



Towards Energy Security and Sustainability in Indonesia: Exploring The *Waqf*-Based Potential

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Abstract: It is ironic to note that Indonesia remains a net importer of energy, which has been one of the basic needs of the Indonesians. As the efforts to decrease the energy import and to secure energy supply, including through Renewable Energy (RE) development which has already started, the gap between the target and the actual is observable and acknowledged in existing studies or official reports by the authorities. Alignment between Islamic Finance (IF) and Renewable Energy can be observed, as both ideally have a preference for the earth and environment-friendly program. They align with several Sustainable Development Goals (SDGs), including SDG 7 on affordable and clean energy, SDG 10 on reduced inequality, SDG 13 on climate action, and SDG 17 on partnership on the goals. That is why this study aims to explore the opportunities and challenges of *waqf*-based renewable energy in Indonesia. To this end, a Focus Group Discussion (FGD) with 15 key informants from 12 different institutions was conducted by *Waqf Center for Indonesian Development and Studies (WaCIDS)*. Notable views from relevant stakeholders, the representatives of both *waqf* and the RE sector, are complemented by an open-ended questionnaire, which was circulated during the session. Data is analyzed using thematic analysis with the assistance of Atlas.ti software. As a pioneer study that relates *waqf* and renewable energy in Indonesia, this study provides an avenue for further research and implementation. This study is expected to offer theoretical and practical references on *waqf* and RE discourse. As the *waqf*-related stakeholders may gain insight into entering the RE projects, the RE practitioners may also acknowledge the potential of *waqf* as part of financing alternatives. Hopefully, this study can benefit the policymakers and the pivotal stakeholders in seeking a solution to secure and sustain energy in Indonesia.

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Introduction

Although representing a primary producer and consumer of energy, up to 2020, Indonesia is among the net importer of energy, especially oil (Agarwal et al., 2020; IEA, 2021). Indonesia is placed 91st out of 115 countries on energy-transition readiness and is categorized as a country with a “potentially challenged” status (Agarwal et al., 2020). This assessment result can be seen from the gap between the actual and the targeted Renewable Energy (RE) development, even with the international exposure for carbon emission reduction, such as the Paris Agreement. Indonesia, however, has targeted to reduce carbon emission reduction up to 29% with its efforts and 41% with international support by 2030, as described in the National Determined Contribution (NDC) (Indonesian Ministry of Environment and Forestry, 2021; Indonesian Ministry of National Development Planning, 2017).

Indonesia Islamic Economic Masterplan (2019) noted that, before 2019, there was no specific indicator to measure energy performance to increase economic independence. Using the 2018 baseline,

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Indonesia has targeted the import rate of the strategic industry will decrease by 25% in the next ten years. Therefore, more studies to support this target need to be encouraged, and thus is pivotal for research. In that case, the alignment between Islamic Finance (IF) and RE can be observed as both ideally have an insight into the earth and environment-friendly program. They both align with several Sustainable Development Goals (SDGs), including SDG 7 on affordable and clean energy, SDG 10 on reduced inequality, SDG 13 on climate action, and SDG 17 on partnership on the goals.

Financing the RE development represents several main identified challenges ([Asian Development Bank, 2020](#); [Wijaya et al., 2020](#)). On the other hand, *waqf* needs to be placed or invested in a strategic business, including the RE sector. Hence, this study aims to explore the potential of *waqf*-based proposals to secure and sustain the energy supply while promoting the economic independence of Indonesia. A Focus Group Discussion (FGD) was complemented with open-ended questionnaire to collect relevant data and important perspective regarding the topic. The data collection process involved 15 key informants in both sectors.

Novelty of this study lies in the idea of integrating *waqf* and RE discourse by involving relevant stakeholders in both areas. This current research is hoped to enhance the body of knowledge on *waqf* and energy topics and offer meaningful information for policymakers and related stakeholders. In the future, *waqf* is expected to strategically take part in the RE sector, as part of financing alternative, to provide energy security and sustainability in Indonesia.

Literature Review

Overview of Renewable Energy Sector

The need for energy on a global scale will increase continuously. This situation is inevitable because population growth will increase the energy demand. By 2017, 80% of human life had relied on fossil fuels energy, such as oil, gas, and coal. At the same time, other energy sources, such as hydroelectric, nuclear, and renewable energy, have a small portion. Contrarily, renewable energy has yet to be optimized to meet the regional and global demands for energy. The energy consumption is expected to continue to increase to around 13.000 Mtoe in 2040 ([Indonesian Ministry of National Development Planning, 2019](#)).

According to the [BP Statistical Review of World Energy 2021 \(2021\)](#), the COVID-19 pandemic had an extreme impact on the energy markets, with both primary energy and carbon emissions decreasing at their fastest rates since the Second World War. However, renewable energy grows continuously, with solar power recording its highest growth. Meanwhile, oil was the highest energy mix (31.2%), and coal was the second largest fuel in 2020 (27.2%). Both natural gas and renewables rose to record highs of 24.7% and 5.7%, respectively. However, renewables have overtaken nuclear power, which holds only 4.3% of the energy mix. The share of hydro energy grew by 0.4 percentage points in the previous year to 6.9%, the first rise since 2014 (see [Figure 1](#)). Renewable energy (including biofuels but excluding hydro) increased by 9.7%. Meanwhile, solar electricity grew by 20%, and Hydroelectricity rose by 1.0%. In that case, China was the primary individual contributor to the growth of renewables (1.0 EJ), followed by the US (0.4 EJ) and Europe as a region (0.7 EJ).

Indonesia is in the early stages of achieving cleaner energy in the future, especially with the RE sector. As per the Paris Agreement to reduce emissions, Indonesia targets emission reduction of up to 29% with its efforts and 41% with international support by 2030, as described in the National Determined Contribution (NDC) ([Indonesian Ministry of Environment and Forestry, 2021](#); [Indonesian Ministry of National Development Planning, 2017](#)).

The proportion of emission reduction targets from the energy sector is 11%. The State Electricity Company (PLN) issued The Electricity Supply Business Plan (RUPTL) 2019-2028 that mentioned 23% of energy must come from the RE by 2025, increased from 13% in 2017 ([Indonesian Ministry of National Development Planning, 2017](#); [Asian Development Bank, 2020](#)). This target has also been stated in Government Regulation No. 79/2014 that the role of new energy and renewable energy is at least 23% by 2025 and at least 31% by 2050. Data from the International Renewable Energy Agency (IRENA) 2018 showed that, until 2015, energy demand in Indonesia is dominated by the industrial sector, transportation, and households ([Indonesian Ministry of National Development Planning, 2019](#)). Reduced technology costs, capacity building, and better procurement methodologies play a key role in

lowering project power costs and making renewable energy more affordable (Indonesian Ministry of National Development Planning, 2017). According to the report from Asian Development Bank (2020), there are some challenges in developing the RE projects in Indonesia, including insufficient power system planning and grid management practices, unbalanced power purchase agreements, inefficient procurement and contracting processes, restrictions on foreign investment, and high local content requirements.

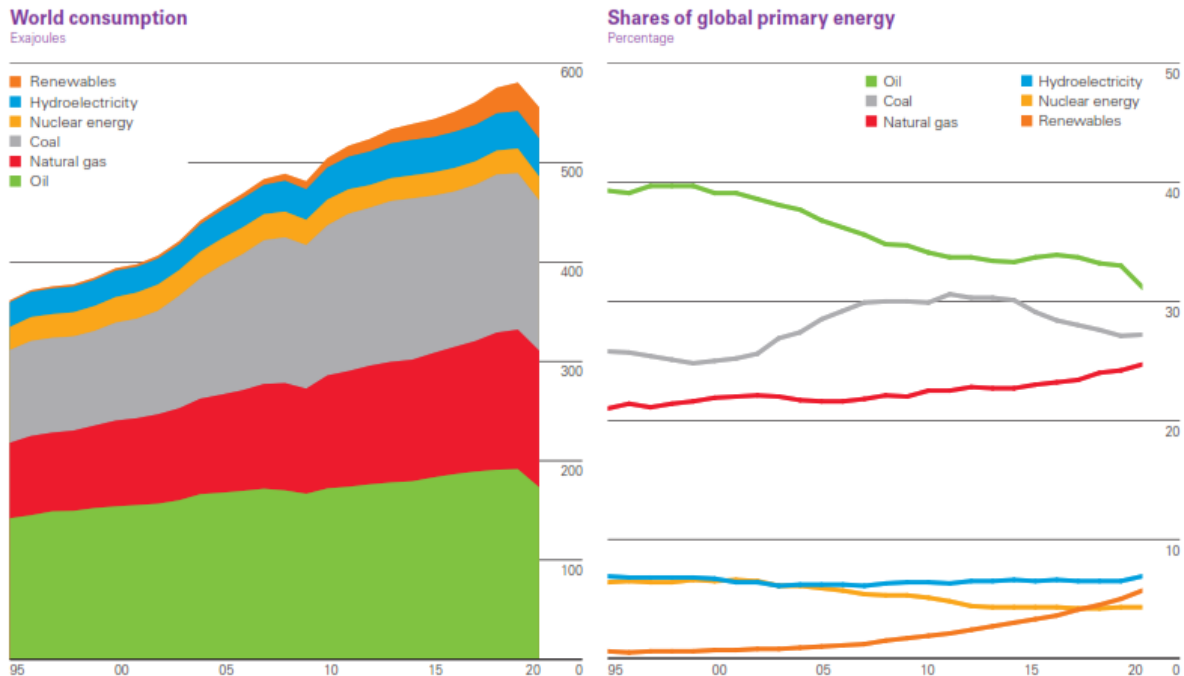


Figure 1. World Energy Consumption
Source: BP Statistical Review of World Energy 2021 (2021).

Developing RE needs huge funding provisions; hence, Islamic finance is expected to be able to contribute through Islamic financial products, such as green Sukuk, which can be linked with *waqf*. This kind of financial instrument has not been implemented yet. One example that has been conducted is using the Murabaha contract by a package of rooftop solar electricity products in BPRS Lantabur Tebuireng, East Java. BAZNAS, using an Islamic social finance instrument, has also conducted an initiative. Specifically, BAZNAS and the Ministry of Energy and Mineral Resources have synergized in opening the Micro Hydro Power Plant (PLTMH) in Lubuk Bangkar Village, Jambi. This program provides electricity for 4,448 people (803 households) (Indonesian Ministry of National Development Planning, 2019).

The Indonesian government also supports several RE projects financing by issuing the green bond and green Sukuk. In 2018, Indonesia issued the world's first sovereign green Sukuk of US\$1.25 billion under a *wakalah* contract for five years (World Bank Group, 2019). Municipal green bonds are also recommended by the Climate Policy Initiative to boost renewable energy development. Simpler issuance standards and procedures, and clear and consistent RE policies from the central government and local governments selling green municipal bonds to quasi-government organizations are some of the suggestions for this municipal green bond (Wijaya et al., 2021).

RE sector is vital and needs to be supported as it can be a catalyst for strengthening the halal value chain by participating in increasing economic independence through energy self-sufficiency. The Islamic financial sector can be a starting point for this synergy as a financing instrument suitable for both new and renewable energy investment needs. Islamic finance instruments that support the RE sectors are Islamic banking, Islamic capital market, zakat, and *waqf* (Indonesian Ministry of National Development Planning, 2019).

Among the proposed strategies to achieve RE targets according to Indonesia's Islamic Economic Masterplan 2019-2024 (2019) are as follow:

1. Support sustainable relationships across the RE industry's value chain to produce sustainable energy.
2. Optimize the involvement of universities, firms, and associations in increasing the number and competency of human resources professionals throughout the RE industry's value chain.
3. Establish a national RE industry and develop product innovation and diversification skills.
4. Create a business environment and a consumer ecosystem through co-branding with the halal industry, greater awareness, and assurance of easy access to RE information.
5. Invent a manufacturing process for industrial growth and organize collaboration with other sectors.
6. Facilitate the financing from banks and non-bank financial organizations as well as investment opportunities.
7. Implement appropriate technology for RE production, distribution, marketing, and promotion.

Overview of Waqf Sector in Indonesia

Waqf has a significant role as one of the financial instruments based on Islamic perspectives to support socio-economic welfare. Some previous studies conclude that *waqf* is significantly-potential for handling unresolved global issues, such as inequality, poverty, hunger, and others (Çizakça, 2000; Sadeq, 2002). Prior studies also state that *waqf* can be more productive through community empowerment and the real sector (Nizar, 2017; Kasdi, 2015; Listiana & Alhabshi, 2020; Listiana & Masyita, 2020; Mahdiah et al., 2020; Munir, 2015; Widiastuti & Wahyuningsih, 2018).

According to the Indonesian *Waqf* Board (BWI) Regulation Number 1 Year 2020, productive *waqf* refers to a *waqf* fund, which is managed productively through investment, either directly or indirectly for *maslahah*, and used for beneficiaries. In this case, Indonesia has great potential for *waqf* land and cash *waqf*. *Waqf* land in Indonesia reached 435.768 plots (4.2 million hectares) in 2016 (Indonesian Ministry of National Development Planning, 2019). However, the total fundraising of cash *waqf* from 2011 to 2018 raised only 255 billion rupiahs. This realization is still far away with the potential of cash *waqf* in Indonesia, which reaches 180 trillion rupiahs (Indonesian *Waqf* Board & Ministry of Religion Republic of Indonesia, 2020).

World Giving Index 2021 stated that Indonesia is the world's most generous country, with a score of 69%. This index score consists of fund donation (83%) and volunteering time (60%) (Charities Aid Foundation, 2021). Meanwhile, Pew Research Center (2011) estimated that the Muslim population in Indonesia will reach 283.833.000 (88%) by 2030. *Waqf*, one of the Islamic social finance instruments, has substantial potential in this developing country. The growth of the Muslim population in Indonesia and globally is expected to improve the realization of the *waqf* potential.

The realization of *waqf* potential needs to be directed in a productive scheme. However, the role of *waqf* in a country's development has not been optimal yet (Indonesian Ministry of National Development Planning, 2019). In addition, the usage of *waqf* land in Indonesia is dominated by Mosques (Siwak, 2019) because of a lack of understanding about *waqf* usage for generating income. *Nāzīr* has a key role in managing *waqf* property productively (Baqutayan et al., 2018; Fadilah, 2015; Huda et al., 2017; Obaidullah, 2016). Integrating *waqf* assets with real sectors, which can be developed strategically, should be done by synergizing all parties, such as the government, communities, *nāzīr*, or *waqf* institutions, universities, and private sectors.

In managing *waqf* assets, there is a need for real action through pilot projects. This strategy is vital to give best practices that can be followed by the community and encourages innovation from that project (Ministry of Religion Republic of Indonesia, 2017). Bank Indonesia (2016) explained that *waqf* management needs four main parties, namely regulator, *nāzīr* (*waqf* manager), *wāqif* (*waqf* contributors), and *mawqūf* 'alayh (beneficiaries). Thus, the regulation of *waqf* in Indonesia needs to encourage *nāzīr* to be a professional *waqf* managers. The public may also give more trust to professional *nāzīr*. If the *waqf* realization increases, more benefits will be delivered to beneficiaries. *Waqf* is more flexible than *zakat* and thus can be optimized in any productive and strategic sector, such as agriculture, tourism, food security, renewable energy, and housing.

According to the BWI website, until October 2021, 303 institutions have been legalized by the Indonesian *Waqf* Board to manage cash *waqf*. In addition, as of January 2022, 29 Islamic financial institutions have been granted cash *waqf* receivers (LKS-PWU). However, 66% of *nāzir* in Indonesia are individual, 16% of *nāzir* are organization-based, and 18% are legal entity *nāzir*. Furthermore, only 16% of *nāzir* work full time in managing the *waqf* (Indonesian Ministry of National Development Planning, 2019). Transforming *nāzir* from individual to institution is one of the solutions for *waqf* issues in Indonesia (Huda et al., 2017). Also, a national *waqf* index has been proposed to enhance the significant role of *waqf* for the community and nation. The index consists of six factors, namely regulator, institution, process, system, outcome, and impact (Sukmana et al., 2021).

Existing Studies on Waqf and Renewable Energy: Avenue for Filling the Gaps

This section is going to review the existing studies that have been conducted on *waqf* and renewable energy. It can be noted that from the quick research to the open access database, Google Scholar, there are limited studies conducted in this area. Technically, a Systematic Literature Review (SLR) is conducted by searching using specific keywords in the open access database Google Scholar at 11 AM Indonesian time 2 September 2022. From the preliminary review, 7,430 results with the keywords of "*waqf*" and "energy" were easily found. However, from the title screening, only four papers used those keywords. A paper entitled *Towards sustainable financing models: A proof-of-concept for a waqf-based alternative financing model for renewable energy investments* was published in *Borsa Istanbul Review* (Science Direct) (Ari & Koc, 2021). The other three papers represent three different concepts; one in general, one focusing on a provincial level, and one on a solar plant.

Methods

This current study gathers primary data through Focus Group Discussions (FGD) or, in other studies, known as group interviews (Eriksson & Kovalainen, 2008; Puvenesvary et al., 2008). In addition, an open-ended questionnaire was distributed during the FGD session to complement and triangulate the responses (Bowen, 2009). According to Guest, Bunce, and Johnson (Guest et al., 2006), 6-12 informants are sufficient to provide meaningful themes and helpful interpretations. Therefore, 15 key informants from 12 different institutions involved in this study have met the minimum requirement for data saturation. These key informants were selected considering their exposure to *waqf* and renewable energy activities. All of them hold a key position in the respective institutions in the senior management structure.

The FGD was conducted on 28 April 2021. The discussion was recorded and then manually transcribed. Verbatim transcription is then analyzed using thematic analysis with the assistance of Atlas.ti software version 8. Thematic analysis is a process that identifies patterns and themes based on codes and categorization emerging from the verbatim transcription/narrative materials (Bryman, 2012; Fereday & Muir-Cochrane, 2006).

Results and Discussion

Proposed Concept of Waqf-based Renewable Energy in Indonesia

As elaborated in the previous section, with biodiversity and abundant natural resources in Indonesia, it is ironic to find that Indonesia remains a net importer of energy supply. This current study identified a proposed concept elaborated by one of the speakers who represented the 15 participants of the FGD. A summary of the proposed concept can be seen in Figure 2.

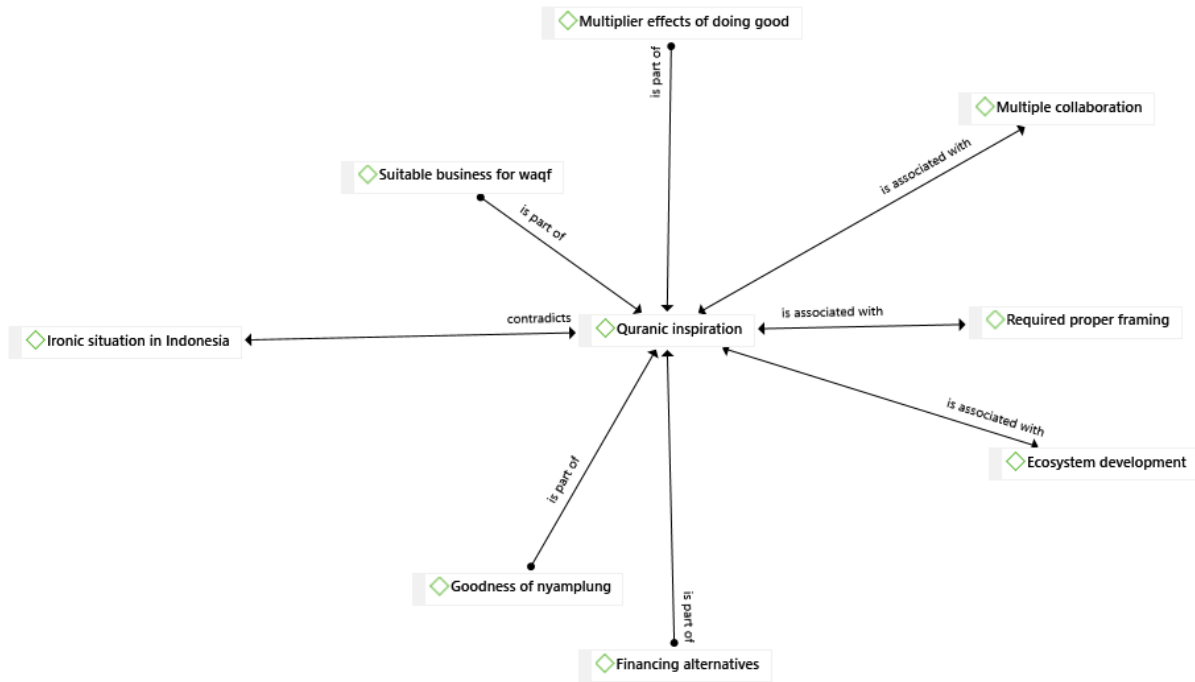


Figure 2. Summary of Proposed Concept of *Waqf*-Based Renewable Energy

According to the thematic analysis, in response to the ironic situation in Indonesia, especially regarding the issue of environment and energy along with the potential of *waqf*, a concept called “Green *Waqf*”, which is inspired by the Quran, is proposed (Iqbal, 2021; WaCIDS, 2021). However, multiple collaborations among relevant stakeholders are required to implement this concept. This proposed concept enables collaboration between activists of *waqf*, the environment, and renewable energy. It also requires collaborative work between various stakeholders, including the government, private, public, and community.

In addition, proper framing is required considering the low level of *waqf* literacy and understanding of the actual concept of *waqf* in society. The necessity for an appropriate framing aligns with the finding in one of the McKinsey reports, which stated that “the success of Indonesia’s energy sector will depend on how the sector reimagines itself...” (Agarwal et al., 2020). Moreover, ecosystem development is pivotal to enabling impactful implementation. To manage the ecosystem development, there is a requirement to cover upstream to downstream activities. This can be done, among others, by focusing on the specific plantation for the pilot project.

To date, the project only focuses on one type of tree called *nyamplung*/tamanu because of its goodness. *Nyamplung*/tamanu tree accommodates the vision of renewable energy from Wali’s history (WaCIDS, 2021). Regarding this case, an experimental study has been conducted and figured out that Tamanu can restore and improve former forests and peat lands that have been burned or damaged from commercial activities or large-scale deforestation (CIFOR, n.d.). More importantly, it is suitable to grow in Indonesia and has the ability for bioenergy conversion and biodiesel production (Arumugam & Ponnusami, 2019; Johanssen, n.d.). In addition to *nyamplung* plantation, other types of RE was mentioned by several informants, including solar panel which can be used to produce electricity.

On the one hand, renewable energy is considered a promising industry in the future because of its potential as a high-demand business (Ari & Koc, 2021; Listiana et al., 2020). *Waqf* can suitably involve in this type of business to maintain its uniqueness and characteristics. The *waqf* assets should be sustained and productively managed to produce continuous benefit for the *mawquf alayh* (*waqf* beneficiary).

Waqf is suitable and has the potential as a financing source/alternative in developing the RE sector (Mutmainah & Listiana, 2021). It is because *waqf*, which must be invested in shariah compliance instruments or business, needs to consider the *maqasid of shariah*. Omar (2019) highlighted that Islamic finance, including *waqf* as part of Islamic social finances, needs to shift from negative screening to

positive screening of *shariah* compliance. This shifting is necessary to accommodate the implementation of Islamic teaching, including being responsible as *khalifah* and maintaining the planet. It means that the *waqf* fund must be invested in a business that can bring positive and social impacts to society, not purely a profit-driven business.

The other important dimension of this project is the potential for multiplier effects that are advantageous for the economic, social, and ecological dimensions. Since the *nyamplung* (Tamanu) tree can produce RE, it has a benefit for the economy. Meanwhile, by planting more trees, more oxygen is produced. This way, the plantation will have benefits for mankind and the environment.

Identified Opportunities to Integrate Waqf and Renewable Energy

All informants of this study, 100%, agreed on the potential collaboration between *waqf* and RE to address the energy issues in Indonesia. *Waqf*, with its characteristics, is expected to provide an alternative funding solution in addressing the lack of capital in a strategic business, including in the energy sector. Based on the thematic analysis, 17 primary opportunities were identified to provide *waqf*-based renewable energy, listed below:

1. Existence of 14 million hectares of critical and very critical land (1:2). This land can be planted with *Nyamplung* (Tamanu) to improve the quality of the land while producing the fruit. The produced fruits then can be further processed to produce RE. *Waqf* institutions may mobilize the collected *waqf* fund in this kind of project.
2. Heading to 2030, all countries will hunt for RE. As National Determined Commitment (NDC) stated, all countries are committed to reducing emissions by 2030 (1:3). *Waqf* institutions may invest in RE projects, so that can contribute to achieve NDC.
3. *Fardhu kifayah*'s concept of the economy (2:20). It is ironic to note that even though the Muslim population is considerably high in number, the Indonesians are currently living in a high level of dependency to other countries, which is represented by the import level. Thus, to decrease this dependency, there is a requirement to apply the *fardhu kifayah* concept in the economic movement, among others is through making more *waqf*.
4. Characteristics of the Indonesian people who have a high willingness to help/to donate (2:22). According to CAF report (2019), Indonesia represents a country with a generous society. This is a good social capital to mobilize more *waqf* fund, which later may be channelled to RE projects.
5. Accommodative regulatory framework on *waqf* (2:27). The existing regulations on *waqf* in Indonesia, especially the *Waqf* Act, have accommodated the different *fiqh* opinions, thus enable involvement in RE projects.
6. Product differentiation for *waqf* campaign (1:136). *Waqf* has a potential to address various issues, including energy insecurity. More campaigns with different *waqf* products or instruments are needed to educate people about the urgency and benefits of *waqf*, including in RE projects.
7. *Da'wah* opportunity for RE activists (2:140). The value of *waqf* is expected to reach people concerned with RE; thus, expanding the audience and potential *wāqif* is needed.
8. Export opportunity with the existence of the Saudi Green Initiative (2:152). There is a high potential to mobilize *waqf* for RE through *nyamplung* plantation. For Indonesia, there is an opportunity on 14 million hectares of critical land and export opportunities for the Saudi Green Initiative.
9. Rehabilitation projects for ex-mining land (2:153). Usually, there is an allocated state budget and private funding from the relevant companies to revive the land after extracting gas/mining. Yet, there is a necessity to explore this information further.
10. Sustainable Development Goals (SDGs) flagship (2:169). It is because both *waqf* and RE share common characteristics, including positively contributing to the environment in producing clean and affordable energy.
11. Availability of unproductive *waqf* land (2:178). These unproductive *waqf* assets can become a potential area for *nyamplung* plantation. It is also possible for the land with existing buildings. The more land is planted with *nyamplung*, the more produced fruits can be further processed into RE.
12. Revenue stream for the *waqf* institutions (2:182). Other than biomass energy from *nyamplung*, it is also potential to use other type of RE, including solar panel. Once the RE plant is installed, the electricity can be managed productively to generate revenue.

13. Regional solutions for electricity (2:187). To date, around 2500 villages face limited access to electricity. The *waqf*-based RE has the potential to provide regional solution, as already implemented by one participant's institution. In addition, this approach can facilitate the village-owned enterprises (BUMDES) to receive periodic income.
14. Communal scale of RE development (2:195). It is simple to build renewable energy on a communal scale when there is an involvement of a homogeneous environment, such as the Islamic boarding schools.
15. Willingness-to-pay on the produced energy (2:210). The willingness-to-pay on the energy produced by RE is relatively high, as long as people can get electricity. However, there is a necessity to educate the society that the energy is not only used for entertainment but also for the economic productivity. It is a significant aspect of maintaining RE sustainability.
16. Everyone can join the campaign (2:212). All community members can participate in planting the tree, which later can be processed into an oil by-product.
17. No single-point-of-failure concept (2:228). This concept is called no single point of failure as it can be started and implemented from any point.

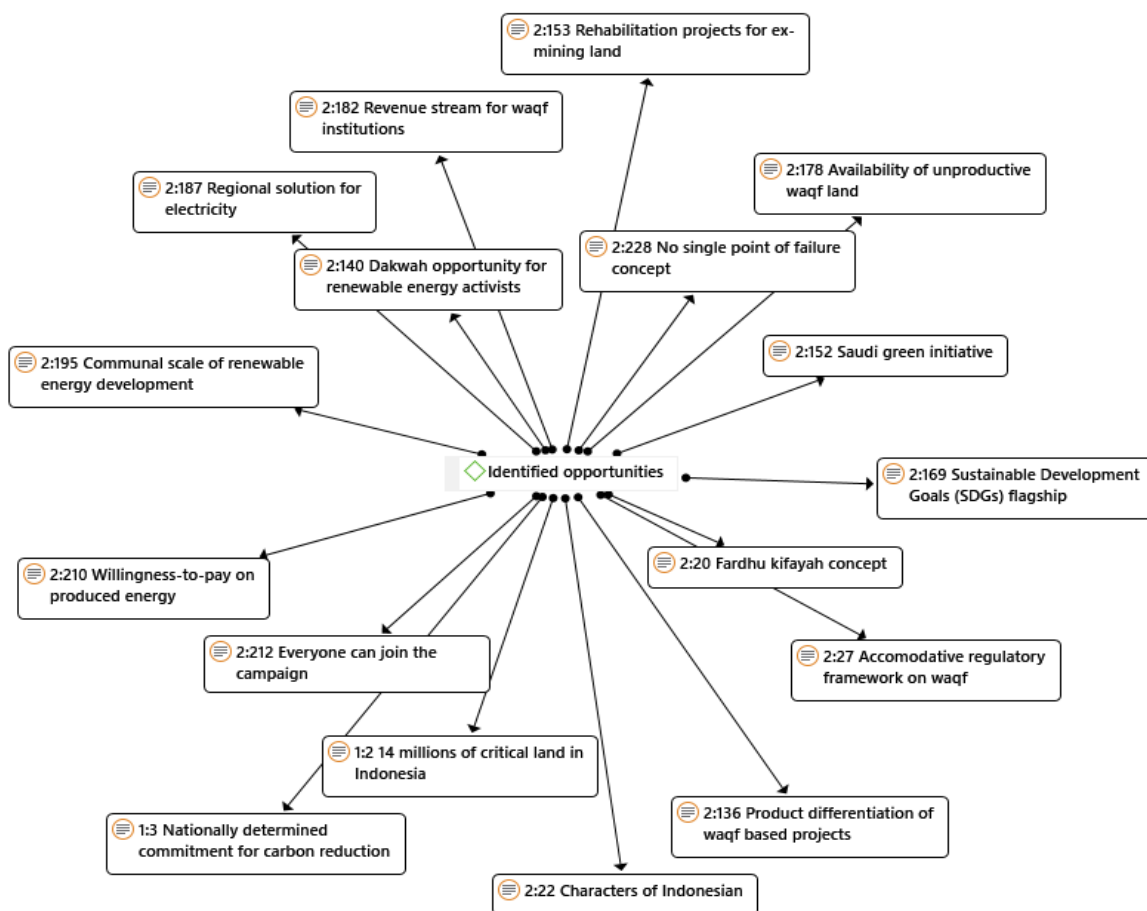


Figure 3. Identified Opportunities for *Waqf*-Based Renewable Energy

Identified Challenges to Integrate Waqf and Renewable Energy

While the bold potential of collaboration between *waqf* and renewable energy is possible, the informants also acknowledged 17 challenges that need to be considered to ensure a successful implementation.

1. Homework on increasing public literacy on *waqf* (2:74). Nāzīr needs to conduct more campaigns and socialization programs to increase public literacy. A broader perspective about *waqf* is needed.
2. Limited land ownership (2:82). There is a necessity to maintain the durability of the *waqf* assets. In terms of land, full ownership is needed to control the property. Otherwise, there will be potential conflicts in the future once the RE plantations are implemented.

3. Financing challenges (2:89). The limited mobilization of cash *waqf* means limited capital to be invested in the RE sector.
4. Individual (sporadic) program (2:101). Every *nāzir/waqf* institution has a different program. To date, there is no legal framework to accommodate the joint ownership of the *waqf* assets.
5. Economies of scale (2:103). Some *waqf* institutions have lands possible to be planted with specific trees. However, since the land size is different, there will be different economies of scale.
6. Concern about the project guarantees (2:104). Among the consideration for the *nāzir/waqf* institutions, the requirement to maintain the *waqf* assets is crucial. As the one who conducts the fundraising program, there is a responsibility to ensure the sustainability of the *waqf* assets. On the other hand, there will always be risks in every investment or placement, including the plantation program and RE projects.
7. Absences on the consortium regulation (2:107). To date, each *waqf* institution works for its programs. There is no available regulation to enable an official consortium in funding and developing big *waqf* projects. This situation limits the movement of the *waqf* institutions in Indonesia, including for RE projects.
8. Preferences for the proven projects (2:149). It can be noted that most informants, who represent *nāzir* from the *waqf* institutions, prefer to be involved in a proven project. In that case, the existing and tested pilot RE project is necessary.
9. Influence of the government through an imposed policy (2:162). Unpredictable policies issued and imposed by the government will influence the relevant stakeholders.
10. The necessity for proper maintenance (2:185). If the installed assets are *waqf*-based, they should be maintained properly. Proper maintenance is needed to enable sustainable utilization. In the case of a grant, the period only lasts for one year.
11. Sustainability issue of RE projects (2:191). One informant shared an experience that, usually, around 80%-90% of the installed RE tools will not work optimally after three years. Assuming that each location needs around IDR 2 billion, a large state budget is required considering the number of locations.
12. Costly development of RE (2:200). It has been acknowledged that developing RE needs a large budget. The RE development is considered expensive, especially for the feasibility study, installation, maintenance, and running costs. This causes the overall installation of the RE project to be costly. Moreover, there is a necessity to ensure the accountability of the project.
13. Limited formal education for RE (2:201). To date, the subject of RE does not exist in vocational high school.
14. Maintenance and running cost (2:202). The biggest concern for the RE project implementation in the field is neither the installation problem nor the feasibility study problem. These issues can be settled nonetheless. The primary concern is the maintenance and running costs due to the absence of the allocated budget to conduct such services.
15. Social engineering issue (2:206). It can be identified that the problem of the RE implementation is not on the technology aspect but more on social engineering. Since RE may cause changes, not all people are ready to deal with such a change.
16. Bureaucracy issues (2:229). Due to bureaucratic constraints, representative from relevant government institutions were absent in this FGD.
17. Linear education track (2:236). The problem is that the current Indonesian education requires a linear path. It means that when majoring in economics, students will only study economics. If majoring in technology, students will learn only about technology and this situation will also apply to the RE major. This situation is in line with the identification of the existing report by the [Asian Development Bank \(2020\)](#).



Figure 4. Identified Challenges in *Waqf*-Based Renewable Energy

Conclusion and Policy Recommendation

From the above discussion, it can be noted that the ironic situation of energy insecurity in Indonesia needs a solution. *Waqf*-based RE, especially the Green *Waqf* project, is highly potential to address this issue while offering multiple benefits. 100% informants agree on the possibility of *waqf* to be involved in the RE projects. To proceed with the implementation, identifying the opportunities and challenges is pivotal. This study has identified at least 17 opportunities and 17 challenges that need to be considered to enable *waqf* to be involved in providing clean energy while maintaining the environment. It shed lighter on the potential of *waqf* to address the exceptionally crucial issue, namely energy security and sustainability.

It is recommended that the relevant stakeholders, especially the regulator and the authority related to *waqf* and RE in Indonesia, are well-informed of the identified opportunities and challenges in this study; hence, a relevant policy and/or regulation can be taken properly. As part of the research implication, the *waqf*-related stakeholders may gain insight into entering the RE projects, and the RE practitioners and regulators may acknowledge the potential of *waqf* as part of the financing and capital alternatives. Further research that accommodates the collaboration between the researchers on *waqf* and renewable energy is necessary, especially in action research. Pilot projects are expected to transform this proposed concept into real action that, hopefully, can be a successful lesson learned to be replicated in other locations or countries.

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