From Policy to Practice: Regulatory Considerations for Offshore Wind Energy in Malaysia's Renewable Energy Sector

[1]Nor Zawanie Binti Nazarudin, [2]Syazwina Binti Shawal, [3]Siti Aminah Binti Mohd Salleh, [4]Mohd Haris Bin Abdul Rani, [5]Nurrulhuda Ahmad*

[1,2,3]Research Associate, Faculty of Law, University Teknologi MARA, Malaysia

[4,5] Senior Lecturer, Faculty of Law, University Teknologi MARA, Malaysia

***Corresponding Author**

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ABSTRACT

Offshore wind power has potential to help Malaysia achieve its goals, in energy advancement. This study delves into how the rules and guidelines governing offshore wind energy development are applied in Malaysia and looks at the impact of existing policies in this area like the Renewable Energy Act of 2011 and the National Renewable Energy Policy and Action Plan are examined to see how well they support offshore wind initiatives, in practice. The research also compares the structures of countries that have well established offshore wind sectors to provide a broader perspective. Key issues, like assessing effects and meeting standards while collaborating with stakeholders are reviewed to pinpoint deficiencies in the existing system. The article stresses the importance of protocols support from the government and the integration of cutting-edge technologies to promote the expansion of offshore wind energy in Malaysia. The research results end with suggestions for enhancing Malaysia's structure to encourage the progress of wind energy while maintaining a well-rounded approach, toward economic advancement, sustainable environment and energy protection.

Keywords: Offshore wind energy; Regulatory framework; Malaysia; Renewable Energy Act 2011; Sustainable development

INTRODUCTION

Offshore wind power is increasingly recognized as a crucial element in the global shift toward renewable energy. It provides a dependable and sustainable solution for reducing reliance on fossil fuels and addressing climate change (Ho, 2016). The United Kingdom and Germany, followed by China, already harnessed wind offshore, proving its potential to generate large amounts of low-carbon electricity, ensuring energy security and fostering economic development (Chen et al., 2019). With the leadership of these countries in the development, Malaysia, blessed with a long coastline and good wind features, is ready to venture in using this under-explored resource (Li et al., 2023). National Renewable Energy Policy and Action Plan (NREPAP) (Energy Commission of Malaysia, 2019) and (UNFCCC, 2015) state that offshore wind power appears to be a significant asset in helping Malaysia achieve its renewable energy objectives; this is particularly relevant as the nation is dedicated to fulfilling its climate obligations under the Paris Agreement.

Despite that, Malaysia's offshore wind sector development still encounters numerous structural and regulatory obstacles, despite its enormous potential. This demonstrates how the nation's offshore wind regulations are disjointed and underdeveloped, leading to ambiguous guidelines, particularly in crucial areas for the sector like environmental impact assessments, maritime zone management, and grid integration. Malaysia Offshore Wind Energy can be considered as significant for the country's RE plans and sustainable development. However, there exists a problem in the failure to come up with a strong and elaborate structure of regulation that would enhance its achievement. The present legal and policy frameworks to cover offshore wind project include The

Renewable Energy Act of 2011 and The National Renewable Energy Policy and Action Plan and these do recognize but do not effectively facilitate offshore wind projects.

To overcome these challenges, Malaysia has the potential to learn from experiences of countries like United Kingdom and Denmark who have developed significant level of offshore wind energy through clear policies, transparent licensing regime, stake holders' consultation and smart planning. Applying energy justice concepts—share distribution of both gains and losses across society—and utilizing GIS mapping for site selection, as well as AI for parking, can improve the planning process.

A thoroughly developed regulatory environment that will best suit the geographical and socio-economic conditions of the country of Malaysia is needed. This framework should deal with the issues of zoning, environmental conservation and management, and distribution of generated benefits across different stake holders in the public domain, private sector and the community at large. In relation to sustainable development principle on focusing on the quality of growth, and the country's energy security and climate change goals, Malaysia can further enhance its policies to achieve these goals by putting into practice international practices on offshore wind energy.

In policy the expansion of offshore wind energy necessitates a legal regime that supports and expands on the present legal guidelines. Although there is legal and procedural support of the rules, which are provided by regulations, policies on the other hand, are critical for defining the necessary operational strategies. Regulations governing offshore wind projects should aim at the provision of clear blueprints and direction on consumption of resources, encouraging stake holders and absorbing environment consciousness. When the strategies are aligned with the frameworks, nations step towards the coherent policy ramp of offshore wind energy to support the environment and economic development.

The lack of clear guidelines and detailed policies does not only make the permitting process more complicated but also scatters potential domestic and foreign investors (Koons, 2024). The absence of tailor-made policies for offshore wind energy, in contrast with successful designs in the United Kingdom and Denmark, forms one of the most serious barriers to the growth of the sector. As such, Malaysia runs the risk of relinquishing a critical opportunity to further diversify its energy mix, improve its energy security, and create jobs within a sector that is gaining unprecedented growth globally.

Furthermore, there are a few challenges in Southeast Asian that restrain the Malaysia's offshore wind development, like complicated maritime zoning regulations, insufficient infrastructure, and the necessity for building local expertise and skills (Koons, 2024). Although, Malaysia has a great potential in its natural resources, the rules and the regulations need to be improved to provide clear direction for both public and private stakeholders

If these are not sorted out, then the country may encounter the likely hood of encountering major challenges in competing to be part of the global offshore wind market and therefore stand to miss out on the environmental and economic benefits associated with the market. This is something that Malaysia still lags compared to some of the advanced countries such as United Kingdom and Denmark where efficient customized policies are implemented for offshore wind energy. As such, Malaysia has a chance to miss the opportunity of diversifying its energy sources and securing its energy needs; at the same time creating employment as the global sector is rapidly growing.

At the same time, distributional justice with respect to offshore wind energy focuses on the fair distribution of environmental and economic benefits including renewable energy and jobs opportunities across communities and jurisdictions, but also the equitable provision of the burdens such as ecological loss or livelihood impacts and experienced by certain social groups, for as a matter of example people of color or low income households. It emphasizes fair supply, eradication of energy poor, and ensuring accessible and sustainable energy system. In addition, it highlights the issue of distribution of energy infrastructure, and the need to avoid overloading some regions or communities with undesirable environmental or social costs. Distributional justice also fosters justified economic reward structures and compensation or profit share mechanisms for injured

communities from energy undertakings. Finally, it also seeks to balance this by attempting to ensure that both the advantages of offshore wind energy development can be availed to both urban and rural areas.

To some extent, this piece will try to discuss these challenges by revisiting the current regulatory framework of the Malaysian offshore wind power, which can identified monumental policy and infrastructural-leveled deficiencies and propose detailed tactical interventions to create a favorable system. It is also aligned with one of the principle of Prudent, Rational, and Sustainable Use of Natural Resources, Heffron et al. (2017) recommended that Sustainable use of natural resources is a term referred to in several conventions either directly or by using alternative expressions like 'conservation,' 'sustainable management', 'optimal, efficient and rational use' or 'reduce and eliminate unsustainable patterns of production and consumption' as stated in

the Rio Declaration on Environment and Development (1992). Learning from the successful regulatory frameworks of offshore wind markets, particularly countries like the United Kingdom and Denmark, can provide valuable or clear guideline to Malaysia (International Renewable Energy Agency [IRENA] & Global Wind Energy Council [GWEC], 2013), this research will explore the ways that Malaysia can adapt successful offshore wind energy strategies to align with its specific geographical, economic, and social conditions. With the right policy support, Malaysia not only can develop a competitive offshore wind industry but also has the potential to become a leading contributor to the renewable energy sector in Southeast Asia

LITERATURE REVIEW

Offshore Wind Energy Global Success Stories

Robust regulatory frameworks and supporting policies can enable successful offshore wind development and several countries have shown how. And the UK, Denmark and Germany are global leaders in this. Clear licensing procedures, financial incentives and strategic marine planning has enabled rapid growth in the UK. It has raised societal acceptance and reduced conflicts and Denmark's model of community ownership and public engagement. Germany's integrated program for renewable energy development has resulted in innovation and investment. These successes demonstrate why comprehensive planning, environmental protection and proactive stakeholder consultation are important (European Commission, 2020). Such frameworks also bring in investors while also helping ensure that offshore wind projects meet environmental conservation goals and serve public interest.

Malaysia Challenges and Opportunities

Offshore wind energy development holds great potential for the renewable energy sector in Malaysia. There are, however, several challenges that must be solved to realize this potential. A lack of a dedicated legal and regulatory framework for offshore wind projects is one of the biggest barriers. As without clear policies regarding zoning, environmental assessments, and protection of marine biodiversity developers are unsure. Project planning is further complicated by spatial conflicts between fishing activities, shipping routes and conservation areas. Thus, learning from international best practice can help Malaysia enable a robust legal structure that combines marine spatial planning and biodiversity protection with conflict resolution mechanisms (Shuib et al., 2021). In addition, the coordination of offshore wind policies with the country's overall renewable energy policies will improve the country's energy security and sustainability.

Environmental Protection with Energy Development

The Principle of the Prudent, Rational and Sustainable Use of Natural Resources rests on the need to harmonize environmental protection with production of energy. Offshore wind energy behaves as a suitable renewable source of energy susceptible to environmental impact minimization when appropriately managed. Coastal and marine ecosystems are crucial to biodiversity and to the livelihoods of local people in Malaysia, and should be planned with care. To designate zones susceptible to offshore wind farms, Marine Spatial Planning (MSP) is provided to take ecological, social and economic factors into account. Critical are adaptive governance structures which build in stakeholder input and scientific data. This is ensured by subsequent rigorous Environmental Impact Assessments (EIA) to mitigate ecological risks. Integration of sustainability

into energy planning is spelt out in Malaysia's participation in international agreements, for example, the Convention on Biological Diversity (CBD) (Lyster, 2015). Balancing the competing interests, they should be able to develop from a comprehensive MSP as well as adaptive strategies perspective.

Energy Justice and Socio-economic considerations

Of great importance when assessing the social implications of offshore wind energy projects, energy justice provides a useful framework. This is a concept of how benefits and burdens are fairly distributed among stakeholders, maintenance of procedural fairness in the decision making process and acknowledgement of the varied community requirements. This impacts coastal communities, fisheries and other marine users as offshore wind projects occur. The community ownership and benefit sharing models used in Denmark showed that when the local groups are involved in the project governance acceptance and support of the project increases. Such participatory approaches build trust and work out conflicts leading to more sustainable results. These models can be adapted by Malaysia to involve indigenous communities, local stakeholders and NGOs in planning and decision making processes (Sovacool Enevoldsen, 2015). Getting inclusive governance and transparent communication on board will increase public trust and help integrate offshore wind projects into social and economic priorities.

Sustainable planning: Technological Innovations

There are advancements in technology that are changing the planning and building of offshore wind projects. Sophisticated tool of resource assessment, environmental monitoring and impact prediction include digital mapping, satellite imaging and artificial intelligence (AI). Detailed spatial analysis is made possible with Geographic Information Systems (GIS) that identify the optimal sites for wind farms while accounting for other marine activities. Wind patterns can be modeled through AI algorithms, turbinemaintenance can be predicted, and turbinesscan be optimized through AI algorithms and hence efficiency as well as cost can be improved. The technology integration provides a means of improvement in the made decisions for the policymakers, the improved stakeholder participation, and increasing the project sustainability (Smith et al., 2023). Additionally, smart grid technologies promote more efficient, better distributed and stored energy so we have a stable and resilient energy supply.

Regulatory Gaps in Malaysia

Although Malaysia has progressed in the renewable energy sector, the regulatory framework for offshore wind energy is in its infant stages. Environmental Quality Act of 1974 is the general guidelines on environmental protection but doesn't have specifics on offshore renewable projects. Such gaps in regulation are particularly evident in the absence of dedicated zoning laws, the lack of comprehensive EIA regulations for offshore installations and of clear licensing procedures. To do this, Malaysia can draw on international models, including the UK's Renewable Energy Directive; from which it can develop specialized regulations tailored to the specific problem of offshore wind development. Such clear legal frameworks will reduce risk for investors, promote sustainable development, and increase the public's accountability. Additionally, the offshore wind sector needs to create mechanisms that respect environmental safeguards, public participation and transparency in governance, to be resilient and sustainable.

Offshore Wind Energy: An Integration of International Best Practices

By highlighting global practices on offshore wind energy development, this thesis offers helpful insights on how Malaysia could create a successful wind energy sector. Also important are developing key principles of establishing centralized planning authority, adopting mandatory EIAs for all offshore wind projects, enforcing spatial planning for accommodating conflicting marine uses. Countries as the Netherlands and Norway consider adaptive management, improving policies in a continuous way according to technological progress and environmental feedback. Incentivizing research and development to advance innovation in turbine design and instalments permit. They have also stated that Malaysia can also seek international partnerships to tap on technical expertise and fund. And these measures will keep the offshore wind energy framework in a state of flux and responsiveness to changing challenges and opportunities.

METHODOLOGY

This research is adopting doctrinal, comparative, and stakeholder analyses to undertake the analysis of Malaysia's regulatory framework for offshore wind energy development. This analysis considers main legislation like the environmental Quality Act 1974 and the National Renewable Energy Policy and Action Plan as well as Malaysia's international commitments under agreements including the Paris Agreement (Energy Commission of Malaysia, 2019; UNDP, 2019). Comparative analysis in turn focuses on lessons learned from the countries that have advanced offshore wind industries such as United Kingdom and Denmark with regard to regulatory elements including EIA, licensing and MSP (Sovacool & Geels, 2019; Jafari & Othman, 2020). In the case of stakeholder analysis, measures of centered quality data collection, involving reports, policy briefs and interviews are used to assess the perceptions of government entities, investors, NGOs and local communities (Chong et al., 2019). This paper integrates the concepts of sustainability with those of energy justice through site selection using GIS for ecological conservation and efficient energy development (Heffron et al., 2017, GWEC 2022). Altogether, these techniques set up a solid epistemic framework to support policy suggestions that address the Malaysia's offshore wind energy positioning and compliance with global standards and domestic needs.

FINDINGS AND DISCUSSION

Regulatory framework

Malaysia lacks the proper level of legal requirements for the offshore wind energy sector at the present time. Among them, one of the most striking ones is the lack of specific zoning regulations that would make it clear where offshore wind development is allowed. This absence of delineation gives confusion to developers who are likely to experience a clash with other sea uses like fishing, shipping and conservation. Further, the legal frameworks have not clearly addressed specific environmental impacts assessment (EIA) policy for offshore wind installations. Even though the Environmental Quality Act 1974 contains general provisions concerning environmental conservation, it lacks provisions for specific consolidations involving offshore renewable energy. These drawbacks prevent proper assessment of a project, slow the permitting stages, and make investors turn away. Suppressed by the absence of BMSs, Malaysia has no way but to continue losing the international offshore wind market by not using its potential wind resources and not reaching renewable energy goals. To overcome these challenges the country needs to establish good statutory regime for the marine environment which should include comprehensible zoning regulation, precise EIA standards and procedures for solving the conflicts between the different sea uses. Measures of this nature would afford legal certainty required for investments whilst facilitating sound, efficient and sustainable offshore wind energy regime.

Policy alignment

Malaysia currently has some policies in place such as the Renewable Energy Act 2011 and the National Renewable Energy Policy and Action Plan (NREPAP), however they lie severely limited in their ability to support offshore wind energy. These frameworks primarily do not pertain to the specifics of offshore wind generation and lack provisions that would cover offshore wind's specific regulatory, environmental, and spatial contexts. This vagueness hinders permitting, maritime zoning, and grid integration, thereby stiffening investment and Sectorial development, both crucial to renewable energy's successful deployment. Comparative analysis of the selected offshore wind policy of UK and Denmark shows that the sound legal infrastructure, efficient licensing process and insertions of the mandatory EIA are vital. It is therefore necessary for Malaysian policies to reflect international standard, measures such as adaptive governance, marine spatial planning (MSP) and community engagement strategies. It would also facilitate strategic planning and sourcing of funds for sustainable development placing Malaysia within reckoning in the global RE market.

Marine spatial planning

MSP is fundamental in addressing the spatial competition between offshore wind farm developments and other activities for instance fisheries, navigation, and conservation. In Malaysia the limited development of a clear

MSP framework introduces risk and inefficiency into the usage of resources by developers. MSP offers clarity in decision making by cables particular areas for offshore wind farms in line with the existing environmental, social as well as economic necessities without compromising the diversity. It also encourages integrated working and limits differences of interest amongst stakeholders. MSP can be implemented in Malaysia, coupled with GIS and satellite data to enhance project planning for the siting of offshore wind turbines in a way that supports the country's environmental goals.

Stakeholder Engagement

One of the key lessons learnt in offshore wind energy development is the importance of transparency and meaningful stakeholder engagement to avoid resistance. Combined consultation reveals the interests of a diverse range of stakeholders including the local people, communities, government departments, and agencies, environmental non-governmental organizations, and business entities so that project development emphasizes the economic, social, and other sustainable aspects. For instance, Denmark has had cooperative wind models where communities and user groups reap some benefits from the project hence drawing intensive support from the populace. It establishes profit sharing, local investment and employment generation for achieving energy justice and social acceptance Plan. The approach has the potential to improve social acceptance and engagement among the people of Malaysia if the country can adopt such approaches into the regulatory structure for offshore wind power development.

Energy Justice

Energy justice plays a critical role in the promotion of fairness in the attainment of the opportunities and challenges arising from the offshore wind energy projects. The same idea also extends to the principles of equity of access of renewable energy sources and their socio-economic benefits including employment of people and boosting social value. In Malaysia, energy justice means providing equitable access to resources and energy for all the people and giving special attention to the poor and coastal peoples during change of environmental or economic status. One may learn from the Danish experience how important the community ownership as the benefit-sharing model in management is in gaining public acceptance. This way, Malaysia can guarantee that the undertaking of offshore wind power will induce enormous socio-economic benefits for the intended communities while providing equal opportunities for societies' share of responsibilities and rewards.

Technological integration

Offshore wind technologies are important in helping strengthen the foundations for progressing offshore wind energy systems as good technologies, about effectiveness and sustainability. Hence, resource activities; site selection, precise with the help of advanced tools such as geographic information systems (GIS), artificial intelligence (AI) help in minimizing risks and more accurate impact predictions as well as planning. Moreover, smart grid technologies have significant applications in the area of distribution and storage of energy, necessary for rational and undisturbed supply of electricity. Using these technologies, Malaysia can enhance the prospects of offshore wind business and make its energy initiatives compatible with the advanced environmentally friendly technology.

Environmental Protection

This means that when choosing a location for the utilization of the offshore wind energy, the environment has to first find a balance with energy output. Malaysia having diverse and unique marine species is very important for the ecological balance and the food security of local communities for these strict measures of conservation need to be put in place. Our case reveals that the lack of integrated MSP and targeted EIA make it difficult for the country to mitigate ecological interference. Highly recognized practices like adaptive governance and the MSP frameworks have shown success in minimizing the impacts of environmental risks since they endeavor to demarcate areas with suitable offshore wind farms while considering ecological, social, and economic values. To Malaysia, the implementation of these strategies will mean that the growth of offshore wind energy as a

renewable source of power is within the framework of Paris Agreement and the CBD in a way that protects the marine environment.

Global Best Practices

Guided by international examples, this paper outlines the direction on how Malaysia can create a successful market for offshore wind energy. Hence, United Kingdom, Denmark and Germany's achievement underscores sound legal and policy frameworks, effective marine spatial planning and broad consultaion. These nations have devised strategies for tackling challenges including the following; Licensing procedures: straightforward Licensing procedures Mandatory EIAs: The legislation requires any project to undertake an environmental impact assessment Involvement of the community: sustainable development principles have implicated that the

community should be involved in any developmental programs. For example, Danish approach focuses on integration of public who actively contribute to development of projects hence creating environment for sustainability of projects. In like manner, Malaysia can solve its deficiencies in the regulatory and policy systems, entice domestic and foreign investors as well as set up the country as the premier producer of renewable energy in Southeast Asia. These best practices are not only used to set a standard and a model, but also as reference for Malaysia to establish an effective and long term sustainable offshore wind energy development plan.

Investment and Economic Impact

Malaysia's efforts to attract domestic and foreign investments towards offshore wind energy are hampered by the existing regulatory and policy gaps. Ambiguities in policies, elaborate procedures of permitting, and lack of special policies raise issues that reduce the chances of potential investors. Nevertheless, offshore wind energy has the potential to open new opportunities for the country's economic development as the source of new jobs, innovative technologies, and additional supply of electricity. To this effect, by filling these regulatory loopholes and adopting investor-friendly policies, great economic benefits are scoop able for Malaysia in addition to achieving its renewable energy targets.

Sustainable goals

Wind energy from offshore platform development captures the spirit of sustainable development and adds value to Malaysia's energy security profile in line with the country's responsibilities under international treaties such as the Paris Agreement as well as the Convention on Biological Diversity. The Paris Agreement requires Malaysia to cut greenhouse gas emission and promote low emission renewable energy for climate change mitigation. In particular, the offshore wind capacity has great potential, which remains almost explored, which might increase the share of renewable power generation in the country and decrease the dependence on the fossil resources. Likewise, the CBD highlights the preservation of marine, stressing a more intense and thorough preparation of offshore wind initiatives not to interfere negatively with ecosystems. Besides, it would also prove that the integration of Marine Spatial Planning (MSP) and more comprehensive Environmental Impact Assessments (EIA) into the existing legal instruments helps regulate renewable energy as environmentally friendly. In partnering with these global international agreements and collaboration for offshore wind energy, Malaysia produce a way forward to indeed apply economic growth and consideration for global environmental conservation while also leading in renewable energy innovation.

RECOMMENDATIONS

Amending and Implementing All-Encompassing Legislation

There is a need for an extensive regulatory structure unique to offshore wind energy for Malaysia to fill gaps that slow down the industry's advancement. No previous acts and statutes have specifically dealt with offshore renewable energy sources except the Environmental Quality Act 1974. Special ordinances for wind farms will remove confusion concerning allowable locations, thus minimizing disputes with fishing and shipping. Further, improved exact Environmental Impact Assessment (EIA) regulation processes will facilitate the grant of

permits as well as improve the environmental management while increasing investor certainty (Koons, 2024; Energy Commission of Malaysia, 2019).

Ensure Polices correlates to best practices of other countries

There is a need for updating the Renewable Energy Act of 2011, and the National Renewable Energy Policy, and the National Renewable Energy Action Plan to world standards. There are country examples of how institutional settings work effectively – UK and Denmark with licensing and MSP, and adaptive governance. In the same manner, Malaysia's policies should also include logical outcomes of consistent measures in order to achieve the policies goals of energy development and marine conservation, as well as conflict transformation (European Commission, 2020; Sovacool & Enevoldsen, 2015).

Engagement and Communication of Stakeholders.

Partnering with the community has shown that models based on sharing of profits and participation in governance increase social acceptance of the technology and equal distribution of benefits. The Malaysian context calls for such frameworks to foster collaboration with local communities, environmental non-governmental organisations (ENGOs), and industry actors as well as to determine effective and sustainable approaches for public participation, especially within highly technical and complex infrastructure projects (Sovacool & Enevoldsen, 2015).

A well-thought-out recommendation is to transform tactics into strategic goals involving advanced technologies.

Tools like GPS and GIS and more so AI technologies improve on planning, impacts estimations, and effectiveness. Both GIS and AI enhance site selection through the use of wind patterns, ecological conditions, and marine activities; assessment of resources; and management of turbines. Smart grid technology management improves the storage and delivery of electricity while at the same time lowering expenses and making the system more robust (Smith et al., 2023; IRENA & GWEC, 2013).

Commit to Seven Energy Justice and Sustainability Principles

Energy justice principles ensure reasonable sharing of gains and pains; these include job creation, reasonable access to energy, and safeguarding of the frailer communities. Compelling EIAs and MSP will render integrated and equitable socio-economic development and environmental conservation. Applying offshore wind strategies to Malaysia's national climate targets as well as responsibilities assumed in the Paris Agreement as well as Convention on Biological Diversity will further climate imperatives and deck on offshore wind energy (Heffron et al., 2017; UNFCCC, 2015).

CONCLUSION

The opportunities of Malaysia to develop this offshore wind energy in the framework of its strategy to boost renewable energy sector seem indisputable. But the study reveals important regulatory, policy, and technological barriers that need to be overcome to unlock this potential. Inadequate regulation policies, for zoning, EIA, and other concerns have acted as drawbacks to the development of the sector as there is a clear-cut policy to guide whoever wishes to invest. In addition, inadequacies of existing national policies including the Renewable Energy Act 2011 and the National Renewable Energy Policy and Action Plan have worsened the problem by not addressing offshore wind requirements per sector.

Based on international cases of successful country experiences, including the United Kingdom and Denmark, the present study stresses the need to learn from the experience of stated adaptive governance, sound MSP, and active engagement of stakeholders. All these elements are important in the building of a proper supportive framework for the establishment and growth of offshore wind energy. Further, application of high technologies like GIS, AI, and smart grid solutions can improve productivity and decrease opportunities for problems in the management of resources.

Energy justice becomes the dominant theme as it seeks to achieve a fair distribution of cost and benefits of offshore wind projects. Through community ownership models and other mechanisms on governance, Malaysia can therefore gain public support and provide the socio-economic benefits for the communities. In addition, integrating the offshore wind energy plan with other international obligations like the Paris Agreement and the Convention on Biological Diversity would enable the country to pursue ambitious renewable energy agenda sustainably.

Therefore, the development of offshore wind power in Malaysia should be comprehensive to look for positive development in the future. Malaysia can assume leadership in renewable energy by more thorough analysis of legal situation and policies, integration of high technologies, and attention to environmental and societal impacts. This not only helps the nation meet energy and climate imperatives but also the necessary foundation for sustainable economic advancement and preservation of the environment.

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