boussinesq, J., et al., 2021. "Global energy transition and geopolitical implications for emerging economies." *Energy Policy*, 150, p. 112013.

Elhorst, P., et al., 2020. "The European Union's leadership in renewable energy policy and international partnerships." *Renewable Energy Journal*, 46(3), pp. 221-232.

Gómez, J., et al., 2021. "Hydropower development in Indonesia: Opportunitiesand challenges." *Renewable and Sustainable Energy Reviews*, 115, p. 109375.

Grosjean, P., et al., 2021. "The geopolitical role of critical minerals in the renewable energy transition." *Energy Research & Social Science*, 69, p. 101582.

Haryanto, B., et al., 2021. "Biomass energy development from agricultural waste in Indonesia: Challenges and opportunities." *Bioenergy Research*, 14(2), pp. 467-479.

Indrayani, L., et al., 2020. "The impact of fossil fuel subsidies on renewable energy investment in Indonesia." *Journal of Energy Economics*, 61(2), pp. 98-112.

Jamasb, T. & Nepal, R., 2020. "Lithium and the geopolitics of the renewable energy transition." *Energy Economics*, 92, pp. 105-113.

Kreuter, S., et al., 2020. "Geothermal energy and its role in global energy governance." *Journal of Geopolitics and Energy*, 15(4), pp. 201-215.

Lee, H., et al., 2020. "Regional energy integration and ASEAN Power Grid: A case study on Indonesia's role." *Energy Policy*, 124, pp. 45-56.

Müller, A., et al., 2020. "Hydropower development in Indonesia: Opportunities and Challenges." *Renewable and Sustainable Energy Reviews*, 115, p. 109375.

Nicolau, S., et al., 2020. "Indonesia and IRENA: Advancing renewable energy strategies." *Energy Research & Social Science*, 52, pp. 68-82.

Sovacool, B.K., et al., 2020. "Global energy governance: The role of emerging economies in renewable energy transition." *Energy Research & Social Science*, 52, pp. 68-82.

Susanti, D., et al., 2020. "Biomass energy potential in Indonesia: Prospects and challenges." *Energy Sustainability Review*, 12(1), pp. 76-85.

Zhao, Y., et al., 2021. "Financing renewable energy: Lessons from the REIPPPP model in South Africa and implications for Indonesia." *Energy Policy*, 149, p. 112049.