

## A Research Design

### **Toward the 7th SDGs targets: Business's challenges in geothermal energy sector in Indonesia**

#### **1. Introduction**

Global communities have agreed upon the United Nations Sustainable Development Goals. The Sustainable Development Goals set the new global agenda, with 193 nations having signed up to achieve the 17 goals by 2030. Sustainable development requires orchestrated efforts to harmonize three core elements of sustainability; i.e. economic growth, social inclusion and environmental protection towards developing a sustainable and resilient future for the society and the earth. These goals call for innovative and stronger action by all countries to achieve these 17 comprehensive yet intertwined SDGs.

Energy access and energy provision are strongly related to many of these SDGs' agenda as a reliable supply of energy can assure countries to power up their development particularly in developing countries (Buyukoskan et.al., 2018), in which many people have not had access to electricity yet (Setyowati, 2020). Addressing this enormous challenge, the 7<sup>th</sup> SDG seeks "ensuring access to affordable, reliable, sustainable and modern energy for all". Therefore energy issues are central to many of these challenges and opportunities the global society is encountering.

One of the 7<sup>th</sup> sustainable development goals is growing the share of renewables in the global energy mix by 2030. Increasing share of renewable energy sources within countries' energy system towards achieving the goal requires carefully planning the appropriate energy sources to reinforce their social and economic development while also protecting the environment (Buyukoskan et.al., 2018). As stated in target 7.A "By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology", the effort to achieve the goal will eventually require facilitating private actors of renewable energy sector along with significant amount of investment fund from domestic and international public and private sources.

The features of existing research in 7<sup>th</sup> SDGs highlight the need for this study. First, existing investigations of necessity of renewable energy development such as the quantitative demand both in currency and calorific units to achieve the goals nationally or globally (Santika, 2020), the gaps of energy access (Setyowati, 2020) and the potential energy provision from renewable energy sources such as biofuel (Acheampong, 2016), solar (Conway et.al., 2019; Senshaw and Edward, 2020). Second, the challenges associated with the diffusion of renewable energy technologies in developing countries (Ahmed El-Imam, 2019; Conway et.al., 2019). Third, the research on geothermal power plant development to achieve greater renewable energy mix largely examines the aspects of technological advancements (Sun et.al., 2018) and its environmental and societal impacts for other sustainable development goals (Olave et.al., 2020; van der Zwaan and Longa, 2019). Fourth, with the aim of encouraging investment in the geothermal energy sector (Winters & Cawvey, 2015), research on the business actors' challenges is limited. Therefore, although geothermal energy development is already being discussed in several ways, this research will contribute to an understanding of the extent to which business encounters challenges to invest and operate geothermal power plants in developing countries, particularly in Indonesia, to support the achievement of the target.

Indonesia has adopted the UN SDGs and developed a roadmap for SDGs including for achieving the 7.A goal. Indonesia is a country with abundant energy resources both renewables and non-renewables, however,

Indonesia's energy system remains heavily dependent on non-renewable energy sources as merely 10.04% renewable energy mix in 2018 (Bappenas, 2018). The roadmaps document depicts Indonesia's plan and effort to increase renewable energy mix, although it also explains that the business as usual scenario is hardly possible to achieve the target due to some constraints of high initial investment cost, geographical location, and low efficiency (Bappenas, 2018). A study estimates that Indonesia will reach a renewable energy mix of only 12.09% and 14.9% in 2025 and 2050 respectively (ref). Thus the 7th SDGs program is expected to accelerate the energy mix and investment in the renewable energy sector. However, questions are raised on whether the constraints are limited to those above ones. This research aims to understand investment challenges in the renewable energy sector particularly geothermal energy in Indonesia by which comprehending and managing the business risks may increase renewable energy investment.

## **2. Literature review**

### **2.1. Geothermal energy in Indonesia within SDGs framework**

Indonesia has large geothermal resources that disseminate from the western to eastern part of Indonesia as a result of its privileged location on the Pacific Ring of Fire. This geological condition gives in return abundant natural resources both conventional energy resources (e.g. oil, natural gas, and coal) and also renewable energy resources (e.g. solar, hydro, tidal and geothermal). At this period, Indonesia has installed power generation capacity about 2130 megawatts (MW) from its total geothermal energy potential up to 25.300 MW (National Electricity Plan, 2019). Presently, most of the exploration and exploitation of geothermal energy are focused in the western part of Indonesia, mainly in Sumatra and Java Island. This is related to the ease of accessibility and the high demand of electric consumption. The geographical condition in the eastern part of Indonesia has its own challenges for the government to explore and exploit geothermal due to its smaller and remote island.

However, the development of geothermal resources exploration remains stagnant. To reach the 7.A sustainable development goal, the Indonesian government launch a road map for the 7<sup>th</sup> goal which announced several programs and campaigns in intention to scale-up and speed-up its geothermal power development, which include issuing a new feed-in tariff policy for geothermal electricity and also established a geothermal fund in order to promote investment in the geothermal sector.

### **2.2. Business risk of geothermal energy development in Indonesia**

Risk for business is considered the potential threats with unwanted consequences to a firm's operations, reputational capital, market share and profitability, as an impact of operational and strategic decisions, and the exogenous responses of other actors to these decisions (Graetz & Franks, 2016). These threats may stem from the political, economic, societal and technological environment of the firm (Amankwah-Amoah and Wang, 2019; Cavusgil et al., 2012; World Bank, 2013). These risks inflict on project cancellation and postponements, higher operational costs, and a loss of reputation.

Governance risks may arise from the dynamic yet contradictory of policies related to the renewable energy sector. Within a decade, there were significant changes in direction of renewable energy policy in Indonesia. During 2014-2016 period, the Indonesian Government launched a few initiatives to boost renewable energy development namely the acceleration of electricity infrastructure of 35,000 MW; setting up a task force for accelerating the development of new and renewable energy; the issuance of regulations on feed-in-tariff for geothermal, solar-, hydro- and biomass-sourced electricity which are favorable for renewable energy investors (Maulidia, et.al, 2019). However, the policy direction began to shift away from the focus on renewable energy in 2016. As the government launched new regulations on energy tariffs that might discourage private investors, and dissolved some strategic pro-renewable programs (Maulidia, et.al, 2019). Additionally, decentralized

governance poses risk on limited incentive from local governments. Rent-seeking behavior in the licensing process also burdens investment flow in this sector (Winters & Cawvey, 2015).

Economical risks may stem from the monopolistic nature of Indonesia's electricity market landscape in Indonesia. Despite there being market liberalisation in the production segment, a state-owned company monopolize the three market segments -production, transmission and end-user distribution. Additionally, the development of renewable energy has been facing fiscal challenges due to the large fossil fuel subsidies that distort the market and hardly allow renewable energy to compete.

Societal risks remain challenging for geothermal energy business. Many geothermal energy projects face resistance and refusal from local communities and civil society organizations. While consent from local communities is a paramount requirement for a business unit to obtain support from financial institutions and social licenses for other future projects.

Technical risks of geothermal exploration and exploitation in Indonesia are mainly related to the remote access of the geothermal area. Mountainous and hilly location makes it more costly to bring the logistics for exploration purposes, starting from land occupation for road development, acquiring drilling rigs by sea, to steep slopes for drill pad. Moreover, the probability of geological disaster due to exploration and exploitation activities remain necessary to be considered.

### **3. Methods**

This research will conduct a study case in In Indonesia. The collection of primary data will be conducted through attending around 5 webinars in which the speaker comes from various backgrounds: governments, energy companies, and civil society. In those seminars, the researchers also will be actively involved in discussion. Additionally, the researcher also conducted semi-structured interviews with former director of geothermal energy companies and academia. Secondary data are government documents, media mass and website. Document will be analysed by content analysis. Data from various sources will be classified according to sub-research questions.

#### **4. Planned research steps**

- a. Literature review on 7th SDGs and geothermal energy development
- b. The primary data collection of research was initially planned to be gathered by interviewing related actors during a fieldwork research. However due to Covid-19 pandemic, the data collection activities were altered by attending and actively engaging in webinars related to the research topic.
- c. The secondary data collection was done by developing a database of government documents, mass media and websites.
- d. Content analysis on primary and secondary data is on progress
- e. Writing up a paper

### **5. Bibliography**

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