COMPARATIVE LEGAL ANALYSIS OF RENEWABLE ENERGY UTILIZATION REGULATIONS BETWEEN ICELAND AND INDONESIA

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Abstract

Renewable energy has emerged as a pivotal aspect in addressing both energy security and climate change concerns. Iceland stands out as a notable exemplar in effectively harnessing renewable energy, with nearly 100% of its electricity demands met through renewable sources by 2023. In contrast, Indonesia is in the process of capitalizing on its abundant renewable energy potential, with renewables constituting only 12.5% of its electricity generation in the same year. This study undertakes a comparative analysis of the regulatory frameworks governing renewable energy utilization in Iceland and Indonesia, focusing on legal dimensions. Employing a comparative methodology with a normative juridical approach, data were gathered through literature review and examination of pertinent legal documentation. The findings underscore Iceland's robust and coherent regulatory structure supporting renewable energy utilization, characterized by clearly defined policies, incentivizing mechanisms, and efficient institutional frameworks. Conversely, Indonesia's regulatory landscape reveals a need for greater cohesion and harmonization, marked by fragmented policies, limited incentives, and suboptimal institutional arrangements. Noteworthy disparities between the two countries are attributed to factors such as political commitment, geographical considerations, and technological capacities. The research highlights the potential for Indonesia to draw valuable lessons from Iceland's experiences in formulating conducive regulations for renewable energy utilization. Key areas for improvement include bolstering policy frameworks, enhancing incentivization measures, and streamlining institutional mechanisms. By contributing insights into renewable energy regulations, this study offers guidance for policymakers in Indonesia towards optimizing the utilization of renewable energy resources.

Keywords: *Iceland, Indonesia, Legal, Regulatory Comparison, Renewable Energy*

1. INTRODUCTION

Renewable energy has become a global concern for overcoming energy problems and climate change. According to the International Renewable Energy Agency (IRENA) report for 2023, global renewable energy capacity reached 3,869,705 MW, an increase of 2.8% from the previous year (Irena, 2024). Awareness of the importance of the energy transition in lowering greenhouse gas emissions and achieving the objectives of the Paris Agreement is driving this growth. Renewable energy is also vital to ensuring energy security and supporting sustainable development.

Iceland and Indonesia have significant differences in their use of renewable energy. Iceland is almost entirely dependent on renewable energy. By 2023, renewable sources, primarily geothermal and hydropower, will satisfy nearly all of Iceland's electricity needs. Favorable geographical conditions, solid political commitment, and advanced technological innovation support Iceland's success (Breyer et al., 2022).

On the other hand, Indonesia is still in the early stages of renewable energy development. Although it has excellent renewable energy potential, such as solar, geothermal, and biomass, its utilization could have been better. Until 2023, the renewable energy mix in Indonesia's electricity production had only reached 13.09%, far below the target of 23% by 2025 set by the *Rencana Umum Energi Nasional* (RUEN) (Paramita & Pranchiska, 2024). Indonesia's challenges include inadequate regulations and policies, a limited budget, and a lack of coordination among stakeholders (Hidayatno et al., 2019).

The difference between Iceland and Indonesia in renewable energy use shows gaps in policies, regulations, budgets, and technological capacity. However, Indonesia can learn from Iceland's experience in developing a thriving renewable energy sector. By considering the national interest and adopting best practices from Iceland, Indonesia has the potential to accelerate the transition to renewable energy and achieve more sustainable energy mix targets (DPRI, 2018).

The primary purpose of this study is to conduct a comparative analysis of laws regarding the regulation of renewable energy utilization between Iceland and Indonesia. Specifically, this study aims to: (a) Identify similarities and differences in renewable energy utilization regulations in Iceland and Indonesia, covering policy, budget, institutional, and integration with other sectors, (b) Analyze factors that influence differences in renewable energy utilization regulations in the two countries, such as geographical conditions, political commitment, technological capacity, and socio-economic context, (c) Formulate recommendations that Indonesia can learn from Iceland's experience in developing regulations conducive to the use of renewable energy, taking into account Indonesia's national context. The scope of this research includes: (1) The period reviewed is the regulation of renewable energy utilization in Iceland and Indonesia until 2023, considering the latest developments in policies and regulations in both countries, (2) Research on renewable energy sources in Iceland and Indonesia focuses on geothermal (geothermal), hydropower (hydropower), solar power (solar), wind power (wind), and biomass, and (3)The regulatory aspects analyzed include renewable energy policy, budget, institutional, and governance aspects, as well as integration with related sectors such as electricity, transportation, and industry.

With this purpose and scope, this research is expected to contribute to academic discussions on renewable energy regulation from a comparative legal perspective. The study results are also expected to be input for policymakers in developing more effective regulations to encourage the use of renewable energy in Indonesia by learning from Iceland's experience as a benchmark.

2. LITERATURE REVIEW

Renewable energy refers to energy sources that can be naturally renewable in a relatively short period, such as sunlight, wind, water, geothermal, and biomass. The main types of renewable energy include solar, wind, hydro-energy, geothermal, and bioenergy. Utilizing renewable energy aims to reduce dependence on fossil fuels, reduce greenhouse gas emissions, and support sustainable development (Ammar, 2023).

Iceland has become a global leader in utilizing renewable energy. By 2023, almost 100% of Iceland's electricity needs will be met by renewable sources, mainly geothermal and hydropower. Progressive energy policies, investment in research and development,

and close cooperation between government, industry, and society underpin Iceland's success (Breyer et al., 2022).

In Indonesia, the use of renewable energy is still in its early stages. Despite having great renewable energy potential, the renewable energy mix in Indonesia's electricity production will only reach 13.09% in 2023. The Indonesian government has set a target to increase its renewable energy mix to 23% by 2025. Efforts include policy and regulatory development, budget provision, and investment promotion in the renewable energy sector (Paramita & Pranchiska, 2024).

Legal comparison is a study comparing legal systems in different countries or jurisdictions to identify similarities, differences, and factors influencing them. In the context of renewable energy regulation, comparative laws can be used to analyze regulatory approaches in different countries, identify best practices, and formulate recommendations for improvement (Majid, 2020).

3. RESEARCH METHOD

This research uses a comparative study method with a normative juridical approach. A comparative study is a research method that compares two or more objects of study to identify similarities, differences, and factors that influence them (Esser & Vliegenthart, 2017).In this study, the object being compared is the regulation of renewable energy utilization in Iceland and Indonesia.

The normative juridical approach reviews laws and regulations, policies, and other legal documents related to renewable energy regulations in both countries (Firdaus, 2022).This approach involves analyzing primary legal sources, such as laws and government regulations, and secondary legal sources, such as academic literature and official reports.

Data collection is carried out through library research and online searches. A literature study involves collecting and analyzing legal documents, policies, and scientific publications relevant to the research topic. Online searches are used to access the latest data sources, such as statistical reports, press releases, and policy documents available on the official websites of governments and international organizations (Anissa & Djuyandi, 2021).

Data analysis is carried out qualitatively using content analysis techniques and comparative analysis. Content analysis was used to identify key themes, patterns, and trends in renewable energy regulation in Iceland and Indonesia. A comparative analysis was conducted to compare the two countries' similarities and differences in regulation and the factors influencing them (Esser & Vliegenthart, 2017).

The validity of the data is ensured through triangulation of data sources, i.e., by comparing and confirming findings from different data sources. In addition, this research also follows the principles of research ethics, such as objectivity, transparency, and respect for copyright (Soekanto, 2007).

4. RESULTS AND DISCUSSION

4.1. Comparison of Renewable Energy Regulations in Iceland and Indonesia

Iceland has a comprehensive and ambitious renewable energy policy. The Icelandic government has set targets to achieve carbon neutrality by 2040 and phase out fossil fuels

by 2050. Iceland's energy policy focuses on the optimal utilization of geothermal and hydropower resources and the development of infrastructure that supports the energy transition (Apriliyanti & Rizki, 2023).

Indonesia has also set renewable energy targets in the National Energy General Plan (RUEN). RUEN targets increasing its renewable energy mix to 23% by 2025 and 31% by 2050. However, implementing renewable energy policy in Indonesia still needs to improve due to a lack of coordination between institutions, overlapping regulations, and limited institutional capacity.

The Icelandic government provides various budgets and investment support to encourage the use of renewable energy. The budget includes subsidies, concessional loans, and funding schemes for renewable energy projects. Iceland also has a carbon pricing mechanism that supports the transition to clean energy (Breyer et al., 2022).

Feed-in tariffs, subsidies, and fiscal relief are just a few of the regulations controlling Indonesia's renewable energy budget. However, the effectiveness of the budget still needs to be improved due to a lack of legal certainty, complex administrative processes, and budget constraints. The Indonesian government needs to strengthen the budget mechanism and simplify procedures to attract more investment in the renewable energy sector (PWC, 2023).

Iceland has solid institutions and is integrated into renewable energy governance. The Ministry of Environment and Natural Resources formulates energy policy, while the National Energy Authority (*Orcustofnun*) regulates, licenses, and supervises the energy sector. Iceland also has a Renewable Energy Agency (*Landsvirkjun*) that manages state-owned renewable power plants.

In Indonesia, renewable energy governance involves various institutions, such as the Ministry of Energy and Mineral Resources, the National Energy Council (DEN), and PLN. However, coordination between agencies remains challenging, with overlapping authorities and regulatory fragmentation. Indonesia must strengthen renewable energy institutions, increase transparency, and ensure policy consistency to create a conducive investment environment.

Iceland has successfully integrated renewable energy with other sectors, such as transport and industry. The Icelandic government is pushing for transport electrification, with budgets for electric vehicles and the development of charging infrastructure. Geothermal energy is also widely utilized for heating, agriculture, and industry.

In Indonesia, integrating renewable energy with other sectors still needs to be improved. Despite efforts to promote electric vehicles, the supporting infrastructure still needs to be improved. Given the dominance of fossil fuels, the utilization of renewable energy in the industrial sector is also still low. Indonesia must develop a clear roadmap to integrate renewable energy with critical sectors such as transportation, industry, and construction (PWC, 2023).

The comparison of renewable energy regulations between Iceland and Indonesia reveals several significant similarities and differences.

Similarities:

1. Both Iceland and Indonesia have established targets and policies aimed at increasing the utilization of renewable energy sources. This acknowledgment underscores the imperative of transitioning towards clean energy to mitigate greenhouse gas emissions and foster sustainable development.

2. Both nations allocate financial resources and offer investment support for renewable energy projects, albeit with varying degrees of effectiveness. Such financial backing encompasses subsidies, concessional loans, and fiscal incentives.
3. Iceland and Indonesia each possess institutional frameworks tasked with overseeing renewable energy governance, including energy ministries, regulatory bodies, and state-owned energy enterprises.

Differences:

1. Iceland boasts a more comprehensive and ambitious renewable energy policy compared to Indonesia. Iceland has set the goal of achieving carbon neutrality by 2040 and entirely phasing out fossil fuels by 2050, whereas Indonesia's targets are relatively more conservative.
2. Iceland's financial commitments and investments in renewable energy exhibit greater efficacy and consistency in comparison to Indonesia's efforts. Notably, Iceland has implemented a robust carbon pricing mechanism, while Indonesia encounters challenges in the implementation of budgetary measures.
3. Renewable energy governance in Iceland is characterized by greater integration and efficiency, with clearly delineated responsibilities among ministries, energy authorities, and state-owned enterprises. Conversely, Indonesia's governance framework remains fragmented, marked by overlapping jurisdictional authority among institutions.
4. Iceland has successfully integrated renewable energy initiatives with other sectors such as transportation and industry, leveraging electrification and geothermal utilization. In contrast, Indonesia's endeavors to integrate renewable energy across sectors require further enhancement.
5. The technological and infrastructural capacities for renewable energy in Iceland surpass those of Indonesia. Iceland has made significant strides in the development of geothermal and hydropower technologies, while Indonesia is in the nascent stages of building its renewable energy infrastructure.

The differences in renewable energy regulations between Iceland and Indonesia reflect differences in economic development, resource availability, and policy priorities. Nevertheless, Indonesia can learn from Iceland's experience in developing more comprehensive, consistent, and integrated regulations to encourage optimal use of renewable energy.

4.2. Factors Affecting the Different Regulations on the Use of Renewable Energy in Iceland and Indonesia

Various internal and external factors influence the difference in renewable energy regulations between Iceland and Indonesia. Some of the main factors influencing such differences include:

a) Geographical conditions and availability of resources

Iceland has a geographical advantage with abundant geothermal and hydropower potential. These conditions supported the development of renewable energy from the beginning and allowed Iceland to achieve a high renewable energy mix. On the other

hand, Indonesia has diverse renewable energy potentials, such as solar, geothermal, and biomass power. However, its utilization still needs to be improved due to geographical and infrastructure constraints.

b) The level of economic development and policy priorities

Iceland is a developed country with a high GDP per capita, so it can allocate substantial resources for the development of renewable energy. Energy transition is also a top priority on Iceland's policy agenda. Meanwhile, as a developing country, Indonesia still faces challenges in balancing economic growth with environmental sustainability. Indonesia's energy policy priorities are still focused on energy security and access.

c) Energy market structure and stakeholder roles

Iceland's energy market is dominated by state-owned energy companies, such as *Landsvirkjun*, which is mandated to develop renewable energy. This allows for better coordination and consistent policy implementation. In Indonesia, the energy market is more fragmented, with various stakeholders, including private companies and local governments. Coordination and alignment of interests among stakeholders remain a challenge.

d) Institutional capacity and human resources

Iceland has a strong institutional capacity in renewable energy governance, supported by competent and experienced human resources. Institutions such as *Orcustofnun* and *Landsvirkjun* have a clear and influential role in developing renewable energy. In Indonesia, institutional capacity must be strengthened with improved coordination, transparency, and adequate human resources.

e) Public support and public awareness

Icelanders are highly aware of the importance of renewable energy and support energy transition policies, which creates a conducive environment for implementing renewable energy regulations. In Indonesia, public support for renewable energy still needs to be increased through education and awareness campaigns. Resistance from certain interest groups, such as the fossil fuel industry, can also hinder renewable energy development.

These factors are interrelated and influence the difference in renewable energy regulations between Iceland and Indonesia. Understanding these factors can help formulate strategies and policies appropriate to each country's national context while learning from other countries' best practices.

4.3. Policy Recommendations

Iceland's success in developing renewable energy offers several recommendations that Indonesia can consider to increase the use of renewable energy. Some of these recommendations include:

a) The need for a comprehensive renewable energy policy

Indonesia can learn from Iceland's approach to setting renewable energy targets and developing comprehensive policies to achieve them. Indonesia's renewable energy policy must cover energy mix, energy efficiency, electrification, and reduction of greenhouse gas emissions. The policy must also be accompanied by a clear and consistent roadmap to provide certainty for investors and stakeholders.

b) Budget strengthening and investor support

Iceland has managed to attract investors in renewable energy through an effective combination of budget and investment. Indonesia can adopt best practices from Iceland,

such as competitive feed-in tariffs, targeted subsidies, and innovative funding schemes. The budget needs to be adjusted to the circumstances in Indonesia and evaluated regularly to ensure its effectiveness. In addition, Indonesia could also consider implementing a carbon pricing mechanism to encourage the transition to clean energy.

c) Improved coordination and institutional capacity

Indonesia can learn from Iceland's integrated and efficient renewable energy governance model. This involves strengthening coordination between agencies, such as energy ministries, regulatory agencies, and state-owned energy companies. A clear division of duties and responsibilities and an effective coordination mechanism can ensure consistent implementation of renewable energy policies. Indonesia must also improve institutional capacity through human resource development and technology transfer.

d) Integration of renewable energy with other sectors

Iceland has shown how renewable energy can be integrated with other sectors, such as transport and industry, to achieve wider decarbonization. Indonesia can adopt a similar approach by developing policies and infrastructure supporting transportation electrification, geothermal industrial utilization, and energy efficiency in various sectors. This Integration requires collaboration between relevant ministries and institutions and active involvement of the private sector.

e) Increased public awareness and participation

High public awareness and support for renewable energy have been a critical factor in the success of Iceland's energy transition. Indonesia can learn from Iceland's approach to engaging communities through education, socialization, and bottom-up initiatives. Increased public awareness and participation can create an environment conducive to renewable energy development and reduce resistance to change.

When adopting Icelandic policies, Indonesia must consider geographical conditions, economic structure, and socio-political dynamics. However, with suitable adjustments and strong commitment, Indonesia can accelerate the transition to renewable energy and achieve the target of a more sustainable energy mix.

5. CONCLUSION

A comparative analysis of laws regulating renewable energy use between Iceland and Indonesia shows significant differences in policy, budgetary, institutional approaches, and integration with other sectors. Iceland has a comprehensive, consistent, and effective regulatory framework supporting renewable energy utilization, supported by favorable geographical conditions, solid political commitment, and advanced technological capacity. In contrast, renewable energy regulation in Indonesia needs to be more cohesive, with challenges in institutional coordination, budget implementation, and integration with other sectors. Various factors, such as resource availability, level of economic development, energy market structure, institutional capacity, and public support, influence regulatory differences between the two countries. Although Indonesia faces different challenges from Iceland, Iceland provides valuable recommendations for developing more effective renewable energy regulations. The recommendations include the need for comprehensive policies, strengthening budgets and investments, improving coordination and institutional capacity, integration with other sectors, and increasing public awareness and participation.

Based on the research findings, some recommendations for the development of renewable energy regulations in Indonesia include: Formulate a comprehensive renewable energy policy with clear targets, a consistent roadmap, and measurable evaluation mechanisms. Strengthen budgets and investments for renewable energy projects, including competitive feed-in tariffs, targeted subsidies, and innovative funding schemes. Consider implementing carbon pricing mechanisms to drive the energy transition. Improve coordination and institutional capacity by clarifying the division of duties and responsibilities between institutions, strengthening coordination mechanisms, and developing competent human resources. Develop policies and infrastructure that support integrating renewable energy with other sectors, such as transportation, industry, and construction. Encourage electrification, geothermal utilization, and energy efficiency in various sectors. Increase public awareness and participation through education campaigns, socialization, and bottom-up initiatives. Involve communities in decision-making and implementation of renewable energy projects. Strengthen international cooperation and technology transfer by learning from best practices in other countries, such as Iceland, and adapting them to suit Indonesia's circumstances. Further research is needed to explore specific aspects of renewable energy regulation in Indonesia, such as policy impact analysis, project feasibility studies, and budget effectiveness evaluations. The research can provide deeper insights to improve renewable energy regulations in Indonesia and support the transition to a more sustainable energy system.

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