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Environmental law as a pillar in the renewable energy transition towards sustainable development in Indonesia

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Abstract

Renewable energy transition is essential for sustainable development in Indonesia, but faces challenges such as suboptimal regulations, minimal incentives, and conflicts of interest. Environmental law plays a strategic role in supporting this transition, but its effectiveness in encouraging clean energy development and ensuring social justice still needs further research. This study examines the challenges of renewable energy transition in Indonesia, the role of environmental law in supporting clean energy, protecting the environment, ensuring social justice, and evaluating its effectiveness towards sustainable development. This research uses normative juridical, analyzing renewable energy regulations and environmental law through a study of primary and secondary legal materials, conceptual approaches, and a comparison of international practices to formulate recommendations for energy transition law. Previous research has found that the renewable energy transition in Indonesia is hampered by suboptimal regulations, minimal incentives, and conflicts of interest. Environmental law has strategic potential, but its effectiveness needs to be strengthened through policy adjustments and adoption of international practices to accelerate the energy transition and support sustainable development and social justice. This research is useful for the legal, public policy, and sustainable development domains. Its findings help strengthen renewable energy regulations, formulate green energy transition policies, and ensure social justice. This research is relevant for policymakers, academics, legal practitioners, and environmental activists to promote inclusive sustainable development.

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Environmental law, Public policy, Sustainable development, Energy regulation, Renewable energy

Introduction

The transition towards sustainable development in Indonesia, as in many other countries, is increasingly dependent on the effective integration of renewable energy

sources. This shift is not only driven by the urgent need to mitigate climate change but also by the economic and social benefits that renewable energy can offer. The role of environmental law in facilitating this transition is pivotal, serving as a critical framework for policy implementation and regulatory compliance [1].

Legal transplantation, a term coined by Kelsen, refers to the process by which legal norms, institutions, and practices are adopted from one legal system to another. This concept is particularly relevant in the context of renewable energy policy, where countries often look to more advanced nations for models and best practices. For instance, Germany's Energiewende policy, which has been instrumental in promoting renewable energy, has inspired similar initiatives in other countries, including Indonesia. The adoption of such policies requires careful consideration of local contexts and socio-economic factors to ensure their effectiveness and sustainability [2].

The reliance on fossil fuels has significant environmental, economic, and social implications. According to the International Energy Agency (IEA), the burning of fossil fuels is responsible for approximately 73% of global greenhouse gas emissions [3]. In Indonesia, the use of coal, oil, and natural gas has led to severe air pollution, health issues, and environmental degradation [4]. In contrast, renewable energy sources such as solar, wind, and geothermal offer a cleaner, more sustainable alternative. The IEA projects that renewable energy could account for nearly 80% of global electricity generation by 2050, significantly reducing carbon emissions and improving air quality. In Indonesia, government initiatives such as the Indonesia Energy Mix Policy (EBTKE) aim to increase the share of renewable energy in the national energy mix to 23% by 2025, thereby stimulating economic growth and reducing dependency on imported fuels [5]. Additionally, community involvement in renewable energy projects can enhance local development and social cohesion. For example, the development of small-scale solar projects in rural areas can improve access to electricity and support local businesses.

Indonesia is one of the countries that provide the largest fossil energy subsidies in ASEAN, as well as the 8th largest on a global scale in 2021 based on data recorded in a World Bank report entitled "Detox Development, Repurposing Environmentally Harmful Subsidies" in June 2023. The report explains that throughout 2021 the Indonesian government has disbursed fossil energy subsidies worth Rp. 170.6 trillion or equivalent to USD 11.9 billion. This is much larger than Singapore, which is carrying out massive development at USD 8.39 Billion. This certainly raises the issue that large amounts of fossil energy subsidies have a negative impact on the environment and public health. New and renewable energy is considered to be a solution for sustainable development programs that support climate change mitigation and an equitable energy transition [6]. The Indonesian government strives for the application of renewable energy from year to year, one of which is by promoting renewable energy on Sumba Island which is expected to reach the target with 100% renewable energy use by 2030 [7]. However, the Indonesian government's efforts to encourage the implementation of new renewable energy have been slow due to policy alignment [8].

The enormous potential of renewable energy to serve as a pillar for sustainable development has yet to be fully explored in several key areas. One major gap lies in the integration of legal frameworks and the wide range of innovations that require customized regulations to address diverse environmental impacts. Another is that biodiversity conservation and renewable energy development are often causing potential harms such as habitat destruction and biodiversity loss and affecting species such as seabirds and cetaceans in ocean life [9]. The legal framework must evolve to harmonize these objectives to ensure the expansion of renewable energy that does not compromise ecological integrity.

The author considers that Indonesia needs an adaptation of regulatory and technical mechanisms in the application of new renewable energy from several developed countries that have implemented new renewable energy as a pillar in carrying out sustainable development, especially in applying legal transplantation theory. Legal transplantation theory is a theory that refers to the process of adopting legal principles and systems from one jurisdiction to another where the focus is on the transfer of legal norms and practices between jurisdictions by introducing laws from a country into the Indonesian legal system [10]. In this case, Indonesia only focuses on adapting and modifying the regulations for the use of new and renewable energy to suit the local context such as cultural, political, and social in achieving the goal of utilizing new and renewable energy as a pillar in sustainable development. This paper aims to explore the role of environmental law in the renewable energy transition in Indonesia, with a focus on the application of legal transplantation. By examining case studies and policy frameworks, the paper seeks to identify best practices and challenges in the adoption of renewable energy policies. The novelty of this research lies in its comprehensive analysis of both legal and socio-economic factors, providing a holistic understanding of the renewable energy transition in Indonesia. The paper contributes to the existing literature by offering practical insights that can inform policy development and regulatory reforms.

Method

The research method used in this research is the normative juridical method and the statutory and comparative law approach method which uses a comparative law approach by comparing legal systems and enforceability in the context of legal cross-issues [11]. The author uses normative juridical methods and a statutory approach in examining how Environmental Law in Indonesia prioritizes new and renewable energy as a pillar in sustainable development by collecting and analyzing data regarding the role of environmental law in the renewable energy transition in Indonesia. Data were gathered from multiple sources, including government publications, academic journals, international reports, and case studies. Key documents included the Indonesia Energy Mix Policy (EBTKE) and reports from the International Energy Agency (IEA) and the United Nations Environment Programme [12].

In addition to the normative juridical method, this research employs a multi-pronged approach. Firstly, it utilizes normative juridical methods, specifically a statutory approach, to analyze Indonesian Environmental Law and assess its prioritization of renewable energy within the framework of sustainable development. Secondly, the study incorporates empirical data to understand the practical implementation of renewable energy projects in Indonesia. Data sources include government reports, case studies of successful renewable energy initiatives, and relevant international agreements. This data is analyzed to identify existing policies, evaluate their effectiveness, and understand the challenges and opportunities within the Indonesian context. Thirdly, the research utilizes a comparative legal approach, examining the legal frameworks of countries with successful renewable energy transitions, such as Germany, Denmark, China, Norway, and Thailand. These countries were selected due to their advanced renewable energy policies, diverse energy mixes, and experiences in addressing challenges relevant to Indonesia, such as geographical constraints and grid integration issues. By analyzing these comparative legal frameworks, the study aims to identify best practices, innovative policy solutions, and potential legal adaptations to accelerate Indonesia's transition to a sustainable energy future.

Results and Discussion

According to the United Nations Industrial Development (UNIDO), Indonesia is one of five industrialized countries whose manufacturing sector is able to contribute above average to the economy. This makes Indonesia an industrialized country with high added value. As an industrialized country that is expected to have sustainable development, Indonesia also needs to pay attention to the balance of environmental ecosystems in carrying out this sustainable development. Environmental Law actually has a role in every aspect of development carried out in Indonesia with the orientation of environmental ecosystem sustainability based on the principle of justice [13]. This is regulated in UU No. 32/2009 which explains about *Analisis Mengenai Dampak Lingkungan (AMDAL)* or Environmental Impact Analysis in English. AMDAL is a study of the important impact of a business / planned activity on the environment which is needed in the decision-making process regarding the implementation of a business or activity that has a special role in mitigating risks to the application of new renewable energy in sustainable development.

To accelerate the transition process of using renewable energy as a pillar of sustainable development in Indonesia and minimize the existing risks, the author considers that there needs to be an adaptive study that adopts policies and regulations from other countries in the use of new and renewable energy, this will be described in detail in the sub-chapters below.

Renewable energy as a pillar of sustainable development in Indonesia

Despite its significant potential for renewable energy, Indonesia has lagged behind in its utilization compared to other Southeast Asian countries. According to the International

Renewable Energy Agency (IRENA), Indonesia's share of renewable energy in total energy consumption was only 11.5% in 2020, far below the regional average of 24.5% [14]. This lag can be attributed to several factors, including inadequate policy frameworks, high initial investment costs, and regional disparities in energy infrastructure.

Indonesia aims to accelerate sustainable development by boosting renewable energy (RE) for electricity. This move is crucial for attracting investment and hitting national energy mix targets, aligning with the country's energy policy. It also helps significantly reduce greenhouse gas emissions. To drive this, the Indonesian government enacted Presidential Regulation No. 112/2022, focusing on expediting RE power plant development for electricity supply. Furthermore, the government underscored its commitment to RE through Presidential Regulation No. 11/2023. This regulation expands the scope of concurrent government affairs in energy and mineral resources to include RE, highlighting its urgent priority. These legal frameworks underscore that renewable energy is a vital foundation for Indonesia's journey toward sustainable development.

The author found renewable energy utilization data obtained from the Ministry of Energy and Mineral Resources collected on September 10, 2024 which is described in Table 1.

Table 1. Indonesia's Renewable Energy Utilization Data

Types of Renewable Energy	Utilization (Megawatt)	Potential (Gigawatt)	Regions with the Greatest Potential
Solar	675	3.294	Nusa Tenggara Timur, Kalimantan Barat, Riau
Wind	152	155	Nusa Tenggara Timur, Kalimantan Selatan, Jawa Barat, Sulawesi Selatan, Aceh, Papua
Hydropower	6.697	95	Kalimantan Utara, Nusa Tenggara Timur, Sumatera Utara, Papua
Ocean waves	0	63	Maluku, Nusa Tenggara Timur, Bali
Bioenergy	3.408	57	Riau, Jawa Barat
Geothermal	250	25	Sumatera, Jawa, Bali, Nusa Tenggara, Sulawesi, Maluku

Source: Ministry of Energy and Mineral Resources 2024

Besides the great potential of renewable energy that has been collected, we can assess that there are efforts made by the government, one of which is to encourage the utilization of agricultural and forestry industry waste as an energy source in an integrated manner with the industry, the Indonesian government integrates biomass development with community economic activities, encourages the manufacture of biomass energy conversion technology and supporting businesses, and increases research and development on the utilization of waste including municipal waste for energy. This certainly shows that the government is serious in carrying out the renewable energy transition, especially in Indonesia. The Indonesian government also through the Directorate General of Renewable Energy and Energy Conservation of the Ministry of Energy and Mineral Resources provides fiscal incentives, such as tax holidays and tax allowances, to companies that invest in the field of New Renewable Energy. It is hoped that the government will increase the renewable energy mix target to 23% by 2025 and 31% by 2050. This of course requires support from stakeholders both private

and international institutions in the development of new renewable energy technologies and then waiving local content requirements for new renewable energy projects funded by foreign loans/grants.

Although Indonesia has considerable potential, Indonesia is still considered to be lagging behind in the utilization of new renewable energy, especially for the electricity system in Indonesia, which is still minimal and considered far behind compared to other countries and still makes fossil energy sources, namely coal as the main resource. An indication of this problem is that Indonesia is predicted to be unable to meet the energy mix target which should reach 23% of renewable energy by 2025.

The author considers that the results of the Conference of Partis 29 United Nations Framework Convention on Climate Change (COP29 UNFCCC) event in Azerbaijan provide results that there is a considerable lag because the country's overall policy and regulatory framework still has a bias towards fossil energy (coal) as information conveyed by Suzanty Sitorus as Executive Director of the Yayasan Visi Indonesia Raya Emisi Zero Bersih who attended the conference. The state's partiality towards Indonesia's electricity system which still relies on fossil energy is considered to be the utilization of New Renewable Energy seems more expensive. Especially for equipment that is utilized is still imported from abroad.

On the other side, the state's favoritism towards Indonesia's electricity system, which still relies on fossil energy, will make renewable energy more expensive. Especially for equipment that is still imported from abroad. On a more important aspect, there are domestic policies that are considered changing and are considered unfavorable and very unsupportive for the development of New Renewable Energy. Another problem on a small scale such as at the regional level, the constraints of renewable energy development especially those under government projects are often not completed due to poorly prepared programs especially in terms of ongoing maintenance. Therefore, there is a need to implement stricter and more efficient regulations especially in terms of financing, operations, maintenance, and trained human resources when there are problems in operation or repair.

Challenges in policy and regional implementation of the renewable energy opportunities and challenges in sustainable development in Indonesia

One of the primary challenges in Indonesia's renewable energy sector is the lack of a comprehensive legal framework. The current regulations, such as the Law No. 30/2009 on Electricity, do not provide sufficient incentives for renewable energy investment. For instance, the feed-in tariff (FIT) scheme, which was intended to encourage renewable energy projects, has been criticized for its complexity and lack of transparency [15]. Regional disparities also pose significant barriers to renewable energy adoption. While Java, the most populous island, has seen some progress in renewable energy projects, other regions, particularly in eastern Indonesia, remain underdeveloped. This uneven distribution of resources and investment has hindered the overall growth of the sector.

Despite of that, Indonesia still has good potential to increase renewable energy, especially hydropower, due to the topographical conditions in Indonesia where mountains and hills are flowed by many rivers and many areas have lakes and reservoirs as potential water resources. In its development, according to the Institute for Essential Services Reform (IESR), there are several inhibiting factors, such as regulatory and policy uncertainty such as overlapping regulations and unsupportive institutions. This has the potential to result in a decrease in investor interest in EBT development [16]. Despite this huge potential, the utilization of renewable energy in Indonesia faces many challenges. One of them is the economy's heavy dependence on fossil fuels. This dependence creates structural barriers to renewable energy development as investments and policies still tend to favor the conventional energy sector.

In addition, energy policies in Indonesia are often inconsistent and poorly coordinated, hampering the development of renewable energy. For example, while there are policies that support the use of renewable energy, their implementation is often hampered by complex bureaucracy and a lack of economic incentives for investors. Overlapping regulations and frequent policy changes also create uncertainty for industry players, which in turn discourages investment in the renewable energy sector.

There are several adaptations of policies that can be made by Indonesia in the utilization of new and renewable energy, for example in Europe, the Renewable Energy Directive 2009/28/EC sets a renewable energy target with renewable energy consumption to increase by 20%. Especially in Germany, where the government continues to develop renewable energy by taking national action to achieve the targets set by the European Union under Directive 2009/28/EC, this is called *Energiewende.*

Germany's renewable energy policy is contained in the *Erneuerbare-Energien-Gesetz* (EEG), an amendment to the StrEG [17]. According to Bechberger, as referenced by Mischa Bechberger and Danyel Reiche [18], the German Renewable Energy Act (EEG) incorporates four crucial components:

1. Shift in Remuneration Structure: The EEG fundamentally altered the compensation mechanism for renewable energy. It moved away from linking payments to average utility revenues per kilowatt-hour sold. Instead, it established fixed, regressive, and time-limited feed-in tariffs that apply to the entirety of the renewable electricity produced.
2. Mandatory Renewable Energy Procurement: The act mandated a priority purchase obligation for electricity generated from renewable sources. This responsibility was specifically placed on the closest grid operator to the generation facility.
3. National Cost Equalization Mechanism: To ensure equitable distribution of the financial burden, a Germany-wide equalization scheme was implemented. This scheme addresses the varying costs incurred by grid operators due to differing volumes of renewable energy integrated across regions. Its purpose is to evenly spread the impact of renewable energy integration, extending the financial

implications of remuneration to all energy supply companies and ultimately to all end-consumers.

4. Grid Infrastructure Financing: For the first time, the EEG included specific provisions regarding the financing of both grid connection and grid expansion necessary to accommodate the growing influx of renewable energy.

Norway implemented regulations that restricted the burning and disposal of fossil energy. In 1971, the government adopted principles known as the Ten Oil Commandments in order to formulate policies related to the oil industry. In addition to these policies, Norway uses a scheme to increase the price of fossil fuels so that people switch to renewable energy. The price of gasoline in 2023 is 23.64 NOK/liter (IDR 34,045.54) and diesel is 21.91 NOK/liter (IDR 31,554.05) [19].

China has demonstrably bolstered its renewable energy supply through significant legislative efforts. A pivotal step was the Renewable Energy Law, enacted by the Standing Committee of the National People's Congress (NPC) on May 28, 2005, and effective from January 1, 2006 [20]. This law established four key frameworks to propel the expansion of China's renewable energy sector:

1. National Renewable Energy Objectives. The Renewable Energy Law mandated the State Council's energy division (operating under the National Development and Reform Commission (NDRC)) to formulate mid- and long-term national targets for renewable energy output (Article 7). It also required the creation of a comprehensive national plan for renewable energy development and utilization (Article 8). Consequently, in 2007, the State Council issued the Mid and Long-Term Development Plan for Renewable Energy (2007 NDRC Plan), outlining these strategic goals.
2. Obligatory Grid Integration and Procurement. Article 14 of the original Renewable Energy Law introduced a crucial provision: it compelled grid operators to both connect to and acquire all renewable power generated within their service territories (referred to as the Mandatory Connection and Purchase Policy). This was a groundbreaking measure, as it secured a reliable market for renewable energy producers and cultivated the stable, long-term market demand essential for attracting investment into large-scale energy infrastructure projects.
3. Guaranteed Pricing (Feed-in Tariff System). Under Articles 19 and 20 of the Renewable Energy Law, the NDRC's pricing authority is tasked with establishing feed-in tariffs for various forms of renewable electricity generation. These tariffs ensure that grid companies pay renewable energy generators a price that is above the prevailing market rate. While the Mandatory Connection and Purchase Policy guarantees the sale of renewable power, the feed-in tariff system secures the specific price at which this power will be purchased. The supplementary expense of these feed-in tariffs, beyond the cost of conventional electricity, is recuperated through a national surcharge applied to end-users of electricity.
4. Shared Cost Mechanism and Special Fund. The initial Renewable Energy Law explicitly stated that costs associated with feed-in tariffs (Article 20) and reasonable

expenditures for integrating renewable generators into the grid (Article 21) would be distributed nationally via a surcharge on electricity consumers. To operationalize this, the NDRC subsequently published the Interim Measures on Renewable Energy Electricity Prices and Cost Sharing Management. This directive instructs the NDRC's pricing department to impose a consistent, nationwide renewable surcharge on electricity users, calculated based on their consumption, to offset the additional costs incurred by grid companies when purchasing renewable energy.

The same is true in Denmark, a country that has been named a transition leader because it is considered worthy of being a leader in the sustainable development transition by the Sustainability Governance Indicators (SGI) and the Transition Performance Index (TPI) in 2020. Denmark has implemented EU directives and decisions regarding policies to deal with the threat of global warming. Denmark established three agencies under the environment ministry, namely The Environmental Protection Agency, The Danish Geodata Agency, dan The Danish Nature Agency [21].

Under these three agencies, eleven strategies were issued to address environmental and energy efficiency issues, example : (1) Climate Change Act 2014, (2) Energy Agreement 2012-2020, (3) The Forest Act 945, (4) Planning Act (No. 937 of 2009; consolidated No. 587 of 2013), (5) Law on the Promotion of Renewable Energy- No. 1392/2008, (6) Environment Protection Act, No. 1757 of 22 December 2006 (renew: No. 879 of 2010), (7) Carbon Dioxide Tax on Certain Energy Products - Act 321/2011, (8) Act on the Energy Tax on Mineral Oil Products- Act 313/2011, (9) The Danish Climate Policy Plan, (10) Green Transport Policy Agreement, (11) Danish Strategy for Adaptation to A Changing Climate (2008) and The Action Plan for A Climate-proof Denmark (2012) [21].

In the strategy, there are five key points to reduce the intensity of greenhouse gas emissions. First, by imposing taxes on companies that produce, process, receive or deliver energy resource products that produce greenhouse gas emissions, such as coal, oil and natural gas. Second, impose mandatory taxes on people who produce carbon dioxide, such as fuel use for transportation and high carbon intensity energy generation. Third, encourage people to use public transportation or use environmentally friendly transportation, such as bicycles, to reduce emissions and congestion in some parts of Denmark. Fourth, the plan to phase out oil and coal energy sources by 2030, so that by 2035 Denmark can fully utilize renewable energy sources to meet energy needs. Fifth, Danish society must support and implement all activities that are low-carbon and related to tackling global warming and climate change [21].

In Southeast Asia, feed-in tariffs have been successfully implemented in Thailand. Thailand pioneered the use of feed-in tariffs (FiTs) in Asia. In 2002, the Thai government introduced simplified grid connection rules and "avoided-cost tariffs," followed by specific renewable energy premiums in 2006. This initiative, known as the "Adder" program, successfully drew significant private investment into various renewable energy projects. The program's strength came from its attractive rates, which encouraged private sector involvement. Its early establishment of streamlined

interconnection procedures and standardized Power Purchase Agreements also played a crucial role. To mitigate risks in specific regions, special rates were offered in the three southernmost provinces. Additionally, unique tariffs for remote areas relying on diesel generation helped lower utility costs in those locations. The simple and clear rate structure made it easy for investors to plan their finances. Furthermore, the secure contracts provided by the Adder program assured investors that their support wouldn't be withdrawn after signing, fostering confidence and leading to substantial investment [22].

Linking legal framework and recommendation

The legal framework in Indonesia needs to be strengthened to support renewable energy development. This includes simplifying the FIT scheme, providing clearer incentives for investors, and establishing a more transparent regulatory environment. The government should also consider adopting international best practices, such as those seen in countries like Germany and Denmark, where robust legal frameworks have facilitated significant growth in renewable energy. To address these challenges, Indonesia need to take some steps such as to strengthen legal framework by revise the existing laws and regulations to create a more supportive environment for renewable energy investment. This could include simplifying the FIT scheme, providing clearer incentives, and establishing a more transparent regulatory environment. Indonesia also need to Increase investment in renewable energy projects in underdeveloped regions, particularly in eastern Indonesia. This will help to reduce regional disparities and promote more balanced economic growth. Adopt international best practices in renewable energy policy and implementation. This could include learning from countries like Germany and Denmark, which have successfully integrated renewable energy into their energy mix. Increase public awareness and education about the benefits of renewable energy. This will help to build support for renewable energy projects and encourage greater participation from the public.

Conclusion

In conclusion, while Indonesia possesses significant potential for renewable energy utilization, its progress has been hindered by inadequate policy frameworks, regional disparities, and challenges in legal implementation. To address these issues effectively, it is imperative to adopt specific adaptive legal mechanisms that can facilitate sustainable development while ensuring environmental ecosystem balance. Indonesia need to do adaptive legal mechanism by simplifying the FIT scheme to enhance transparency and accessibility for investors, thereby encouraging greater participation in renewable energy projects. Developing comprehensive regulatory frameworks that provide clear guidelines for renewable energy investments, ensuring that all stakeholders understand their rights and obligations. And some practical recommendations such as strengthening legal frameworks, investing in regional development, leveraging international best practices an enhancing public awareness.

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