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RENEWABLE ENERGY DEVELOPMENT TOWARDS SUSTAINABLE DEVELOPMENT GOALS: A REVIEW OF THAILAND'S AND THE PHILIPPINES' LAWS AND POLICIES

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ABSTRACT

Background and Purpose: Renewable energy (RE) is vital for sustainable energy access and climate change mitigation. Despite rising energy demand, Thailand and the Philippines have made limited progress in integrating RE into their energy portfolios. Both countries have implemented policies and projects aligned with Target 7 of the Sustainable Development Goals (SDGs), which emphasizes affordable and sustainable energy for all. This study examines the effectiveness of legal and policy frameworks in overcoming barriers to RE development and supporting sustainable energy transitions.

Methodology: A comprehensive library-research methodology was employed, incorporating statutory and conceptual approaches. Key legislations, such as Thailand's National Energy Policy Act (1992) and the Philippines' Renewable Energy Act (2008), were reviewed to evaluate their alignment with sustainability principles and SDG commitments. The analysis focused on identifying regulatory gaps, financial barriers, and governance challenges within the RE landscape.

Findings: The findings indicate that, while RE presents significant potential for socioeconomic development and energy security, its growth is hindered by regulatory inefficiencies, financial

constraints, and limited government support. Comprehensive legal frameworks and targeted incentives are essential to address these barriers and promote a transition to a sustainable energy mix.

Contributions: This study contributes to the discourse on RE governance by highlighting the need for robust policies, financial incentives, and stakeholder collaboration. It provides insights for policymakers to enhance RE adoption and achieve sustainable development goals in Thailand and the Philippines.

Keywords: Renewable energy, legal framework, policy, Thailand, Philippines.

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1.0 INTRODUCTION

Renewable energy (hereinafter referred to as "RE") is an alternative energy source that is widely utilised to safeguard the environment from the hazards associated with the use of fossil fuels (Olabi & Abdelkareem, 2022), diversify energy sources and enhance energy security (Cergibozan, 2022). In the next 10 years, the market for RE is anticipated to expand at the fastest rate, making it one of the main energy sources in the world (Nakapreecha et al., 2021). In Southeast Asia, a minimum of 25% of the target RE share is expected to be incorporated into the grid by 2025 through regional cooperation. Thailand and the Philippines, together with Brunei, Singapore, and Laos, are the most prepared nations for incorporation into the regional renewable energy grid (Huang et al., 2019). The RE sector in the region could be improved through regional grid connections (Martinot, 2016) and any surplus electricity generated could be shared among member states (Stappel et al., 2015) and subsequently allow each state to have access to affordable clean energy. Thailand and the Philippines have both made efforts to increase their use of RE sources in recent years, but their progress differs (Kuramochi et al., 2021). The Philippines is the second largest geothermal producer globally, with a capacity of about 1,9 GW (Erdiwansyah et al., 2019). Ahmed et al. (2017) suggested offshore winds in the Philippines and Thailand should also be exploited. In addition, Thailand has become the third-largest producer of photovoltaic cells in the world in terms of solar energy in the region (Erdiwansyah et al., 2019). Furthermore, the RE industry has created many job opportunities in these two countries and the region. For instance, in 2016, 349,000 jobs were made available in the liquid biofuels industry, 59000 jobs in the solar PV industry, and 10,000 jobs in the wind energy sector (IRENA, 2018).

The consumption of energy sources is rising as the global economy develops more rapidly. The main issue is the depletion of limited and non-renewable resources especially in the energy sector, raising alarms on energy reliability at a global scale (Abbasi et al., 2022; Cergibozan, 2022). Energy sources are crucial to achieving economic growth and development, particularly RE, in attaining sustainable development. As Thailand and the Philippines are developing countries, the focus of this study is to examine the current landscape of RE legal frameworks in Thailand and the Philippines, in line with their commitment to the Sustainable Development Goals (SDGs), Target 7, which is to "Ensure access to affordable, reliable, sustainable and modern energy for all".

2.0 LITERATURE REVIEW

2.1 Climate Change Mitigation, Sustainable Development Goals (SDGs), and Renewable Energy (RE)

The Paris Agreement is the first global climate change accord that accommodates all nations to meet the targets outlined in Article 2. The developed nations emphasise mitigation and adaptation, financial support, technology transfer, and strong global transparency for national mitigation activities through this agreement. According to the Paris Agreement, each party must submit a National Determined Contribution (NDC) that must be reviewed every five years in order to routinely report on its commitments (Dimitrov, 2016). Article 9 (1) of the agreement mentions specific obligations for developed countries to assist developing countries in terms of financial, and technology transfer and enhance support for capacity-building actions as stipulated under Article 11 (3). In the case of *Juliana v. United States of America, 947 F.3d 1159 (9th Cir. 2020)*, a climate lawsuit was filed in 2015 by 21 youth plaintiffs against the United States government and fossil fuel and industry groups. They claimed that the government has violated their fundamental rights and the government failed to exercise its duty to protect the public by encouraging and permitting the combustion of fossil fuels. Although the court dismissed the claim by stating that developing and supervising a plan to mitigate anthropogenic climate change would exceed the remedial powers of the court, this case shows a great example of the doctrine of public trust and international responsibility related to natural resources as well addressed the adverse impacts of fossil fuels such as emitting hazardous air pollutants that are harmful to both the environment and public health.

Although the Paris Agreement is silent on the energy sector, there is a signal to revamp the existing energy sector as the common goal to limit global surface demonstrates a commitment to limit fossil fuel (Van de Graaf, 2017). Among the submitted NDCs, 105 have

GHG emission targets, and 20 have combinations of GHG and non-GHG targets that include renewable energy and energy efficiency measures. Nevertheless, NDCs themselves might not lead to substantial differences in global oil and natural gas consumption, yet RE will play a vital role in climate change mitigation action whereby low-carbon technologies encompassing nuclear and wind energy, biomass, hydro, and solar will be increased by 2030 (Vandyck et al., 2016). Moreover, some countries have indicated a specific instrument in their NDCs, including carbon prices and technology-specific instruments like feed-in tariffs and other domestic energy policies (Vandyck et al., 2016). As to whether countries will abide by Paris Agreement and accelerate Re as part of climate change mitigation measures, international treaties are binding based on the principle of *"pacta sunt servanda"* as the bedrock of the customary international law of treaties whereby upon acceptance, treaties shall be complied with. Thus, as a legally binding agreement, the Paris Agreement navigates towards efforts to reduce GHG emissions and achieve the ideal earth's climate system.

There are two important international environmental law principles in discussing the roles of RE as part of climate change mitigation regime, which are the principle of sustainable development and the precautionary principle. The case of *New Zealand v France (the Nuclear Test II case) [1995]* explained the concept of sustainable development which it should be recognized as a principle in the customary international law, where there is a duty of 'continuous' environmental impact assessment. Whereby in *Gabcikovo-Nagymaros case (Hungary v Slovakia)*, Judge Weeramantry elaborated the concept of sustainable development as "...a part of modern international law by reason not only of its inescapable logical necessity, but also by reason of its wide and general acceptance by the global community." While the precautionary principle was defined in Principle 15 of the 1992 Rio Declaration as a cost-effective approach that must be immediately implemented to avert environmental degradation in the case of threats of grave destruction.

Southeast Asia is a region that is highly dependent on fossil fuels for energy. The region is also home to significant RE sources, including solar, wind, hydro, and geothermal with the ASEAN Plan of Action for Energy Cooperation (APAEC) aimed to achieve 23 % of RE shares in the primary energy mix by 2025 (Malahayati, 2020). The expansion of cross-border power exchange incorporating solar and wind power could empower ASEAN nations to accomplish the objectives of their nationally determined contributions (NDCs) under the Paris Agreement (Do & Burke, 2022). Despite this potential, the adoption of RE in Southeast Asia has been relatively slow due to a range of factors, including limited financing options, regulatory challenges, including policies uncertainty (Junlakarn et al., 2021) and the dominance of

traditional power producers (Malahayati, 2020). To meet the Paris Agreement and other sustainable development targets, the energy sector in this region would require approximately $140 billion in annual investment between 2019 and 2040 and the electricity industry requires more than half of the investment (Aleluia et al., 2022). In addition, there is a growing interest in distributed RE sector, such as rooftop solar, which can provide a more reliable and affordable source of energy for rural and remote communities (Junlakarn et al., 2021; Hidayatno et al., 2020). Overall, while the transition to RE in Southeast Asia is still in its early stages, there are positive signs that the region is moving in the right direction. Continuous investment and policy support will be crucial to accelerate the RE development and simultaneously meet its sustainability goals (Dhakal & Shrestha, 2021).

Thailand ratified the Paris Agreement in September 2016, becoming one of the first countries in Southeast Asia to do so. The country submitted its Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) in September 2015 to show its commitment to reducing greenhouse gas emissions and transitioning to a low-carbon economy, including targets for RE development. Thailand targeted 20% GHG emissions by 2030 and up to 25 % reduction with assistance (Veng et al., 2020). The adoption of the Thailand Alternative Energy Development Plan (AEDP 2015-2036) would be an effective effort to meet Thailand's first NDC's GHG emission reduction target of 2030 (Misila et al., 2020). The Philippines also ratified the Paris Agreement in February 2017, in which the country had previously submitted its NDC to the UNFCCC in October 2015, outlining its commitment to reducing greenhouse gas emissions and transitioning to a low-carbon economy. The Philippines' target is to reduce 70% of carbon emissions by 2030 (Veng et al., 2020). The Philippines' NDC sets a target of increasing the share of RE in the country's total energy mix to 35% by 2030. The NDC also includes a target of achieving 7,484 MW of newly installed renewable energy capacity by 2030 (Koebrich & Speer, 2019). To achieve these targets, the Philippine government has introduced a range of policies and incentives to promote the development of RE, including the Renewable Portfolio Standard, the Green Energy Option Programme (GEOP) and the Net Metering Programme (Koebrich & Speer, 2019).

Energy reliability is essential to achieve the targets of SDG 7 and the current energy infrastructure must be strengthened through energy centralisation and decentralisation (Nerini et al., 2018). The achievement of SDG 7 necessitates a long-term financial investment (Nam-Chol & Kim, 2019). In this context, the UN suggests that global nations should undertake robust efforts to realise these targets and these SDGs merely suggest objective goals and metrics (Büyüközkan et al., 2018). The achievement of one SDG is critical as it is linked to the

achievement of others. For example, SDG 7 may affect other issues such as human development, economic growth, and the implementation of the Paris Agreement to the United Nations Framework Convention on Climate Change (UNFCCC) (Nam-Chol & Kim, 2019). Access to energy has increased significantly with RE improvements in the rural power sector (Blenkinsopp et al., 2013; Kitchen & O' Reill, 2013) especially when millions of people lacked access to electricity in this region (Jiang et al., 2019). This reflects the critical role of RE legal frameworks to maximise capital and effectively leading the world towards SDG 7. Ensuring universal access to reliable and clean energy puts the world in a better position to face many problems, including hunger, climate change, and unsustainable cities. Above all, the rural and urban poor are the most disadvantaged because of depleting resources and environmental degradation (Nazeer & Furuoka, 2017).

The technological advancements in RE development as well as the new energy partnership through import and export seem to be rising with the RE strategies in the region. Potential risks and opportunities could be addressed through cooperation and a comprehensive energy security index (Ralph & Hancock, 2019). For instance, the ASEAN Centre for Energy (ACE) may initiate regional cooperation policies and plans on RE and other issues (Ghazali, 2018). As all members have committed to elevating the share of RE, regional cooperation to improve and promote the use of RE is required with the ultimate goal of advancing the incorporation of RE information and technology (Ahmed et al., 2017). The achievement of RE share in the ASEAN energy mix will not only enable access to energy in rural areas and meet energy demands, but will also be favourable to the climate change agenda (Fünfgeld, 2019). Furthermore, cross regions' cooperation on energy and trade will bolster the energy sector's stability (Indeo, 2019) since foreign investment is required to support RE growth, notably through technical cooperation and financial contributions (Bujang et al., 2016). Thus, it would be highly beneficial to enact clear legal measures to optimise RE growth and simultaneously will encourage foreign investment and stimulate other regional geopolitical interests (Fünfgeld, 2019).

Table 1 shows the interaction of SDG 7 with other SDGs 1, 2, 3, 8, 10, 11, 12, and 13. McCollum et al. (2017) in their study have highlighted the impacts of SDG 7 to support other SDGs, in which the achievement of SDG 7 leads to significant impacts in respect of human development, economic growth, and climate change mitigation as suggested by Nam-Chol and Kim (2019). Similarly, Büyüközkan et al. (2018) also suggested that the energy sector has momentous influences on employment, poverty, pollution, and ecosystems. Therefore, it is critical to implement comprehensive laws and policies to support RE development in a country

to navigate towards the maximum potential of these RE resources and eventually achieve SDG 7 and the other SDGs.

Table 1: Interaction of SDG 7 with SDG 1, 2, 3, 8, 10, 11, 12, and 13

Goal	Target	Interaction with ADG 7 with other SDGs
SDG 1	To end poverty in all its forms everywhere	Improved energy access supports poverty eradication. Off-grid electrification such as solar PV systems can enable energy access to poor communities and eventually help them to improve their livelihood.
SDG 2	To end hunger, achieve food security and improved nutrition, and promote sustainable agriculture	Improved energy access supports the traditional agricultural sector which allows farmers to use powered water pumps and other modern equipment that help them run their farms and increase food crop yields.
SDG 3	To ensure healthy lives and promote well-being for all at all ages	Improved energy access improves air quality that essential to thus promoting good health and well-being as well reduces bacterial contamination. Moreover, electricity is important to support medical services.
SDG 8	To promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all	RE development increases innovation and employment in the community.
SDG 10	Reduce inequality within and among countries	Improved affordable energy access supports advancement in the educational, health, and employment sector particularly o for the rural poor.
SDG 11	To make cities and human settlements inclusive, safe, resilient, and sustainable	Improved clean, affordable energy access supports the establishment of safe, resilient, and less-polluting human settlements.
SDG 12	To ensure sustainable consumption and production patterns	Utilisation of RE technologies improves production and consumption patterns, minimise waste as well reduces energy usage in waste management.
SDG 13	To take urgent action to combat climate change and its impacts	Utilisation of RE technologies improves the ecosystem as a whole, which contributes to keeping the global average temperature below 2°c above pre-industrial levels.

2.2 Renewable Energy Development in Thailand

Thailand's socio-political context has contributed to the development of RE in the country, whereby the successful introduction of new technology is also induced by socio-political support (Chaiyapa et al., 2018). For instance, the Thai government and the late Thai monarch had initiated biofuel projects that delivered tremendous contributions to both the agricultural and energy sectors (Rennkampa et al., 2017). The solar programme in 2013 was among the earliest solar programme that demonstrated the government's willingness to expand Thailand's solar market and increase RE's contribution to the energy mix (Winston & Strawn, 2014). Thailand has been making significant progress in the development of renewable energy in recent years, with a range of policies and incentives aimed at promoting the use of clean energy sources. The government has set an ambitious target of achieving 30% of the country's energy mix from renewable sources by 2036 (Clemons et al., 2021). The Thai government has strived to make RE the main energy supply through the Thailand Integrated Energy Blueprint (TIEB) while reducing carbon emissions by 2036 (Frank-Fahle & Morstadt, 2017). In 2020, the total RE in Thailand was 43 693GWh (IRENA, 2022). One of Thailand's most successful RE industries has been the solar industry, with the country having high irradiance and daily solar exposure. As of 2020, solar generation in the total energy mix is equal to 3 % (IEA, 2022), equal to 2 988MW (IRENA, 2022). The current Alternative Energy Development Plan (AEDP) strives for 3.4 GW of installed solar technology by 2025 and 6.0 GW by 2036 (Clemons et al., 2021).

Universal energy access is considered an important factor that has driven RE development in Thailand. The Thailand Eleventh National Economic and Social Development Plan (2012-2016) focused on delivering rural electrification to eradicate poverty. Diesel-based generators were used to produce electricity in remote areas, which proved costly (Krueasuk et al., 2015). Accompanying the government efforts toward RE development, the public optimistic perception of the RE as a means for environmental protection and energy security contributes to the expansion of the RE sector in the country (Suppanich & Wangjiraniran, 2015). In addition to solar photovoltaic (PV), Thailand has also made significant progress in developing wind energy. The government has also introduced a feed-in tariff (FiT) program to incentivize wind energy development (Niyomtham et al., 2022). The Thai Energy Policy and Planning Office sets the goal of installing electrical power capacity from wind energy resources of 3,002 MW by 2036 (Pawintanathon et al., 2022). Thailand is also exploring other forms of RE, including biomass, biogas, and geothermal (Misila et al., 2020). The country has a significant amount of agricultural waste that can be used to generate energy and there are

several biogas projects currently in operation. Geothermal energy is still in the early stages of development, but there is potential for the technology to play a role in Thailand's renewable energy mix in the future (Misila et al., 2020).

2.3 Renewable Energy Development in Philippines

The low-carbon transition agenda is of paramount importance to countries that are vulnerable to severe weather, such as the Philippines. Due to the Philippines' status as a net importer of fossil fuels, they are affected by market forces. The Philippines is more sensitive to supply disruptions, price variations, and geopolitical changes. Dependence on foreign sources of primary energy leads to favourable renewable energy policies (Brahim, 2014). The Philippines is working towards diversifying its energy sources to develop and maintain a more reliable and long-term energy supply. As one of the fastest-evolving economies in Southeast Asia, with more than 11% of the population lacking access to energy and electricity (IRENA, 2017) as well as a commitment under the Paris Agreement (Mondal et al., 2018), the government has placed their national interest in providing for more power in an environmentally-friendly manner (Bertheau et al., 2020). With outstanding physical features, including the archipelago's irregular configuration that comprises 7,641 islands, the Philippines' energy supply breaks down regions into two categories; on-grid and off-grid. The off-grid has fewer advantages compared to the on-grid system, in terms of varying power sources and infrastructure (IRENA, 2017). The Philippines depends heavily on coal-fired power generation, and its electricity costs are among the highest in Southeast Asia (Bertheau, 2020). Public electricity is available to only 65% of the population living in rural areas, while 3% of the urban population has no access to it (Bakhtyar et al., 2013).

Energy insecurity and limited electricity access are major problems in many of their islands, in which most small island grids are operated mainly by applying diesel generators for power supply (Roxas & Santiago, 2016). The government affirms the significance of developing RE to pursue climate change agendas and improve the quality of life, as noted in SDG 7 (Gupta & Vegelin, 2016). Moreover, sufficient electrification will provide significant additional value to the island communities, especially for water purification and cold storage (Bertheau, 2020). According to Mondal et al. (2018), the Philippines have a great RE prospect relevant to the supply of modern energy services and supporting overall energy security. Although the development of RE is important to support off-grid electrification in the islands (Surroop et al., 2018), high costs for submarine power cable interconnection (Kuang et al.,

2016), the existence of investors' hidden costs, and a slow bureaucracy allow a pretense for development of RE in these small and remote islands (Bertheau et al., 2020).

The Philippines has made significant progress in developing renewable energy in recent years, with a range of policies and incentives aimed at promoting clean energy sources, which would help decrease GHG emissions and consequently mitigate environmental vulnerabilities (Gulagi et al., 2021). In 2020, the total renewable energy in the country was approximately 21008GWh (IRENA, 2020). In 2020, 1 058MW of solar energy was generated, and 1370MW in 2021 (IRENA, 2020). In 2019, RE supply in the power mix was 32%, of which both geothermal and bioenergy contributed 48% each, hydropower 3%, and solar contributed only 1% (IRENA, 2020). Developing and utilising home-grown technology is imperative for the Philippines. RE is more expensive than conventional energy sources such as coal and oil. Thus, dependence on imported REs drives up the costs. Consequently, the country will continue to pay more as it relies on technology from abroad (Brahim, 2014). Without public sector funding and sponsorship of RE projects, the implementation costs are onerous. The credibility and capabilities of the industry and its players are essential for financial institutions to create new markets and investor partners for the clean energy paradigm (Bertheau et al., 2020). A comprehensive instrument and support system allows national governments to predict and address dynamic shifts in the energy market, including energy cost reductions and technological innovations. Nevertheless, this comprehensive strategy is missing in the Philippines at the moment (Mondal et al., 2018). Ideally, 100% RE is the solution for most off-grid electrification, which can result in high levels of autonomy and low operational costs. It may be achievable with a long-term investment identified by legislative and fiscal measures (Bertheau et al., 2020).

3.0 METHODOLOGY

This study used library research methodology by gathering data through studying and comprehending information from relevant resources. Two approaches were used, namely, conceptual theoretical discussion and statutory approach. The conceptual approach was used to interpret the existing concept of sustainable development and its relationship with RE development. The statutory approach is to review prevailing laws and regulations supporting RE development in these two jurisdictions toward achieving Sustainable Development Goals (SDGs). Legal resources used in this study include legal documents of international law and national law, such as legislation and regulations in Thailand and the Philippines.

Four Thai-related legislations were reviewed in this study, namely:

i. The National Energy Policy Act B.E. 2535 (1992);
ii. The Energy Industry Act B.E 2550 (2007);
iii. The Energy Conservation Promotion Act B.E. 2550 (2007);
iv. The Royal Decree on the Establishment of the Thailand Greenhouse Gas Management Organization (Public Organization) B.E. 2550 (2007).

In addition, another four related legislations in the Philippines were reviewed:

i. The Electric Power Industry Reform Act of 2001;
ii. The Biofuels Act of 2006;
iii. The Renewable Energy Act of 2008;
iv. The Energy Efficiency and Conservation Act of 2019.

4.0 ANALYSIS AND DISCUSSION

This part reviews RE laws and policies relating to the energy sector, particularly in supporting RE development in Thailand and the Philippines.

4.1 A Review of Renewable Energy Policies and Legislation in Thailand

Although electricity in Thailand is primarily generated from natural gas and approximately 20% is from coal, the Thai government is keen to develop renewable energy (RE) (Kumar, 2016). In fact, Thailand has a long history of developing RE policies. The Energy Conservation Program (ENCON), which commenced in 1992, provides various economic instruments to develop multiple RE sources through research and development (R&D), and technology advancement. Through this policy, the government set an ambitious target of RE ratio in the energy mix of about 30% and an emission reduction of 25% by 2036. Two years later, the Small and Very Small Power Purchase Agreements were launched as regulatory instruments for developing various RE sources, such as onshore wind, biomass, hydropower, and solar energy.

The Thai government also created a special project for hybrid systems in 2008 that granted solar thermal energy subsidies, which was subsequently suspended in 2011. A feed-in premium, specifically an Adder Program, was introduced in 2007 to incentivise RE development which emphasised biomass, wind, and solar energy, producers. Through their Renewable Energy Development Plan (REDP) 2008-2022 for the Period 2008–2022, the Thai Government projected that solar energy would contribute a quarter of the energy mix in 2022. To diversify RE generation, Thailand commenced a Biodiesel blending mandate in 2012.

Thailand was the first Southeast Asian country to implement the Feed-in Tariff (FiT) in 2002, while technology-specific RE premium tariffs were introduced in 2006, known as the Adder Program. The Adder program offered power producers a chance to sell electricity at a good price, with a long-term renewable energy power purchase agreement (REPPA) regulated by two regulations, namely the Very Small Power Producers (VSPP) regulations, and the Small Power Producers (SPP) regulations. With the latest FiT scheme, the National Energy Policy Council introduced a guaranteed tariff agreement for 20 years for all RE technologies except for landfill gas power.

The Thailand Integrated Energy Blueprint (TIEB) is a comprehensive framework for the development of the energy sector by 2036. Under TIEB, there are five independent plans that drive the whole energy in Thailand, as follow:

i. The Power Development Plan 2015–2036 (PDP);
ii. The Alternative Energy Development Plan 2015–2036 (AEDP);
iii. The Energy Efficiency Plan 2015–2036 (EEP);
iv. The Gas Plan 2015–2036;
v. The Oil Plan 2015–2036.

TIEB acknowledges the important role of RE to substitute fossil fuels and strengthen national energy security. The Thailand Alternative Energy Development Plan (AEDP 2015-2036) was implemented in 2015 to continue promoting various RE sources and uphold its aspirations. With the implementation of the new policy, the government projected a 20,000 MW, RE generation by 2036. Through the AEDP, Thailand perceived RE's potential for being a main future energy source and also as an opportunity to create a solid foundation for energy security. Among RE sources potential under this policy are waste-to-energy, biomass, biogas from waste and wastewater, biogas from plants, wind energy, solar energy, small as well as large-scale hydropower. The government's constant efforts to create a resilient and robust energy sector have been reflected through the launch of other strategic energy plans, such as the PDP and EEP. Under PDP, Thailand aims to enhance energy security through the expansion of coal power generation through clean coal technology, decreasing reliance on natural gas power generation, importing power from neighbouring nations, and developing RE.

To empower the community in RE development, the Ministry of Energy in 2013 launched a programme to promote community production of renewable energies. The objective of the study is to examine the community RE support scheme, CRE financial model, obstacles,

and main factors for success. The test project created a framework for communities to partially participate in their own CRE project (Chaichana et al., 2017). The Ministry of Energy contributed the remainder of the investment. By participating in a project, the members of the group will have a sense of ownership. The participants take good care of the project in this manner and are able to generate income. It was believed that the community helps to guarantee the effective administration of this RE project (Chaichana et al., 2017).

In the midst of regulating the power sector and RE development, in the absence of the Renewable Energy Act, there are principal statutes that regulate matters on energy and the RE sector in Thailand:

i. The National Energy Policy Act B.E. 2535 (1992);
ii. The Energy Industry Act B.E 2550 (2007);
iii. The Energy Conservation Promotion Act B.E. 2550 (2007);
iv. The Royal Decree on the Establishment of the Thailand Greenhouse Gas Management Organization (Public Organization) B.E. 2550 (2007).

The National Energy Policy Council Act B.E. 2535 (1992) mandates setting up the established National Energy Policy Council (NEPC) subject to Sections 5 and 6 of the Act. It further authorises the NEPC to advise the government on developing national energy policies, issuing regulations on energy prices, and monitoring the operations of all committees with authorities and duties related to energy, including government agencies, state enterprises, and the private sector. This Act was later amended in 2007 and again in 2008 as the National Energy Policy Council Act (No. 3), B.E. 2551 (2008). The Act is important for energy conservation and aiding the government in formulating energy policies and developing plans in Thailand.

The Energy Industry Act B.E 2550 (2007) extends its application to all conduct pertaining to the energy industry, except that related to the Petroleum industry. The Energy Regulatory Commission (ERC) was also established following Section 10 of the Act. According to Section 11, the commission is empowered to enact rules and regulations for electricity procurement and to impose a duty for the ERC to promote the efficient use of energy and RE deployment in the electricity sector. One of the significant provisions in the Act is that it mandates the establishment of the Power Development Plan under section 93, which is also used to support RE and green technology deployment. Section 97 of the Act further lists eligible activities entitled to the fund, including RE promotion. This Act is a comprehensive piece of legislation that not only established the ERC as the primary regulator of the electricity industry

but only provides guidelines for Thailand electricity generation, distribution and transmission. Nevertheless, this Act must be read with the Electricity Generating Authority of Thailand Act, B.E. 2511 (1968) permits the EGAT to disseminate regulations regarding the purchase of electricity from independent producers and the operation of the transmission system network.

The Energy Conservation Promotion Act (No. 2) B.E. 2550 (2007) was previously known as the Energy Conservation Promotion Act, B.E. 2535 (1992). Section 3 of the Act defined energy as "the capacity to do work embedded in the things that may produce work", while renewable energy includes "energy generated from wood, firewood, rice husk, bagasse, biomass, water, sunlight, geothermal, wind, and waves, etc." Chapter I of the Act enumerates provisions on energy conservation for factories, Chapter II details provisions on energy conservation for buildings, and Chapter III specifically talks about energy conservation for machines and equipment. Section 24 further deliberates on the Promotion Energy Conservation Fund to support measures taken pertaining to energy conservation, in line with Sections 25 and 26 of the same Act. Energy consumption in the country is regulated under this law which is aimed at limiting energy consumption in certain factories and buildings, which is seen as a good mechanism to promote energy efficiency and to reduce energy wastage as energy resources such as coal, natural gas and oil are exhaustible.

The Energy Development and Promotion Act B.E 2535 (1992) is a successor to the National Energy Act 1953. Section 5 of the Act provides similar interpretations to section 3 of the Energy Conservation Promotion Act, B.E. 2535 (1992). The Act also mandates several powers to the Department of Energy Development and Promotion by virtue of Section 6 to develop frameworks on energy transition towards new and RE for electricity generation, promote technology transfer, and conserve energy. Section 9 of the Act also dictates the power of the Department of Energy Development and Promotion to delegate certain undertakings to state agencies. Section 25 (1) of the Act, prohibits any production or expansion of energy production capacity without a license from the Department of Energy Development and Promotion. Section 25 (2) and Section 26 further augments considerations taken in granting such a license, including impacts on the economy, environment, and security, the hazard threats resulting from energy production or expansion, and experiences in exploiting natural resources.

In addition, two regulations have been issued under this Act, including the Sample of the Officer's Identity Card No. 1, B.E. 2539 (1996), and the Permission for Production or Expansion of Regulated Energy, No. 2, B.E. 2539 (1996). Last but not least, the Royal Decree on the Establishment of the Thailand Greenhouse Gas Management Organization (Public Organization) B.E. 2550 (2007) was extensively explicated in establishing the Thailand

Greenhouse Gas Management Organization. The Decree is not directly linked to RE; however, the objective behind the organisation's foundation is to support climate change mitigation measures and adopt the clean development mechanism according to the Kyoto Protocol as stated in Sections 3 and 7 of the Decree. Regardless, through a great commitment by the Thailand government and various laws and policies on energy, it was found that the current RE laws and policies are ineffective in curbing carbon emissions and promoting sustainable development. A study shows that emissions will gradually increase, despite the growing RE generation pattern, and that RE generation is projected to drop after 2040 (Kumar, 2016).

In the absence of a specific law on RE, the Energy Conservation Promotion Act (No. 2) B.E. 2550 (2007) covers matters related to energy efficiency (energy conservation) and RE sources generation, whereby priority is given to reducing energy intensity and developing RE technologies. The combination of energy efficiency measures with RE policies provides better outcomes in respect to economic, social, and environmental. The introduction of these laws and policies are to safeguard the reliability of energy supplies, reduce the dependency on conventional energy sources and subsequently reduce greenhouse gas emissions. Thus, the all-inclusive implementation of measures for energy efficiency and RE generation is vital for ensuring energy security and supporting environmental policy. Nevertheless, the existing legal framework could be too restrictive for businesses to expand and sustain energy security, without taking into account the impending changes that might occur in the future (Nakapreecha et al., 2021).

Similar to other countries, RE projects in Thailand also require environmental standards and impact assessment to prevent environmental degradation. Section 48 of the Environmental Conservation Act empowered the Ministry of Natural Resources and the Environment to request for an EIA report that must be submitted to the Office of Natural Resources and Environment Policy and Planning (ONEP) for approval. Licences and permits to commence such projects subject to state monitoring and environmental regulations, in which non-compliance with regulatory requirements will incur penalties.

The current state of the energy market at both domestic and international stages is continuously changing, refining the current energy need and other circumstances. Therefore, promulgating energy laws and policies can be challenging, as they can supposedly meet ambitious government targets. The laws and policies should solve various technological and economic challenges, especially concerning developing RE. Meanwhile, the Foreign Business Act B.E 2542 enacted by the King of Thailand according to Sections 29, 35, and 50 of the Thai Constitution has limited foreign ownership of certain Thai industries. Nevertheless, such

restriction imposed by the Act is not applicable to the Thai Board of Investment's (BOI) promoted projects. Notably, 100% of the shares may be held by foreigners. The BOI offers various investment promotions such as the exemption of corporate income tax for up to eight years and exemption from import duties on machines and raw materials. Moreover, any company promoted by the BOI is permitted to purchase and own land for the purpose of the project. The BOI also enables and grants permits for the employment of foreign professionals for the project.

Thailand, through TIEB, offers foreign investors enticing investment options that will support the growth of RE sources. The AEDP and the BOI also offer prospective investors a variety of alluring investment promotions with reference to RE projects. The vast investment promotions and incentives Thailand offers appealing investment prospects for foreign investors. In addition, the expansion of the power grid capacity will be vital for the success of the implementation of the energy policy. As the RE market expands, more RE technologies and equipment will emerge, and these new RE technologies will require specific measures to enable their access into the market. Therefore, continuing economic, financial, and legislative reforms are imperative to penetrate investment in the sector. Medium and long legislative targets are needed to support this energy transition. Moreover, investment in RE projects will entail not only legislation but also political stability.

4.2 A Review of Renewable Energy Policies and Legislation in the Philippines

The Philippines government has been working to utilise affordable indigenous resources, whereby the policy focuses on ensuring long-term energy security, reducing the generation cost, diversifying energy resources, and expanding a modernised and sustainable energy sector (Mondal et al., 2020). Previously, the Philippines' energy market was an integrated vertical monopoly, where the National Power Corporation managed its power generation, transmission, and distribution (Guild, 2019). The government has introduced the National Renewable Program (NREP) 2011–2030 to help foster development, encourage utilisation, and increase commercialisation of renewable energy resources. Some of the incentives include a zero per cent value-added tax rate on income and income tax holidays for 7 years for equipment and materials imports and carbon credits. According to this plan, the country aims to almost triple its RE capacity from 5,232 MW in 2010 to 15,000 MW by 2030, with solar energy supplying 284 MW (Ismail et al., 2015).

The Feed-in Tariff (FiT) scheme was adopted by the Energy Commission (ERC) in 2012 to increase private investment in RE sources. The FiT will give investors and power

producers an agreement prior to commitment, lessen the risk of business loss, and assist in financial advances (Ismail et al., 2015). Revenue concerns with FiT, short project-cap deadlines, and minimal caps for feed-in tariffs kept prices high. Nevertheless, FiT favoured short development and construction-cycle technologies such as solar and wind (Barroco & Herrera, 2019). Apart from FiT, Renewable portfolio standards (RPS) were also implemented under the RE Act. It mandated energy suppliers to put a specified percentage of their power supply from renewable resources like wind, solar, biomass, and geothermal into the supply mix. The implementation of RPS aims to provide 35% of the country's energy mix with REs by 2030 (Barroco & Herrera, 2019).

Other RE policies in the Philippines that are directly connected to the community or the end-user are the Green Energy Option Programme and Net Metering. The Green Energy Option gives end-users the option to choose RE resources as their energy sources, whilst Net Metering refers to a system in which the users of the distribution grid have a two-way connection to the grid, and are charged only for their net electricity consumption as well as credited with any overall contribution to the electricity grid (Peñarroyo, 2010). The transmission and distribution system called the National Transmission Corporation (TRANSCO) has provided connection facilities for RE-based power plants for both transmission and distribution. Furthermore, the development of the off-grid RE through the National Power Corporation Small Power Utilities Group (NPC-SPUG) delivers missionary electrification through a minimum percentage of generation as may be determined by the DOE (Peñarroyo, 2010). Furthermore, the development of the off-grid RE through the National Power Corporation Small Power Utilities Group (NPC-SPUG) delivers missionary electrification through a minimum percentage of generation as may be determined by the DOE (Peñarroyo, 2010).

In supporting the development of the Philippines' energy sector, several legal frameworks were enacted. The Electric Power Industry Reform Act (EPIRA) of 2001 stipulates the overall restructured regulatory framework for the country's electric power industry. The Act mandates the Energy Regulatory Commission to promote competition, encourage market development, ensure consumer choice, and penalise market power abuse in the restructured electricity industry. Among the objectives of the Act as stipulated in Section 2 are "To ensure and accelerate the total electrification of the country", "To ensure the quality, reliability, security, and affordability of the supply of electric power" and "To promote the utilisation of indigenous and new and RE resources in power generation to reduce dependence on imported energy". Section 8 concerns the establishment of a National Transmission Corporation, which is responsible for the planning, installation, and unified operation and maintenance of its high-

voltage transmission facilities, including grid interconnection and ancillary services. Through this reform, a larger role for IPPs was given to power generation. The IPPs generate the most power in the Philippines except for isolated and under-developed areas (Guild, 2019).

The Biofuels Act of 2006 encourages the use of biofuels as an initiative to reduce dependence on imported fuels with consideration to the conservation of public health, the environment, and natural ecosystems, in line with the sustainable economic development of the nation, which would increase livelihood opportunities. Biofuels in this Act include bioethanol, biodiesel, and other fuels produced from biomass. Through this Act, several measures are implemented by developing and exploiting indigenous renewable and sustainable sources to mitigate greenhouse gas (GHG) emissions, improve the community economy, and ensure the availability of alternative and renewable clean energy without prejudice to the country's natural environment biodiversity and food supplies.

The Renewable Energy Act of 2008 establishes the basis for advancing clean energy technology, RE, and the local energy market. It intends to boost the Philippines' independence from imported energy by utilising solar, wind, hydropower, and biomass. The law is anticipated to expedite the discovery and application of renewable resources and provide financial and non-financial fiscal resources available for this goal. The Renewable Energy Act of 2008 mandates establishing the FiT scheme that guaranteed a fixed rate per kWh for a given period. Under this law, the Department of Energy may enter into contracts with qualified RE developers for 25 years and could be renewed for another 25 years. Sections 13 and 17 of the law provide several incentives for RE, including income tax holidays and tax exemptions for the carbon credits, corporate income tax, accelerated depreciation, zero percent value-added tax (VAT) rate, cash incentive for missionary electrification, and realty tax cap on the cost of RE equipment. Additionally, the Act prioritises the procurement, grid connection, and transmission of electricity produced from renewable resources. It details the various concrete initiatives that must be implemented, such as a renewable portfolio standard requirement. Section 2 of Article XII of the Philippines Constitution allowed the State to exercise full control over the exploration and exploitation of natural resources including RE, whereby the state in a joint venture with its citizens or corporations with at least 60% of their capital owned by its citizen as per Section 16 of the RE Act 2008. However, in November 2022, the DOE amended the RE law to remove stipulations that required Filipino ownership of RE projects. Foreign investors can now own 100% of the equity in companies that explore and explore sources. The regulatory modification comes as the Philippines looks to draw in international capital to expand its renewable energy industry and achieve its long-term climate goals.

The latest legislation passed by the Parliament in 2019 is the Energy Efficiency and Conservation Act. The Act helps to consolidate energy efficiency and conservation initiatives in the country by governing energy-efficient technology in buildings. Through this legislation, programmes are formulated to enhance the energy security of the country in the view that fossil fuel sources are depleted and the cost imported fuels are expensive. Moreover, this initiative indirectly protects the environment and supports the economic and social development goals of the country. This law offers both fiscal and non-fiscal incentives to engage in energy efficiency and other best practices and programmes. The Inter-Agency Energy Efficiency and Conservation Committee was also set up to oversee the implementation of the Government's Energy Management Program, which aims to reduce electricity and fuel usage by the Government. Disparate from Thailand, the Philippines adopt two distinctive legislations for RE and energy efficiency. Despite the government's interest in the development of RE through the enactment of related laws, electricity generation in the Philippines still relies heavily on fossil fuels (La Viña et al., 2018). As insignificant deviations with respect to the share of fossil fuel generation in their energy portfolio and limited grid connectivity for power transmission, carbon emissions will continue to grow, and achieving targets under SDG 7 would be more difficult (La Viña et al., 2018). In addition, power grid connectivity will require significant investment due to grid instability and complexity, especially the location of the Philippines close to the typhoon belt and ring of fire with active volcanoes and frequent earthquakes. Stabil grid connectivity and access are vital particularly for solar PV and wind power transmission and distribution. Moreover, the Renewable Energy Act 2008 and the Energy Efficiency and Conservation Act 2019 should also address issues on energy storage, whereby it is beneficial to ensure energy security and reliability. Although the utilisation of RE is ideal to reduce greenhouse emissions caused by the energy sector, these two laws fail to address the concept of decarbonisation as a whole whereby they focus more on electricity generation than transportation.

Apart from energy laws, any RE project is subject to environmental regulations, including compliance with the Environmental Impact Assessment (EIA) and the Local Government Code. Through EIA, assessments are conducted to examine the potential of the RE project's significant effects on the environment. Although RE sources are more environment-friendly compared to fossil fuels, the commencement of such a project may cause some detrimental effects on the environment. Furthermore, one distinctive feature of the Philippines' energy sector is energy developers are required to ensure that the interests of all concerned parties in the renewable service area are respected under the Indigenous People's

Rights Act of 1997. The project should not overlap or impact an area where the people have given their prior and informed consent to the project. This legislation limits the state's right to dispose of public lands for activities including the construction of dams and RE technologies construction and installations which likely infringe on Indigenous People's ancestral domains in which their livelihood will be greatly affected.

Similar to Thailand, the Philippines' RE development is supported by several agencies. Department of Energy (DOE), which was established under Republic Act No. 7638, has been mandated to lead the implementation of the RE Act according to Section 5 of the Act. Among the important roles of DOE are establishing the Renewable Energy Market (REM) and Green Energy Options Programme (GEOP) for end users, promulgating the Renewable Portfolio Standard (RPS) and encouraging the adoption of waste-to-energy facilities. The RPS implementation in the Philippines is the same as in the United States which mandates electricity companies to derive an agreed portion of their energy supply from approved RE sources. Power producers must produce a specific percentage of their electricity from eligible RE sources. Provisions under the RE Act 2008 also mandate the establishment of the National Renewable Energy Board (NREB) for formulating the FiT system as in Section 27 and the Renewable Energy Management Bureau (REMB), which to develop, formulate and implement policies, plans, and programmes to accelerate the development, transformation, utilisation, and commercialisation of RE resources and technologies. Moreover, Section 10 of the Renewable Energy Act 2008 stipulates the role of the Energy Regulatory Commission (ERC) which is an independent quasi-judicial regulatory agency to establish net metering interconnection standards, in consultation with the NREB.

4.3 Overall Outlook on Renewable Energy Laws and Policies in Thailand and the Philippines towards Sustainable Development Goals

Based on the previous discussion, both Thailand and the Philippines are very committed to exploiting RE sources and increasing RE shares in their national energy mix. The governments have supported RE sectors by promulgating various laws, policies, and economic initiatives. Both have adopted Feed-in Tariff (FiT) system in their national laws and policies to catalyse the development of RE generation. The implementation of FiT has well-known for its advantages in terms of providing access to the national grid which is vital to ensure energy access for all. However, both countries, still have a long way to go and need to learn from developed countries. Kuramochi et al. (2021) explained that both Thailand and the Philippines have since taken steps to implement their commitments under the Paris Agreement to promote

renewable energy development, Thailand will achieve their targets accordingly but not the Philippines.

Generally, comprehensive laws and policies are only one aspect that contributes to the advancement in the RE sector. Governments' support and public awareness and acceptance are also critical to navigating the transition toward a cleaner and affordable energy sector. Moreover, they also need financial and technological support to fulfill their commitments towards carbon reduction made under the Paris Agreement. Again, the law and policies on RE need to be clear and comprehensive in order to penetrate investment and support technology transfer. The objectives of RE laws and policies should not be confined to diversifying RE sources and scaling up the power generation, but they should also address matters related to research and development (R&D), training and other legal assistance related to RE generation, in which generally will encourage investors to participate in RE sectors.

Since both countries are located near the equator, they have similar potential concerning the type of RE sources that can be exploited. However, there are compelling arguments for endorsing or rejecting RE tools in the national energy policy for both Thailand and the Philippines. Those who favour RE innovations stress that RE services are inevitable for a low environmental impact (Azhgaliyeva et al., 2020). Externalities relating to environmental degradation are limited since no fossil fuel is used to generate electricity, unlike traditional energy sources. Many scholars also contend that RE resources reduce energy production costs because only operating and maintenance costs are involved (Ngadiron & Radzi, 2016). In an era where the prices of fossil fuels are unpredictable, RE is the ultimate solution. For fast economic developing countries like Thailand and the Philippines, there is an increasing need for electricity for industry and households; hence, using RE services already available in both countries and upholding their international commitments towards sustainable energy production are ideal.

Critics of RE resources, on the other hand, refer to supply variability and the high expense of implementing RE technology (Diesendorf & Elliston, 2018). The supply of RE can be volatile or intermittent, while traditional energy sources can provide baseload electricity, especially in high-demand periods. Nevertheless, this argument will be void in the near future as new RE technologies are comparative in price and efficient in energy production. Though such resource blessings are knocking, it seems the policies and laws relating to RE in Thailand and the Philippines lack the strength to grapple with RE's benefits. Table 2 below shows the Regulatory Indicators for Sustainable Energy (RISE) by the World Bank. These indicators were used to evaluate efforts to provide energy access, energy efficiency, and RE in Thailand and

the Philippines in 2017. Thailand obtained perfect scores on energy access, while the Philippines led with respect to RE development, despite their limited electrification grid.

Table 2: Regulatory indicators for sustainable energy by the World Bank (Naimoli & Nakano, 2018)

	Energy access (%)	**Energy efficiency (%)**	**Renewable energy (%)**
Thailand	100	62.54	59.57
Philippines	82.24	42.23	66.57

Despite progress in the development of renewable energy in Thailand, there are several barriers faced by the country in accelerating RE development. Although Thailand has a well-established electric power grid infrastructure providing universal access to electricity, not all power grid infrastructure is not fully equipped to handle the intermittent nature of some RE sources. This can lead to issues with grid stability and reliability, making it more difficult to integrate renewable energy into the grid (Huang et al., 2019) especially the wind energy. Besides, the upfront costs of developing RE projects can be high compared to conventional energy. While there are incentives available to support RE development in Thailand, some investors may still be hesitant to take on the high initial investment costs especially when the economic structure has not yet been completely driven by innovative technology coupled with long-term societal issues such as poverty and income inequality (Nakapreecha et al., 2021). It is hoped that growing foreign investment in the RE sector will boost RE generation in the country. Moreover, developing RE projects often require significant land use, which can be challenging in populated areas and to the ecosystem. For instance, the project initiated by Thailand and Laos, the Monsoon Wind Farm project near the Mekong River in southern Laos. Although no evidence showing any interruption to the environment or livelihood of the community, the process of clearing the ground and removing all vegetation for the wind farm causes soil erosion (Pratiwi & Juerges, 2020). Emissions of greenhouse gases may also increase due to indirect land use changes for the production of biofuels. It is believed that the biofuel manufacturing process has a higher potential for causing global warming than carbon sequestration (Kumar et al., 2013) and based on a study on the greenhouse gas performance of bioethanol in Thailand, land use changes from grassland to cassava plantation results in higher emissions (Pratiwi & Juerges, 2020).

The Philippines faces several challenges in developing RE. While the Philippines has introduced policies and incentives to promote RE, the regulatory framework is complex and creates uncertainty for investors and developers and makes it more challenging to bring RE projects to fruition (Bertheau et al., 2020). The costs of RE are still higher than traditional fossil fuels which makes it more difficult for RE to compete in the market, especially when subsidies and incentives are limited (Gulagi et al., 2021). As of November 2022, the government has removed the requirement for Filipino equity in RE-related companies, more foreign investment will be penetrated into the Philippines RE industry and simultaneously lead to cost competitiveness of such energy. Moreover, The Philippines' grid infrastructure can be a constraint for renewable energy development. The country's grid is relatively small and fragmented, which can make it difficult to integrate large amounts of RE into the system (Gulagi et al., 2021; Bertheau et al., 2020). In addition, financing is a key challenge for RE projects in the Philippines. Despite incentives and policies to support renewable energy development, securing financing for projects can be difficult due to factors such as high upfront costs and perceived risks (Barroco & Herrera, 2019; Pan et al., 2019).

Natural gas and crude oil are still the main energy sources for electricity production in Thailand. The Thailand Integrated Energy Blueprint (TIEB) has benefited the entire country by saving money on imported energy and lowering the use of imported energy. In recent years, the amount of RE available has also increased due to the implementation of the Alternative Energy Development Plan. The increase in RE shares in the energy mix reflects the nation's growing awareness of energy insecurity and climate change impacts. On top of that, less dependency on fossil fuels means a rise in RE as a possible option as well as improving the energy supply in Thailand. In the near future, the Philippines face a tight supply of electricity, rising demand, and a lack of new-generation energy. Coal is also the most widely used source of electricity as it is cheaper, easier to store and has more operational flexibility compared to RE (Shahzad et al., 2021). However, this imported resource led to a higher cost of electricity and also the biggest sources of carbon dioxide emissions (La Viña et al., 2018). Through initiatives on RE have been in place precisely to reduce electricity costs and reduce reliance on imported power, the Philippines is currently lagging behind its neighbours in penetrating the RE market (Kuramochi et al., 2021). RE production continues to be daunting, given the various and often contradictory regulatory barriers, and as a result, project financing can be difficult to meet.

Undeniably ineffective legal frameworks and limited technology could hamper the development of the low-carbon energy infrastructure and efforts to reach sustainable

development in Thailand and the Philippines. Thailand and the Philippines are yet to achieve their NDC following the Paris Agreement in respect to the utilisation of RE. An effective breakthrough is indispensable to support the development of the RE sector, especially for the power sector alongside the cooperation of the stakeholders at all levels. For countries to achieve SDG 7, effective implementation of the relevant legal framework on RE is required, inclusive of regulations pertaining to financial support, technology transfer and experience exchange. The importance of the development of RE technologies as an alternative to conventional ones has been well recognized by almost all countries. However, although adequate regulations at the national level support for RE sector, if they are not properly implemented, the relevant RE targets will not be achieved.

5.0 RECOMMENDATION

Although RE sources help to reduce greenhouse gas emissions and both countries have declared goals and priorities to support the RE sector, significant progress in this energy transition has not yet been accomplished. Nevertheless, several factors, including the country's rising economy, lucrative fiscal and non-fiscal incentives, and the wealth of available renewable resources, combine to make Thailand and the Philippines attractive destinations for developing RE projects. Population expansion, rapid economic growth, and energy security policies will also coincide as RE is expanded. The reduction of carbon emissions from RE utilisation will play a crucial role in the transition towards a low-carbon society in Southeast Asia, particularly in Thailand, and the Philippines. Hence, we forward the following suggestions:

a) Although RE technology has been categorised as expensive, recent data shows that the cost of RE technologies is decreasing rapidly (Diesendorf & Elliston, 2018). The localisation of renewable technology can make RE energy sources more lucrative than traditional energy sources. Given the price trends, both countries' governments should reconsider the incentive schemes, for example, a review of the FiT rates. Apart from that, other instruments such as renewable energy auctions could also be applied to support existing mechanisms. For instance, renewable energy auctions are beneficial to reduce cost through competitive prices offered by power producers and it also allows for speedy project execution.
b) The laws and policies relating to RE should also uphold the objectives and plans to induce foreign investments for proper acceleration, exploration, and development of RE sources. The bureaucratic administrative structure must be reformed from licensing to production, and one-stop services must be introduced. Currently, both countries are depending on FiT to catalyse the development of RE generation. The implementation of the FiT system, in the long run, maybe less beneficial to encourage foreign investment.
c) Governments should regularly review their RE laws and regulations with a participatory process of the stakeholders. It will help the government to understand the positive and negative impacts on the RE market. Moreover, self-generated power such as solar PV by domestic users should be widely promoted through Net Energy Metering. This initiative not only supports increasing the RE shares but also helps to achieve 100% of clean and affordable energy access as stipulated in SDG 7. Public acceptance of RE is an important factor for RE development. More campaigns and programmes should be embarked on to circulate information and to raise the public's awareness on reducing the dependency on fossil fuel as well as the advantages of RE.
d) With the advancement of RE technologies and commitment towards international agreement related to climate change and sustainable development, the policy implementation should be regularly reviewed, and realistic targets should be formulated with the adoption of medium and long-term targets.

6.0 CONCLUSION

Thailand and the Philippines are facing rapid economic growth, which will see an increase in domestic energy demand. With the pattern of increasing energy demand, the challenges of energy security are expected. Both countries have enacted laws and policies to attract and

encourage investors to invest in the RE sector, which will pave the way for the expansion of the sector. These laws are highly significant to support rural electrification, especially in the Philippines' islands, and support access to energy for all in line with SDG 7. However, the law needs to be tailored in line with the SDGs' spirit. Notably, the lack of access to energy and electricity may hamper a country's economic development. Therefore, access to energy could improve RE development through the implementation of SDG 7.

While Thailand and the Philippines have made progress in promoting renewable energy development, there are still challenges that need to be addressed to accelerate the growth of the sector. Continued policy support, as well as investment in grid infrastructure and financing mechanisms, will be key to achieving the country's renewable energy targets and transitioning to a low-carbon economy. The establishment of various government agencies has also led to significant developments in the RE sector. However, essential factors, including RE policies, technologies, manufacturers, electricity systems, and markets, must be present to rapidly ramp up RE development. Establishing a cooperative framework to foster an increase in RE technology, policy, and programs in these countries is critical to fully unlocking their RE potential and promoting a robust energy sector.

Both countries also have taken steps to implement their commitments under the Paris Agreement, including the development of policies and measures to promote renewable energy development, increase energy efficiency, and reduce greenhouse gas emissions. The Paris Agreement has indicated that gas emissions in the atmosphere could also be reduced significantly through maximum exploitation of RE. Access to energy and electricity is currently the world's prime agenda as enumerated in SDG 7, but access to clean energy is indispensable to safeguard the ecosystem, including the climate. Thailand, the Philippines, and other countries in the region are committed to the SDG, and they have been working hard to ensure access to affordable, reliable, sustainable, and modern energy for all, primarily through promoting different means of RE sources. The energy cooperation among regional countries appears to be more promising as they have initiated various policy instruments to support RE development as well as joint research and development in the RE sector with other industrialised countries. With grid reliability and effective resource management, there is enormous room for regional cooperation in Southeast Asia, which could potentially reduce the risks of energy insecurity.

Nevertheless, undeniably laws and policies are critical in accelerating the development and advancement of RE, and, the gaps between the implementation of policies and putting in place the related mechanisms needs to be addressed. Laws and policies play a substantial role

to accelerate the development of RE technologies and increase RE share in the country's energy portfolio. Diversity and effective financial and economic instruments are necessary to promote a wide range of RE technologies as well as enhance the competitiveness of the energy market by offering cheaper RE technologies. The constant reduction in utilising fossil fuels sources and unwavering commitment to reducing GHG emissions will navigate these countries to contemplate more sustainable policies for their energy sector.

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