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Challenges and Strategies in Financing Renewable Energy Projects in Malaysia: A Review

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Abstract
Purpose: The purpose of this study is to highlight the challenges, strategies and recommendation in financing the renewable energy projects in Malaysia.
Design/methodology/approach: The review of research and articles starting from identifying the definitions, findings and conclusions of the research papers covering renewable energy in Malaysia and international including the current statistics and status of renewable energy around the world including Malaysia. Topics that developed specifically for the conceptual review on renewable energy are broadly reviewed including the definitions, purpose, barriers, problems, challenges, principles, policies, strategies and recommendation.
Findings: The main challenges in financing RE is the high initial cost of investment which in turn give the investors to refuse and reluctant to invest in RE. The changes in policies and lack of government initiatives also become as the challenges in RE development. The current

COVID-19 pandemic faced worldwide become as the factor for RE sector to develop rapidly. The government initiatives and measure, support from the financial institution and private investors as well as the cooperation from producer is very crucial in ensuring the success of RE projects and to have better environment in the future.
Research limitations/implications: This paper only review and discusses on the challenges, strategies and recommendation on financing RE projects in Malaysia. Quantitative future research can be conducted to provide more fruitful findings to improve the literatures.
Practical implications: This study will help the participants from industry, for example, project developers, technology and product inventors, investors, and policy makers to enhance their knowledge and understanding on the challenges faced and strategies to be adopted in financing RE projects. This study also will encourage these participants to cooperate and collaborate to improve the current structure and policies in Malaysia. This will in turn encourage the new development of policy to support the RE development in Malaysia.
Originality/value: The growing concerns of the climate change impact has created the awareness and motivates the people worldwide to seek for supply energy and employing new measures to reduce the greenhouse gas emissions and other environmental impacts. The growing demand for clean energy has contributed to raising demand in RE sectors. Thus, this study highlighted the challenges in financing the RE projects as well the recommendation to improve the RE projects.
Paper type: Literature review

Keywords: Renewable energy, Renewable energy financing, Malaysian economy

Introduction

The growing concerns of the climate change impact has created the awareness and motivates the people worldwide to seek for supply energy and employing new measures to reduce the greenhouse gas emissions and other environmental impacts. A statistic by United Nations (UN) shows that by 2050, the world's population will reach to 9.7 billion (United Nation, 2015), hence will increase the demand for energy supply. Dawson (2015) emphasised on the importance of energy resources as it became as an essential element of human's daily life and is crucial among various sectors such as residential users, commercial and transportation users, where 40% of energy produced globally was consumed by residential users. One of the major energy policy strategies employed in many countries worldwide is the application of Renewable Energy (RE) resources. To date, around 15-20% of the total world's energy is contributed by different types of RE resources such as biomass, hydropower, solar, wind, biofuel, geothermal, ocean energy and others (Kumar, 2020). Thus, it is very important to focus on RE technologies to cater the increasing need for energy resources (Imteyaz &Tahir, 2019; Ou et al., 2018; Perlaviciute & Steg, 2014). The use of RE will help to mitigate the climate change and decrease other environmental impacts, contribute to easy access to energy and enhance the development of social and economic (Panwar et al., 2011).

To ensure the success of RE, a huge volume of investment and capital will be needed (Hall et al., 2017). IRENA (2020) found that there is a significant progress in the global investment of RE, with cumulative of USD 1.8 trillion invested between the year 2013 to 2018. This improvement arose because of the reduction in installation costs resulting from technology advancements and the application of procurement mechanisms to changing market conditions. Between the year 2013 to 2018, the major capital provider for RE was the private sector which represents 86% of investments while project developers contributed 46% of private finance, followed by commercial financial institutions at 22% globally (IRENA, 2020). However, findings by IRENA (2020) shows 34% decrease in RE investment in the first half of 2020 as compared to the same period in 2019 due to the COVID-19 Pandemic.

The Malaysian Government has set the target to attain a higher infiltration of RE in the Malaysian energy mix. Currently, RE contributes to 18% of Malaysia's energy mix that is led by hydropower technologies, which represents 86% of renewable capacity (Sivaprasad & Kumbhare, 2021). To pave the way towards a more sustainable and green future, in 2018, Malaysian Government has announced a target to achieve 20% of RE, excluding hydropower by 2025 (Sivaprasad & Kumbhare, 2021). To achieve this target, Malaysia will need the estimated of RM33 billion worth of investment in its RE sector, which the sources are expected to come from both the government and public-private partnerships and private financing (GlobalData Energy, 2019). The current energy mix for Malaysia power generation is mainly provided by natural gas and coal (Wan Abdullah et. al, 2019). To encourage the development of RE, Malaysian government has developed a lot of initiatives, among others, the introduction of Fit in Tariff (FiT) program to promote RE usage starting from year 2011 (Ahmad et. al, 2011). Even though the total expenditures involving RE production have been declined substantially in recent years because of technological advancements (IRENA, 2019a), investors are hesitant to make investment in RE and bear the investment risk because of the huge amount of fund needed and changes in policies associated with RE. Thus, financing the RE development projects in this 21st century became as debatably one of the greatest challenges.

This study is conducted to highlight the challenges, strategies and recommendation in financing the RE projects in Malaysia. Even though many research have been done relating to RE financing in Malaysia, these research were either focus or discuss only on a specific policy, challenges, and awareness. Therefore, this paper will fill in this gap by discussing the challenges in financing RE projects, including the impact of COVID-19 pandemic towards RE development, followed by strategies and recommendation to enhance the RE development. RE financing strategies and recommendation then is discussed to enhance RE financing and development in Malaysia. This study will help the participants in the industry such as product innovators, project developers, financiers, technology and policy makers to enhance and improve their understanding on the challenges faced and strategies to be adopted in financing RE projects. This study also will encourage these participants to collaborate together and cooperate in improving the existing structure or policies as well as encourage the introduction of new policy structures and frameworks towards RE development in Malaysia.

Literature Review

RE in Malaysia

RE in Malaysia has started since the year 1980 as Malaysia initiated the Four Fuel Diversification Strategy with the objective of balancing the consumptions of energy mix such as gas, oil, hydro and coal. (Wan Abdullah et al., 2019). Typically, Malaysia has relied on the traditional power generation, such as hydropower, coal and natural gas (Daut et al., 2011). Hence, the government is very dedicated to move forward towards increasing the power generation from RE sources (Daut et al., 2011; Mekhilef et al., 2014; Subramaniam et al. 2018) including solar power, wind, biomass, biogas, Battery Energy Storage Systems (BESSs) and Virtual Power Plant (VPPs) (Eusoff, 2018). Figure 1 below shows the primary energy supply in Malaysia from the year 2000 to 2018.

Figure 1 below shows the main energy supply in Malaysia that comes from natural gas, followed by biogas and energy from coal and coke. As stated by Wan Abdullah et al. (2019), the Malaysia power generation energy mix is mainly supplied by natural gas and coal. According to U.S. Energy Information Administration (EIA, 2021), in 2019, Malaysia has become as the second-largest oil and natural gas producer in Southeast Asia and was placed as the fifth largest exporter of liquefied natural gas (LNG) in the world. Coal is the cheapest type of fossil fuel and is the largest power generation source in peninsular Malaysia (Wan Abdullah et al., 2019).

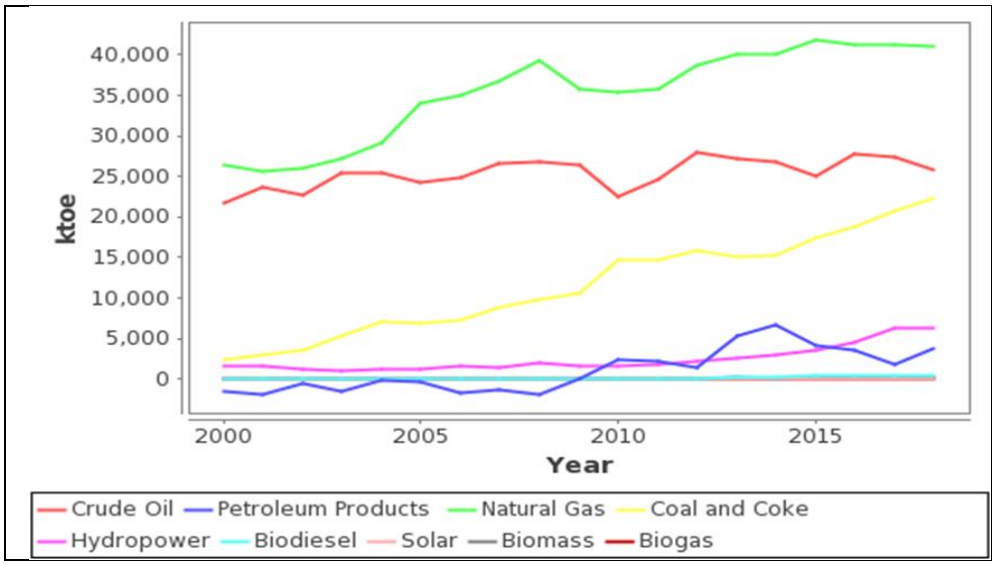

Figure 1: Primary Energy Supply, 2000-2018 *(Source: Energy Commission, 2021)*

With this regard, Malaysia has taken proactive actions to diversify its energy mix and is very committed to move towards RE by introducing the policies related to RE and climate change such as Renewable Energy Act (2011), National Green Technology Policy (2009), National Renewable Energy Policy and Action Plan (2009) and National Policy on Climate Change (2009) to tackle the depletion of natural resources and environmental deprivation problems (Yatim et al., 2017). To reduce the greenhouse emissions and increase the power fuel mix, Malaysian Government also has set its target to attain 20% of RE in the energy mix by the year 2025. In May 2020, the government have launched the fourth round of the Large-Scale Solar PV (LSSPV) tender for 1 gigawatt (GW) to improve the solar energy development, especially from the local market players (EIA, 2021). The development of these policies and initiatives shows that the Malaysian government has committed in implementing RE in the country (Fathima & Palanisamy, 2018; Maulud & Saidi, 2012).

RE Financing in Malaysia: Current State

To date, Malaysia was ranked 12th in the World Bank's Ease of Doing Business index. This qualification has proved that Malaysia is broadly welcoming the foreign investment and multinational companies to Malaysia (Sivaprasad & Kumbhare, 2021). Hence, Malaysia's encouraging environment for potential investors and operators will create the encouraging future of RE adoption and as a result will offer a wide-ranging benefit for the nation. The growing demands for RE technologies will also provide the chances for countries to create new industries and markets and strengthen the industrial policy and macroeconomic goals (Yatim et al., 2017). Thus, the long-term commitment from all stakeholders involved in the green growth projects is crucial to ensure the effectiveness and successfulness of RE projects. This includes an easy access to financing facilities for RE through fiscal and financial support (Yatim et al., 2017).

Undoubtedly, the government assistance in financing and funding the RE projects development are essential at the initial stage of the projects. However, substantial amount of private sectors financing, funding assistance from capital markets and financial institutions also equally crucial for RE to commercially obtain new ideas and produce clean technologies (Croce et al., 2011). Financing RE projects not only require a large initial investment but also subjected to many risks such as liquidity risk, operational and regulatory risks, market risk and credit risk

(Lee & Zhong, 2015). Findings by IRENA (2020) shows that between the year 2013 to 2018, on average, 86% of total investment in RE projects was finance by private sectors, equivalent to annual commitments of USD 257 billion as compared to public finance which shows an average of USD 44 billion annually in the same period.

The introduction of Green Technology Financing Scheme (GTFS) by Malaysian Green Technology Corporation (Green Tech Malaysia), The Renewable Energy Act (2011) and the feed-in-tariff mechanism also became as a valuable contribution towards the development of the local RE projects in Malaysia (Ibrahim et al., 2016). To ensure continuous supports towards Green Technology projects, including RE, Malaysia's Ministry of Finance has agreed to the recommendation projected by Ministry of Energy, Science, Technology, Environment and Climate Change (MESTECC), to issue GTFS 2.0 scheme that was enhanced and improvised from previous GTFS which was first introduced back in 2010, worth of RM 2.0 billion for the period of January 2019 until the end of 2020 (Green Tech Malaysia, 2021). GTFS 2.0 offer a financial support to the Producer, User and Energy Services Companies (ESCOs) which subject to only to the green technology/component cost finance by Participating Financial Institutions (PFIs). GTFS 2.0 also offer a 2% interest/profit rate subsidy for the first seven years with 60% government guarantee on the financing (Green Tech Malaysia, 2021). GTFS 2.0 offers the financial support for six sectors namely energy, water, building and township, transport, waste and manufacturing. To encourage the development of RE, along with the Renewable Energy Act 2011, Malaysian government has introduced a Fit in Tariff (FiT) program to promote RE usage starting from year 2011 (Ahmad et al., 2011), net energy metering (NEM), large-scale solar (LSS) and self-consumption (SELCO) (Shinde & Skowron, 2021).

Methods

This study is conducted to highlight the challenges, strategies and recommendation in financing the RE projects in Malaysia. Even though many research have been done relating to RE financing in Malaysia, these research were either focus or discuss only on a specific policy, challenges, and awareness. Therefore, this paper will fill in this gap by discussing the challenges in financing RE projects, including the impact of COVID-19 pandemic towards RE development, followed by strategies and recommendation to enhance the RE development.. The review of sources started from identifying the definitions, findings and conclusions of the research papers covering RE in Malaysia and international including the current statistics and status of RE around the world including Malaysia. Topics that developed specifically for the conceptual review on RE are broadly reviewed including the definitions, purpose, barriers, problems, challenges, principles, policies, strategies and recommendation. The impact of COVID-19 on RE is also discussed in this paper to show the future development and strategies to continue financing RE in Malaysia.

Discussion and Conclusion

Challenges in Financing RE in Malaysia

This section discusses the challenges in financing the RE projects covering the financial, political, social challenges and challenges on COVID-19 pandemic.

Financial Challenges

Financial challenges can be related to the difficulty in raising the sources of funds in financing the RE projects contributed by the high costs of capital. As the government assistance in financing and funding the RE projects development are essential to projects development, the current government financing plans will not be able to meet the investments costs. A large

amount of initial cost to invest in RE and lack of available support mechanisms have made the RE technology as unappealing (Yusoff & Kardooni, 2012). This is because, financial returns will remain as the major focus for most of the RE investors (Antonenko & Smith, 2021). Even though the number of approved and certified projects was increase by the years in Malaysia, but these projects were unable to receive sufficient amount of financing assistance especially from the capital market and financial institutions as a result of high investment risks (Yatim et al., 2017). These financial institutions and capital markets also typically will impose a stricter investment and financing agreement and policies to reduce these risks and as a result will increase the financing cost that is higher than government financing schemes (Yatim et al., 2017). Further, even though the potential benefits of energy efficiency projects are well documented, the absence of commercially viable business opportunity also become as the challenges towards RE development (Pascual, 2021).

As deploying RE projects needs an enormous initial investment, the cost of capital contributes to a major part of the lifecycle costs of RE projects (Steffen, 2020). Egli et al. (2018) in their study of solar photovoltaics (PV) found that the cost of capital comprised of 12–37% of the levelised cost of electricity (LCOE) in Germany. Another study by Schmidt (2014) revealed that the cost of capital can approximately contributed by fifty percent of the LCOE for solar PV in developing countries such as India or Brazil. Meanwhile, Borenstein (2012) documented how solar PV generation expense changes vastly based on the expected rate of interest. In contrast, Schmidt (2014) discovered that for fossil fuel-based power generation, which majority of the lifecycle costs are fuel expenditures is less affected by its cost of capital as it does not have to be financed up front. Moreover, the low level of exposure and insufficient knowledge, understanding and experience regarding RE among the financial institutions and investors also contribute to small involvement of national financiers (Yusoff & Kardooni, 2012), as they have insufficient capacity to evaluate the RE projects (Yatim et al., 2017). As a result, the cost of financing the RE projects will increase as the contribution is needed from foreign investors, thus increase the investment risk.

Political Challenges

Since the RE transition and development is fundamentally a political struggle, the attempts to move to RE will need a very confronting and challenging dominant systems of energy power (Burke & Stephens, 2018). Assessing the political challenges is becoming as an important step in RE investment decision making process. This is because, most of the countries have a fast development and changing in regulations such as in wind and solar projects (Burke & Stephens, 2018). An unclear or changing regulations, lack of grid capacity and protracted land acquisition process becomes as barriers towards clean energy development (Pascual, 2021). Additionally, Burke and Stephens (2018) also emphasised on the strength of democratic practices in a country by extending democratisation of energy systems across all components, stages and end-users as well as improving positions in relation to main pressures of capitalism and market ideology that will benefit RE futures. A supportive political environment is very important in ensuring the success of RE projects as it can encourage and enhance a more practical regulations related to RE (Yusoff & Kardooni, 2012). The absence of supportive political environment will lead to unstandardised guideline and demotivate RE development. Yusoff and Kardooni (2012) further added that if the support from political environment is not available, no lower level of regulation can be established.

Lack of cooperation among the organisations in RE policy implementation also becomes as main challenge in developing RE projects. Typically, large investors and governments tend to make decisions based on old perspectives because they are not aware regarding the changes in the market relating to RE sectors (UNESCAP, 2021), which resulted in the postponements of more opportunities for RE to enter the market. For instance, even though the prices of PV have

declined drastically through the time, but the policies are made based on past prices. Thus, because of this price unawareness, the conventional energy projects may have the priority as compared to solar energy projects (Sgouridis et al., 2016).

Other challenges in development of RE projects is lack of attention by the government in terms of maintenance of RE buildings which in the long run will incurred more repair costs (Yusoff & Kardooni, 2012). This high maintenance cost with the addition of long delays in authorisation and lack of standardised access conditions (Yusoff & Kardooni, 2012), make it difficult to achieve RE targets and can influence RE policy in Malaysia. These, at the end will increase the political risks and cause the inventors to refuse to invest in RE projects. Further discussion by Yusoff and Kardooni (2012) reveals the administrative challenges to achieve effective RE in Malaysia such as a lack of prevailing execution of RE policy in Malaysian Development Plan, lack of coordination among the involved authorities and lack of RE specialists among decision makers which lead to unawareness of the features, contributions and benefits of RE. Furthermore, the current instability of political events in Malaysia, the increasing division of political parties, and COVID-19 outbreak that cause a slowdown in economic activities are projected to substantially raise the uncertainty level of the political landscape in Malaysia. As the consequences, these factors may contribute to a more complex business environment for international companies operating in Malaysia (EIA, 2021).

Social challenges

A country economic stability can be achieved when the societies consume the natural and human resources effectively. In fact, the socioeconomics situations of a society will have the effect on the energy consumption of the individual (Khan et al., 2019). The high-income family will have more resources to invest extra capital in clean energy, but the lower income family will not have the opportunity to do so. In this regard, the financial condition of the societies who have limited amount of fund and capital is one of the main challenges for them to invest in clean energy, which discourage the RE development projects (Kowalska-Pyzalska, 2018). Thus, economic stability and income stability need to be achieved first to enhance the RE consumption among the societies. As for instance, China, that has achieved recent economic growth becomes as the leading country in the world in employing RE potential (IRENA, 2019b). Thus, all the parties involved in RE projects, such as researchers, investors and policy makers must integrate the socio-economic elements in decision making process (Van Der Kroon et al., 2013).

Yusoff and Kardooni (2012) found that among the social challenges that have impact on the development of RE projects in Malaysia are lack of public awareness on RE technologies and benefits, the public dependency on fuel sources, lack of awareness on the environmental and social impact of non-renewable energy sources and perception of unrealistically high costs of RE. Meanwhile, Alam et al. (2016) in their study on RE development in Malaysia, found that limited access to RE information and the level of interest and awareness on RE become as the major challenges towards achieving effective RE development in Malaysia. Furthermore, investment in RE projects will require a huge investment in purchasing the land, particularly for the large projects, for instance the large scale solar and large hydro which in turn will affect the surrounding society and environment (Wan Abdullah et al., 2019).

According to Geels et al. (2017), most of traditional producers in energy have critically condemned the usage of RE and describe it as expensive and volatile. Other studies from Harjanne and Korhonen (2019) argued the feasibility of RE capacities to meet the world's energy demand. These arguments and critics have influenced the public perception on the dependability, safety and affordability of RE sources (Diesendorf & Elliston, 2018). According to Melovic and Cirovic (2020), financial incentives are useless when there is lack of public awareness and understanding in RE. This is because, the people will have the intention to invest

in something when they are clear on the benefits that they will obtain. The study conducted by Enevoldsen and Sovacool (2016) reveals that the absence of support from the publics contributes to lack of participation from both individuals and government in RE projects. Thus, additional benefits and advantages of RE should be promoted to the public to achieve RE development goals.

Impacts of COVID-19 Pandemic

The report by World Trade Organisation (WTO) showed a world trade slump in 2019 and with the global pandemic crisis in 2020, it is expected that the global financial crisis becomes worst (WTO, 2020). WTO has projected that major economies will lose around 2.4 to 3.0 percent of their gross domestic product (GDP) during 2020 due to the COVID-19 pandemic (WTO, 2020). The businesses around the world will struggle financially because of revenue decreasing and high level of uncertainty (Donthu & Gustafsson, 2020). The businesses worldwide also forced to rapidly run in newer and more flexible ways in respond to new challenges introduced by the pandemic such as testing businesses' flexibility as they attempt to lay a foundation for the future (Ivanov, 2020). COVID-19 pandemic affected most businesses around the world, causing a looming global recession, with countries suffering a sudden fall in national gross domestic product (GDP), income and employment levels (Pascual, 2021). To protect the people, governments around the world have introduced various relief packages and fiscal incentives to decrease the economic distraction.

The COVID-19 pandemic also badly affected the RE industry as many projects were delayed or halted altogether (Shinde & Skowron, 2021). A study by International Energy Agency (IEA) estimates that the COVID-19 pandemic will reduce in at least a 5% decrease in global energy demand (ADB, 2021). This pandemic has resulted significant hitches in the RE sector, such as delays in the supply chain, problems in tax stock markets and the risk of not being able to benefit from government incentives (Eroglu, 2020). The effect of COVID-19 pandemic on RE can be seen from the closure of a wind power plant in North Dakota (Frangoul, 2020) and LM Wind Power and Siemens Gamesa in Spain that have decided to stop their wind turbine blade plant production (McPhee, 2020).

The massive lockdowns in response to the COVID-19 pandemic has not only impact the economic but also increase the investment risks and policy risks in RE which has raised the concern among the developers and investors. The existing policies' amendments, the existing incentives' elimination, the availability of supporting framework and changes in public opinion are among the challenges faced by RE sectors due to COVID-19 pandemic (Monasterolo et al., 2020). Furthermore, the decrease in demand in energy during this pandemic may possibly reduce the investors' motivation to participate and contribute their fund in new RE projects and slow down the previously achieved progress (Bertram et al., 2021; Santiago et al., 2021). It also lead to significant losses for both RE producers and conventional (Waldholz, 2020). In the year 2019, for example, some EU countries were on the edge of not being able to meet their targets because lack of hostile policy from the government to aid the RE projects (Stern et al., 2020).

However, Pascual (2021) documented that the transition to clean energy did not come to end. A study conducted by Ernst and Young (EY) on clean energy projects found that, to date, more than 800 projects with a potential total investment of more than US$316 billion was taken by the countries in Thailand, Vietnam, Japan, Indonesia, Taiwan, Philippines, Malaysia, and South Korea which 75% share of projects focused on RE (Pascual, 2021). Pascual (2021) further revealed that the private sectors are ready to invest a large amount of fund in clean energy, including RE. For instance, during COVID-19 pandemic, Myanmar and Malaysia have obtained huge responsibilities from developers of solar energy through tender processes (Pascual, 2021).

Strategies and Recommendation to Encourage RE in Malaysia

The accessibility and availability of financial sources become as the main factor in RE projects (Krupa et al., 2019). Before making the decision to contribute the funds in RE projects, the investors are typically will consider and access the investment risks and returns (Polzin et al., 2019). Therefore, the energy financing literature is needed to enhance the stakeholders understanding (Zhang and Ji, 2019) on the energy financial markets. This will help the investors to conduct details analysis on the risk and returns from the investment and enable them to eliminate several risks by selecting the right investment strategy. Furthermore, government assistance in research and development (R&D) of RE projects is also important since R&D typically involved a high risk (Fernandes et al., 2016). Thus, R&D assistance would be the main agenda for countries who seek to move to RE, especially the countries who have lack of expertise or knowledge regarding RE (Zhao et al., 2016).

On the other hand, the roles of government in formulating the policy are very important. The success of RE projects can be achieved if the government and regulatory authorities develop applicable and standardise policy concerning all parties affected including the small medium size producers and public. Further, certification and standard testing for small size producers could encourage the RE market (Zhang & Ji, 2019). Based on BP's Statistical Review of World Energy 2021, the COVID-19 pandemic had a remarkable impact on energy markets. The primary energy and carbon emissions sinking at their quickest rates since the Second World War (EIA, 2021). However, the COVID-19 pandemic offers the policymakers the opportunity to create economic and social advantages of low carbon energy transition by moving towards clean energy sector (Pascual, 2021). This current situation will enable a clear pathway for rapid implementation of RE, even though specific involvements need to be allocated for each market to suit the market framework through appropriate incentives and regulations (Pascual, 2021). In addition, Pascual (2021) suggests establishing a more detail and comprehensive framework to develop a commercially viable and attractive investment opportunities to encourage private sectors' participation in RE projects. Better cooperation between the public and private sector can contributed to better economic, environmental and social outcomes.

Other strategies to encourage RE projects is by providing various incentives by the government. These incentives are proven to be constructive in promoting RE projects deployment (Zhao et al., 2016). One of the incentives that can be enhanced is fiscal and tax incentives. These incentives will waive the taxes and duties on the imports of RE equipment, which will encourage the import of technologies and enhance RE system integration. The fiscal and tax incentives will reduce the per-unit electricity cost and as result will enable the RE technology to compete with other power generation sources, such as oil and gas. To construct RE plants for residential use, another fiscal incentive that can be introduced is to provide loans at a minimum rate (Zhi et al., 2014). Typically, the investors are reluctant to invest in RE projects because of grid unavailability, for example, for electricity production that do not have grid infrastructure will not accommodate the additional power (Qadir et al., 2021). The most popular grid connection incentives provided worldwide is FiTs (Qadir, et al., 2021). FiTs program was introduced to benefits the producer where the government sets the electricity price to increase the profitability and promotes more investment (Zhao et al., 2016). An incentive proposal was suggested by Mihaylov et al. (2019) to use energy as a digital currency to improve and encourage the usage of RE and green energy.

Besides, technology companies such as Microsoft, Google, Apple and Facebook play a significant part in RE projects (Qadir et al., 2021). For example, Qadir et al. (2021) revealed that Google has recently decided to acquire electricity totaling 1600 MV to offset its Gas House emissions and it has become as the sector leader in RE generation. The role played by Google will directly improve the confidence among investors to invest in RE technologies (Opiah,

2020). If more companies act and play their role like Google, an effective RE technologies will undoubtedly increase significantly.

To address the impact of COVID-19 pandemic on RE development strategies, policy on short term based should be first acknowledged along with the formulation of mid-term and long-term action plans to attain well-defined RE targets and development towards future sustainable energy (IEA, 2020). In addition, all governments worldwide have to establish a stringent policy on energy with the improvement of subsidies in RE as the alternative solutions to boost the economy (Akrofi & Antwi, 2020). In addition, a large-scale investment should be as main governments' stimulus plans to enhance the development, deployment and integration of clean energy technologies as it will benefits the economies and speed up the clean energy transitions (IEA, 2020). Besides, IRENA (2020) has suggested other policy recommendations for the governments in respond with COVID-19 Pandemic for the year 2021-2023. This post-COVID-19 economic recovery can encourage a lifelong shift in the global energy mix. Among the recommendations for the governments are to provide the public financial support to protect and mobilise private investment in RE industry, improve the function of RE in industrial policies, the revision on the labour and education policies on RE to shift the workers into RE jobs and reinforce the cooperation from international level to accelerate RE deployment that meet with global climate and sustainability objectives. The energy transition investment also can enhance the economy and offer jobs opportunities to the citizens.

The lockdown measures that have been implemented in Malaysia since mid-March 2020, has significantly reduced the air pollution which resulted in increasing concentration in solar radiation on the solar panels (How, 2020). Since the Malaysian GDP continues to be affected by the COVID-19 pandemic, Malaysian government has taken an immediate action through its Ministry of Energy and Natural Resources (KeTSA) Committee to introduce a new clean energy quota to improve the Malaysian economy (Naderipour et al., 2020). To attract the RE investment, KeTSA has opened a competitive bidding process for the Large-Scale Solar (LSS) programme that is headed by Malaysia Electricity Industry.

Conclusions

The challenges in financing RE projects need to be addressed properly by all the stakeholders including government, investors, producers as well as the public to ensure the success of RE in Malaysia. Achieving RE goals means that achieving cleaner and better environment for sustainable future. The proactive initiatives and actions taken by Malaysian government to diversify its energy mix and move towards RE must be supported with clear policy, framework and guidelines to attract more potential investors to invest in RE projects. Undoubtedly, the government assistance together with the cooperation from private sectors, financial institutions and capital markets in financing and funding the RE projects development are very crucial for RE to commercially obtain new ideas and produce clean technologies. Thus, Malaysian government should offer sufficient incentives to investors in the RE projects. The government also must provide guarantees to the private sectors to prove that investment in RE will provide a lot of benefits and return in order to attract investment. Besides, creating the awareness among the public on the importance of RE will boost the RE industry in Malaysia. This can be done by offering sufficient knowledge, education and incentives to the public that can give positive perception on RE sectors in Malaysia. Thus, the cooperation by all the parties is needed to achieve these goals. Furthermore, the formulation of short-term policy, mid-term and long-term action plans are critically required to attain well-defined RE targets and development towards a more sustainable energy future, especially during and after COVID-19 pandemic.

Practical and Social Implications

This study will help the participants from industry, for example, project developers, technology and product inventors, investors, and policy makers to enhance their knowledge and understanding on the challenges faced and strategies to be adopted in financing RE projects. This study also will encourage these participants to cooperate and collaborate to improve the current structure and policies in Malaysia. This will in turn encourage the new development of policy to support the RE development in Malaysia.

Limitations and Suggestions for Future Research

In this paper, we come up with the review and discussion on the challenges, strategies and recommendation on financing RE projects, which focused only on Malaysia. Quantitative future research can be conducted to examine the relationship between the COVID-19 impact on RE sectors which may provide fruitful findings to improve the literatures.

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