A Comparative Study of Policies Affecting the Consumption of Fossil Fuels Between Malaysia and Thailand

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ABSTRACT

The reliance on fossil fuel is a focal issue among most developing economies because it has brought about repercussions of environmental sustainability, energy security and resilience of the economy in the long run. Malaysia, being a producer and exporter of fossil fuels, still depends on energy sources that are carbonintensive, although the policy has been making efforts to diversify the energy mix. The paper takes the doctrinal and comparative approach to policy analysis to analyse the impacts of government energy policies on the fossil fuel dependence in Malaysia and to use Thailand as a comparative country since both are of similar regional, economic and developmental characteristics. Based on the primary legal and policy documents used as well as secondary sources, the paper evaluates the development of the energy diversification policies, renewable energy policies and policy frameworks in the two nations. The results show that Malaysia and Thailand are both still largely reliant on fossil fuels. However, Thailand has been more organised in integrating its policies to use alternative energy sources by coordinating long-term planning tools. The article asserts that policy coherence and institutional commitment are important factors that influence the outcomes of the energy transition process in a country. It ends by noting that greater policy alignment and implementation systems were required to curtail the reliance on fossil fuels and facilitate sustainable energy production in Malaysia.

Keywords: Fossil fuel dependency; energy policy; renewable energy transition; Malaysia; Thailand

INTRODUCTION

Fossil fuels refer to the sources of energy that are the products of the remains of plants and animals, which existed a long time ago, millions of years ago (International Energy Agency, 2023). Coal, crude oil and natural gas are the primary fossil fuels which have historically been at the centre of economic growth and industrial development throughout the world (World Bank, 2022). Malaysia has not been left out of this global dependency, whereby this country operates as a producer and exporter of fossil fuels and is structurally dependent on the same to produce its energy. Nonetheless, there are serious environmental concerns that surround the long-term and intensive use of fossil fuels, especially in terms of greenhouse gas emissions and long-term sustainability. The consumption of fossil fuels in Malaysia has been on a growing trend over the last 20 years, which indicates a historical reliance on carbon-intensive fuels despite the policy to vary the energy mix (International Energy Agency, 2022). In line with this, the current study will aim at analysing the level of government policy on fossil fuel dependency through comparing the Malaysian energy policy setup to that of its neighbour, Thailand.

Although diversification of the energy supply and development of renewable energy have been long-standing policy promises in Malaysia, the country still displays a significant degree of fossil fuel reliance (International Energy Agency, 2022; World Bank, 2023). Although various national energy policies and institutional programs have been launched in an effort to facilitate sustainable energy transition, there are concerns about their effectiveness, their coherence and implementation in the effort of minimising structural dependence on carbon-rich energy sources (Oh et al., 2018; International Renewable Energy Agency, 2023). Other neighbouring

nations, including Thailand, have taken on more integrated and coordinated energy planning systems, which imply possible variations in policy design and institutional direction (International Energy Agency, 2021; Asian Development Bank, 2022). Nevertheless, comparative policy studies on the role that these divergent policy frameworks have in fuel dependency in the context of similar regions and development levels are still scarce (Sovacool et al., 2020; Cherp et al., 2018). This gap would require a more detailed analysis of the role that government policies play in determining national energy dependency patterns.

METHODOLOGY

The research used in this study is a qualitative doctrinal research methodology with a comparative policy analysis. To analyse and discuss the instruments used by the Malaysian and Thai governments to regulate the use of fossil fuels and diversify energy systems, the doctrinal approach is used in the analysis. This approach is suitable because the study aims at examining the content, structure and objectives of the current energy policies instead of quantifying empirically behavioural and economic outcomes.

An analytical framework is used to compare Malaysia and Thailand on the basis of their similarities and differences in their energy policy. The two jurisdictions are chosen because of the similarity of their regional context, trends in their development and the reliance on fossil fuels, which can be compared through the policy. The discussion will focus on energy policies adopted nationally, strategies and long-term planning tools used in the two countries to affect the reliance on fossil fuels.

The study is founded on purely secondary sources that were acquired in the course of desk-based research. The primary sources of legal and policy can be statutes, government policy reports, national energy plans and government official reports released by authorities. Secondary sources include academic journal articles, books and reports released by international organisations referring to energy policy and sustainable development. The use of documentary sources like the statistics of energy consumption and policy reports is the documentary source that is utilised to support the contextual analysis and not for quantitative modelling.

The thematic analysis of the gathered materials is conducted to outline trends in the policy goals, diversification policies and regulatory focus connected to fossil fuel dependence and renewable energy transformation. Combining the policy design and institutional planning with the doctrinal legal analysis, the study aims to evaluate the role of policy design and institutional planning in determining energy transition pathways at the national level. The approach to the methodology will allow for a systematic analysis of the policy coherence and implementation patterns and at the same time be consistent with the qualitative and normative character of legal and policy studies.

Fossil Fuel Dependency in Malaysia

The power generation system of Malaysia is still structurally reliant on fossil fuels and fossil-based sources contribute to around 89 per cent of total primary energy input to power generation (International Energy Agency, 2022). This dependency is a product of the historical features of the energy system due to the availability of domestic resources, investment and policy focus based on supply security and affordability. Although this reliance has contributed to industrialisation and economic development, it has also led to massive environmental externalities and one of them, in particular, is the emission of greenhouse gases, which are by-products of the combustion of fossil fuels (World Bank, 2023). These environmental consequences have gained more relevance due to the fact that Malaysia has signed international climate goals and national sustainability targets.

In addition to environmental factors, the further use of fossil fuels also brings up the issue of long-term energy security. The evaluation of policies shows that the domestic reserves of crude oil and natural gas in Malaysia are exhaustible and liable to a slow decline, which exposes weaknesses in the future energy supply, especially with the increased electricity demand as a result of economic growth and urbanisation (International Energy Agency, 2022). Despite Malaysia being an energy producer, the deteriorating lifespan of the reserves dictates the need to have strategic planning in order to reconcile the short-term energy requirements with the long-term sustainability objectives. This dilemma of energy security today and transition preparedness tomorrow remains a factor in the policy formulation in the Malaysian energy industry.

Malaysia has been developing its energy transition process in a gradual manner, although diversification and sustainability issues have been appreciated at the outset. Policy frameworks have consistently recognised the

significance of renewable energy and diversification. However, their implementation has continued to focus on rebalancing between the fossil fuel sources, as opposed to decisively abandoning the use of carbon-intensive energy systems (International Renewable Energy Agency, 2023). The literature on energy governance in Southeast Asia indicates that these approaches are the institutional preferences towards policy stability, cost regulation and risk minimisation, which may unknowingly delay the process of structural change (Cherp et al., 2018; Sovacool, 2021). This has seen the growth of renewable energy being introduced very tentatively in an energy system that is predominantly fossil-based.

Malaysia's Energy Policies

National Depletion Policy 1980

The National Depletion Policy was one of the first strategic measures that Malaysia took in energy resources management, which was carried out following the intensive increase in crude oil production in the late twentieth century. The policy was supposed to save on the amount of petroleum resources by controlling the rate of extraction and ensuring that the resources were not exhausted too soon. The major oil fields, especially those that had oil initially in place of over 400 million barrels, were subjected to production controls, initially to a range of 1.75 per cent and later reduced to 3 per cent in 1995 in response to changes in the production realities (International Energy Agency, 2022).

Although the policy managed to moderate the extraction and add reserve life, it was more of a conservationist policy than a transformative policy. The policy aimed at using the fossil fuel resources more effectively, without introducing mechanisms to support the development of alternative energy or decreasing long-term dependency on hydrocarbons. This way, as much as it helped to secure short-term energy supply, it did not necessarily change the energy direction of fossil fuels in Malaysia (Economic Planning Unit Malaysia, 2021).

Four-Fuel Diversification Policy 1981.

In line with the National Depletion Policy, the Four-Fuel Diversification Policy aimed at increasing the national energy security by diversifying the national energy supply to include oil, natural gas, coal and hydropower. The policy was expected to decrease excessive dependence on crude oil and enhance selfsufficiency as a result of more active use of domestic sources of energy (International Energy Agency, 2022). The diversification strategy played a crucial role in the process of natural gasification for generating electricity using fuel oil, as Malaysia also has relatively substantial gas reserves.

Nonetheless, as diversification minimised exposure to disruptions in oil supply, it did not significantly affect the dependence on fossil fuels in general. The role of oil in the energy mix was gradually being replaced by natural gas and coal, yet renewable energy was not a central part. Policy analyses suggest that diversification within this framework was more of a fossil fuel replacement policy as opposed to a road towards the lowcarbon shift, which strengthened carbon-intensive infrastructure and investment streams (Asian Development Bank, 2022).

The 5-Fuel Diversification Policy.

The presentation of the Five-Fuel Diversification Policy was the official acknowledgement of renewable energy as a part of the Malaysian energy policy. As part of the Eighth Malaysia Plan (2001- 2005), renewable energy became the fifth fuel alongside oil, gas, coal and hydropower in order to increase sustainability and minimise greenhouse gas emissions (International Renewable Energy Agency, 2023). The policy set a goal of five per cent of electricity generation by 2005 to be contributed by renewable energy.

Although symbolic in value, the practical implications of the policy were limited by conflicting priorities in the energy industry. The long-term planning projections were to assign a significant role to coal and natural gas, as it was believed that the aids were more cost-effective and reliable in supply. According to the policy analyses, renewable energy targets within this framework did not have a strong enforcement system and regulatory stability in the long term, restricting investor confidence and large-scale implementation (Asian Development Bank, 2022). This led to a slow growth in renewable energy as compared to fossil fuels.

New Energy Policy 2010

New Energy Policy presented a more coherent policy framework that is based on the five guiding principles: energy pricing, supply security, efficiency, governance and change management. Such a policy represented an

increasing concern about sustainability and governance issues and the efforts to create a balance between economic performance and environmental and social principles (International Energy Agency, 2022). It aimed at solving structural problems like sufficiency of infrastructure, availability of fuel, affordability and institutional coordination.

However, the implementation of policies remained focused on the stability of supply and economic competitiveness. The deployment of renewable energy was done at a slow rate, limited by the structure of the market, the complexity of the regulations and the fear of energy becoming costly. Consequently, fossil fuels continued to play a key role in the Malaysian power generation system, which describes a policy dilemma between gradual change and radical energy change (World Bank, 2023; International Renewable Energy Agency, 2023).

Thailand's Energy Policies

The energy policy framework in Thailand has been developing as a result of both structural and external pressures, such as the fluctuation in the global energy prices, the rise in energy security concerns and the rise in regional and international commitments to decarbonisation. Thailand, as a net importer of energy and having minimal domestically available fossil fuel reserves, has traditionally made supply security and price stability one of its key policy goals. Nevertheless, over recent years, these goals have been sought in conjunction with the creation of renewable energy, the increase of energy efficiency and long-term planning of energy simulation in order to mitigate the exposure to external energy shocks (International Energy Agency, 2021; Asian Development Bank, 2022).

In contrast to other jurisdictions which have a lot of domestic fossil fuel endowment, the policy approach in Thailand indicates a strategic focus on diversification and coordination within the energy system. The development of the energy sector has always been perceived as one of the pillars of national economic competitiveness and social stability, primarily due to the fact that the country depends on the energy-intensive manufacturing industry, transport and export-dependent industries (World Bank, 2023). The policies of Thailand on energy have thus attempted to strike a balance between affordability and reliability, as well as gradual structural change towards a more sustainable energy mix.

Early Transition Planning and National Energy Policy 2008.

The National Energy Policy 2008 of Thailand was developed at a time when the world was experiencing unstable oil prices and this increased the fear of reliance on imports and also a lack of supply. The policy focused on energy security by diversifying the supply, increasing domestic power generation wherever possible and increasing energy efficiency in major sectors. It also highlighted the necessity of lessening the dependency on imported fossil energy by promoting the development of alternative energy and demand-side management approaches (International Energy Agency, 2021).

Simultaneously, the Renewable Energy Development Plan (REDP) of 2008-2022 presented a premature road map to the encouragement of the renewable energy implementation, specifically biomass, solar and small-scale hydropower. Although the REDP has helped in incremental increases in renewable capacity, policy assessments have shown that the implementation process at this time was still rather sporadic, with little coordination between planning tools and a disproportionate implementation across sectors (International Renewable Energy Agency, 2022). This led to the fact that despite the renewable energy picking up the policy, fossil fuels remained the major source of primary energy in Thailand.

Thailand Integrated Energy Blueprint 2015-2036.

There was a significant institutional change by having Thailand Integrated Energy Blueprint (TIEB) 20152036 that integrated five earlier policy frameworks into one unified, integrated policy. They are the Power Development Plan (PDP), Energy Efficiency Plan (EEP), Alternative Energy Development Plan (AEDP), oil plan and gas plan. The TIEB serves as the de facto national energy policy of Thailand, which gives long-term guidance to the development of the energy system in the absence of a revised National Energy Policy (Asian Development Bank, 2022; International Energy Agency, 2021).

The combination of these plans is a significant shift in the sector-specific policymaking, as it allows for aligning the electricity generation with fuel supply, energy efficiency and renewable energy goals in a more effective way. Policy studies indicate that such coordinated action has enhanced institutional coherence and enhanced policy signalling to investors, especially in the renewable energy and energy efficiency sectors (International Renewable Energy Agency, 2022). Nonetheless, the success of the TIEB is still dependent on the long-term interaction between ministries and adaptive mechanisms of governance that can respond to the evolving economic and technological factors.

Thailand forecasted average growth of about 3.9 per cent in GDP over the 2015-2036 period under the TIEB framework, which is more conservative than previous planning assumptions (Asian Development Bank, 2022). This new growth path also signalled more realistic energy demand projections and the value of efficiency increases and demand-side controls to achieve the future energy requirements.

Renewable Energy and Energy Efficiency under AEDP and EEP.

The policy tools currently used to enhance renewable energy development under the Alternative Energy Development Plan have increased rapidly in recent years, with the aid of policy tools being used to develop renewable energy, including feed-in tariffs, competitive bidding and community-based renewable energy projects. Thailand has reported considerable advances in the use of solar photovoltaics and biomass energy, which have been utilised to exploit the agricultural foundation and favourable solar radiation (International Renewable Energy Agency, 2023). Such an undertaking has been supplemented with energy efficiency undertakings as part of the Energy Efficiency Plan, which focuses on cutting back on energy intensity in the industrial, transport and building sectors.

In spite of these developments, fossil fuels still dominate the Thai energy system, especially natural gas in power generation. Policy evaluations point out that the growth of renewable energy has been parallel and not substitutional to the consumption of fossil fuels due to the difficulty in striking a balance between the goal of decarbonisation and the energy security and system stability (International Energy Agency, 2021; World Bank, 2023). However, the integrated planning architecture of Thailand contrasts with a more disaggregated policy context and offers a basis for more far-reaching structural change in the long run.

Implications for Comparative Policy Analysis

The example of Thailand demonstrated that coherence in the process of energy transition management can be achieved despite the lack of access to significant energy sources at home through integrated planning and coordinated policy design. Although there is still work to be done in terms of decreasing absolute reliance on fossil fuels, the institutional framework that is provided by the TIEB provides a relatively sound framework upon which renewable energy, efficiency and security goals can be aligned. This is opposed to more fossilbased diversification strategies and highlights the significance of governance structure in determining national energy dependency paths (Cherp et al., 2018; Sovacool, 2021).

Comparative Analysis Of Energy Diversification And Fossil Fuel Dependency

Policy Logic and Diversification Approaches

This has been a strategy of energy diversification adopted by both Malaysia and Thailand in their effort to curb supply security and vulnerability to external energy shocks. Nevertheless, the logic of policy and implementation behind policies in both countries varies in significant respects. The diversification policy of Malaysia has traditionally been based on the distribution of dependence among a variety of oil sources instead of the reduction of reliance on carbon-based energy sources. Despite the national fuel mix consisting of oil, natural gas, coal, hydropower and renewable energy, fossil fuels remain dominant in electricity production because of the consideration of price issues, the lock-in effect of infrastructure, policy choices and focus on the stability of the supply (International Energy Agency, 2022; International Renewable Energy Agency, 2023).

Conversely, the diversification policy of Thailand has been directed more specifically in the direction of incorporating other energy sources with fossil fuels through the synchronisation of planning tools. Although fossil fuel, especially natural gas, is still the core of the power sector in Thailand, the diversification policies are

integrated into an all-inclusive governance system, which harmonises renewable energy development, energy efficiency and demand management on a long-term basis (International Energy Agency, 2021; Asian Development Bank, 2022). This organisational dissimilarity demonstrates the higher level of focus on policy coordination, but not fuel substitution, in Thailand.

Patterns and Structural Dependence of Energy Consumption.

Comparative energy consumption data make it apparent that Thailand has higher total primary energy consumption than Malaysia, which is related to variation in the population size, industrial structure and transport demand. Nevertheless, increasing the aggregate consumption does not mean that the dependence on structural fossil fuels will increase. An improved energy governance system accompanies the increased energy use rates in Thailand and the less intense consumption rates in Malaysia are covered by the fact that the country is more dependent on fossil fuels in its electricity production system (World Bank, 2023; International Energy Agency, 2022).

Per capita energy consumption also presents contradictory socio-economic processes. Malaysia has more energy consumption per capita than Thailand, which indicates higher income levels, ownership of more vehicles and consumption of electricity in the residential and industrial sectors (World Bank, 2023). Although to some extent, these differences can be attributed to socio-economic factors, policy decisions in terms of pricing, subsidies and efficiency standards have influenced consumption patterns. In this concept, the further use of fossil fuel subsidies in Malaysia has been seen as a structural impediment to demand-side transition, but Thailand has implemented more comprehensive energy efficiency measures and demand management (Asian Development Bank, 2022; International Renewable Energy Agency, 2023).

Renewable Energy Governance and Institutional Frameworks.

One of the points of divergence between the two countries is institutional design, which is crucial. The Sustainable Energy Development Authority (SEDA) is the body that regulates renewable energy in Malaysia and it was set up through the Sustainable Energy Development Authority Act of 2011. SEDA is an advisory and coordinating body which facilitates the implementation of renewable energy sources via activities like net energy metering, large-scale solar programmes and facilitation programmes. However, policy analysis argues that the exploration of renewable energy is still limited by the unelevated institutional control and the conflicting policy priorities of fossil fuel-based policies (International Renewable Energy Agency, 2023; World Bank, 2023).

The institutional structure in Thailand is more policy-integrated. Under the Energy Conservation and Promotion Act B.E. 2535 (1992), the Energy Conservation Promotion Fund was put in place to help fund renewable energy, energy efficiency and research projects. The instruments are part of the Thailand Integrated Energy Blueprint, which aligns the role of renewable energy with the goals of power development, power planning and efficiency (International Energy Agency, 2021; Asian Development Bank, 2022). This combined practice has not only increased policy coherence but also lessened regulatory uncertainty for investors in support of more stable renewable energy development.

Implications of Resource Constraints and Energy Security.

Variations in domestic energy resource endowments also influence the course of policy. Malaysia also has a relatively larger amount of natural gas reserves than Thailand, which has traditionally contributed to the fact that the country can still rely on gas-fired power production. Nevertheless, the forecasts on the reserves reveal a growing vulnerability over the long run, unless there is a faster pace in the implementation of renewable energy sources (International Energy Agency, 2022). The more restricted fossil fuel reserves and increased reliance on the importation of Thailand have led to the necessity of a greater focus on diversification, efficiency and resilience of the systems (World Bank, 2023).

The difference in the resource conditions supports the existence of divergent policy incentives. The availability of fossil fuels in Malaysia has diminished the short-term urgency in structural transition, as compared to Thailand, where the dependency on imports has been a stimulus in integrated planning and development of alternative energy sources. This difference highlights the significance of political economy and resource environment in determining the outcomes of national energy policies.

Economic Development, Dynamics of Energy Usage and Emissions.

Malaysia and Thailand have high energy consumption and economic growth, which is in line with the development trends of the entire ASEAN. According to empirical research, a relationship exists between energy use and GDP expansion, wherein fossil fuels dominate at the stages of industrial growth and both variables are mutually reinforcing in the long run (World Bank, 2023; International Energy Agency, 2022). Nevertheless, the reactions of the policy to these dynamics vary.

Thailand has also taken steps to be more ambitious on the part of renewable energy targets, with the goal of having renewable energy sources to be about 30 per cent of the total energy consumption by 2036. The targets of Malaysia are substantial, but relatively small and have been prone to delays in their implementation (International Renewable Energy Agency, 2023). Such variations imply that the commitment to energy transition among countries is different, where Thailand is more inclined to allocate its long-term structural change, though with greater adjustment costs in the short term.

The Environmental Kuznets Curve hypothesis offers a good analytical tool when trying to explain these trends. Although at the beginning of growth, an increase in the level of income is associated with a proportional increase in emissions, it is possible to achieve the decoupling of these two parameters with the help of policy intervention, modernisation of technologies and a redesign of institutions later in the development process (Cherp et al., 2018; Sovacool, 2021). The integrated planning system of Thailand places it in a better position to undergo such decoupling compared to Malaysia, which is fossil fuel-focused in diversification, resulting in the risk of postponing transition thresholds.

Comparison Findings Synthesis.

Altogether, the comparative analysis shows that although both Malaysia and Thailand continue to be dependent on fossil fuels, the character and direction of such dependence are also quite different. The energy diversification approach in Malaysia has been a significant boost in the fossil fuel dominance, as the strategy has been able to substitute the fossil fuel spectrum. Thailand, by contrast, has followed a more integrated and institutionally coordinated policy on diversification and development of renewable energy. These disparities underscore the essential importance of governance design, policy coherence and institutional coordination in determining the national patterns of energy dependency.

Implications For Energy Governance and Policy Analysis

This comparative analysis highlights that fossil fuel dependency is shaped not solely by resource endowment or energy demand, but more fundamentally by governance design, policy coherence and institutional coordination. The comparison between Malaysia and Thailand demonstrates that diversification strategies centred primarily on reallocating fossil fuel sources may reinforce structural dependence, even where renewable energy objectives are formally acknowledged. By contrast, integrated planning frameworks that align power development, energy efficiency, fuel supply and renewable energy deployment can enhance policy coherence and create more favourable conditions for long-term transition, even in energy-importing contexts.

The findings suggest that energy transition outcomes are closely linked to how policies are structured and coordinated across institutions rather than to the presence of individual policy instruments alone. Differences observed between Malaysia and Thailand underscore the importance of long-term planning horizons, crosssectoral alignment and consistent policy signalling in shaping national energy dependency trajectories. These insights contribute to broader discussions on energy governance in developing economies by illustrating how institutional arrangements and policy integration influence the effectiveness of diversification efforts.

Rather than advancing prescriptive reform proposals, this study offers a comparative perspective that may inform future policy analysis and scholarly inquiry into energy transition governance. The implications drawn from this comparison provide a foundation for further research on how integrated policy frameworks and institutional capacity can support more effective management of fossil fuel dependency in similarly situated jurisdictions.

CONCLUSION

This paper set out to examine how government policies shape fossil fuel dependency through a comparative analysis of Malaysia and Thailand. By analysing national energy policies, institutional arrangements and

diversification strategies, the study demonstrates that fossil fuel dependency is not determined solely by resource availability or energy demand but is significantly influenced by policy design, governance coherence and long-term planning approaches.

The comparison reveals that Malaysia's energy diversification strategy has operated mainly within a fossil fuel–centric framework, emphasising substitution among fossil fuel sources while incorporating renewable energy in a gradual and incremental manner. In contrast, Thailand has adopted a more integrated energy governance model, aligning renewable energy development, energy efficiency and power sector planning within a consolidated policy architecture. While both countries remain reliant on fossil fuels, the nature and trajectory of that reliance differ, reflecting underlying institutional and policy choices rather than purely economic or technical constraints.

By situating these findings within a comparative policy framework, this study contributes to the broader literature on energy governance and transition in developing and emerging economies. It highlights the importance of policy coherence and institutional coordination in shaping national energy dependency patterns. It provides a foundation for future comparative research on how governance structures influence the effectiveness of energy diversification and transition strategies.

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This manuscript was prepared with the support of artificial intelligence tools, which were used solely to assist with drafting, editing and language refinement. All intellectual content, scholarly analysis, interpretation and conclusions presented in this work are the original work of the authors. The use of AI tools was transparent, supervised and did not contribute to the generation of original research data or substantive intellectual content.

REFERENCES

1. Asian Development Bank. (2022). Thailand energy sector assessment, strategy and road map. Asian Development Bank. https://www.adb.org/documents/thailand-energy-sector-assessment-strategy-road-map
2. Cherp, A., Jewell, J., Goldthau, A., & Sovacool, B. K. (2018). Governing global energy: Systems, transitions and policy challenges. Energy Policy, 126, 1–10. https://doi.org/10.1016/j.enpol.2018.10.003
3. Economic Planning Unit Malaysia. (2021). Twelfth Malaysia Plan, 2021–2025. Prime Minister's Department. https://www.epu.gov.my
4. International Energy Agency. (2021). Thailand energy policy review. IEA. https://www.iea.org/reports/thailand-energy-policy-review
5. International Energy Agency. (2022). Malaysia energy outlook. IEA. https://www.iea.org/reports/malaysia-energy-outlook
6. International Energy Agency. (2023). World energy outlook 2023. IEA. https://www.iea.org/reports/world-energy-outlook-2023
7. International Renewable Energy Agency. (2022). Renewable energy market analysis: Southeast Asia. IRENA. https://www.irena.org/publications/2022/Jun/Renewable-Energy-Market-Analysis-Southeast-Asia
8. International Renewable Energy Agency. (2023). Energy transition outlook: Southeast Asia. IRENA. https://www.irena.org/publications/2023/Jun/Energy-Transition-Outlook-Southeast-Asia

9. Oh, T. H., Hasanuzzaman, M., Selvaraj, J., Teo, S. C., & Chua, S. C. (2018). Energy policy and alternative energy in Malaysia: Issues and challenges for sustainable growth – An update. Renewable and Sustainable Energy Reviews, 81, 3021–3031. https://doi.org/10.1016/j.rser.2017.06.112
10. Sovacool, B. K. (2021). Energy governance and energy justice. Edward Elgar Publishing.
11. World Bank. (2023). World development report 2023: Climate, development and energy. World Bank.