Indonesia’s Energy Security Policy In LNG Sector: The Challenges And Opportunities

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Abstract
The world consumes excessive amount of natural gas energy for its purpose in supporting fuel production, industrial needs, and daily necessities. The importance of energy as the core of the economy means proper energy management is essential. Likewise, the concept of energy security has grown along with the development of technology and energy commodities, such as natural gas and renewable energy. One of Indonesia’s biggest natural gas productions is Liquified Natural Gas (LNG), which brings Indonesia as one of world’s influential actors in international LNG trade. The increasing demand of Indonesia’s gas demands proper energy management policy to balance the issue. Indonesia’s abundant LNG potential has opened opportunity towards alternative energy development. This article analyzes challenges and opportunities of Indonesia’s LNG energy opportunity through literature study. Analysis shows that Indonesia still faces multiple challenges in their LNG management, ranging from lack of technology and poor piping infrastructure to support the production.

Keywords: Energy security policy, LNG, Challenge, Opportunity.

INTRODUCTION
Data of 2018 shows that Indonesia’s total production of oil, gas, coal, and renewable energy reached 416 MTOE (Million Tonnes of Oil Equivalent), with 261,4 MTOE of the total value comes from coal and LNG (Dewan Energi Nasional, 2019). Coupled with Indonesia's position as the fourth most populous country in the world, the demand energy consumption in Indonesia is also quite high, resulting in the significantly high consumption. Despite Indonesia’s abundance and alternatives of energy supply, people are still struggling to access energy and are highly dependent to fossil-based energy (Alami, 2012). This fact shows that Indonesia is still struggling...
with meeting their energy supply to their people’s needs. In response to this issue, government is expected to maximize the nation’s energy potentials to meet the need of energy security.

Energy is one of life’s essentials. The more productive the people are, the bigger the needs of energy to support their mobility (Klare, 2008), access to food, and economy development. This claim reflects on the consistent increase of Indonesia’s fuel demand, resulting in high fuel import that burdens national expenditure, which ironically happens at the same time with high export of energy. Thus, the struggle becomes a call to effective policy in energy utilization.

Indonesia needs sufficient supply of energy. We need to understand that energy security can only be met when sufficient energy is accessible to the people with the right price (Keliat, 2006). Indonesia’s energy security issue is addressed in Energy Policy Blueprint 2005-2025 that pinpoints energy as a commodity for sustainable development. The policy focuses on energy management directed through the utilization and diversification of energy production, distributed in accessible price for the people (Alami, 2012). In addition, the blueprint requires collective cooperation among stakeholders, the government, government-owned enterprises, and private sectors. The energy sector shall be seen from not only through the perspective of market mechanism, but also from strategic commodity.

One of the alternatives to energy utilization and diversification that can be implemented by the government is utilizing LNG as source of energy. The utilization of LNG as an alternative source of energy can balance the high demand of fuel (diesel/solar), reduce the high import of energy, and open an opportunity to increasing energy export. LNG is a liquified natural gas that has been processed to eliminate heavy hydrocarbon and impure contents, condensed to atmosphere pressure, and frozen in -160°C (Nuswantara, Priharnanto, & Wibawa, 2014). LNG is similar to other types of natural gases, but the form is liquid from certain process which makes LNG becomes easier to be transported and distributed from the hand of producers to the hand of consumers.

LNG is considered as alternative energy by Indonesian government (Kementerian ESDM RI, 2005). In 2005, about 185.8 TSCF (Trillion Standard Cubic Feet) of national natural gas reserve was found, which breaks down into 88.54 TSCF of potential reserve and 97.26 TSCF of proven reserve. These number of reserves is higher in quantity than Indonesia’s crude oil reserve. The problem is, it was found in a remote area, precisely in the middle of the sea far away from islands of civilization. Only tanker pipes can transport the mined gas from that area by liquifying the gas (Santoso, 2014). Transporting LNG to the hand of customers also cost lower and more sustainable than transporting normal gases.

The utilization of LNG in Indonesia is far from ideal, and poor infrastructure, lack of socialization to alternative energy utilization to the public, and government’s low effort in optimizing LNG are the reasons behind it. Through the lens of energy security, the LNG sector can be made as an implementation instrument by Indonesia in implementing their energy security to evenly distribute the energy with accessible price. Other benefits that include in this instrument are granting Indonesia energy stability, reducing energy imports, and increasing
alternative energy exports, thus giving opportunity for Indonesia to level up their confidence in the global energy trade.

LITERATURE REVIEW
Energy security is a broad concept that is dependent to the context of a study. At first, energy security is a concept that heavily relates to oil supply accessibility, but now the concept has evolved to include more sectors such as technology, gas, and renewable energy. Studies related to energy security now also covers oil and gas price, considering how both commodities are profoundly traded in the global market. The evolution of this concept shifts from just addressing the supply of oil and gas to a broader concern that includes economy design related to commodity price. Furthermore, energy security now also heavily relates to robustness of a system and the infrastructure of oil and gas supply, considering how the production now faces modern challenges like cyber-attack, terrorism, and natural disaster on certain regions (Ang et al., 2015).

Experts classify energy security concept into four main elements that is more notable with Four A’s: availability, affordability, accessibility, and acceptability. The first element, Availability, focuses on problems related to the geologically availability of energy. Second element, Affordability, focuses on the commodity’s economical aspect. Third element, Accessibility, focuses on how actors access energy source in the middle of geopolitical challenges. Lastly, Acceptability, is the element that focuses on external factors that include public and environment acceptance of the provided energy (Kruyt et al., 2009).

The energy security study is a multidisciplinary study. This study can be seen through three different perspectives: Political Studies, Science, and Economy Studies, whereas the three give different approaches to the concept. Political Studies addresses the concept with sovereignty aspect-approaches where energy supply is seen as an interest that must be secured despite the pressure from increasing demand of energy and geopolitical tension. On the other hand, Science focuses on the supply of the energy and technical capacity building, while as for Economy Studies, focuses on sensitivity of energy market against changes which can result in price fluctuation (Cherp & Jewell, 2011).

Studies related to energy security, especially to LNG commodity, is still lacking. Research on energy security about LNG mostly focus on importers like China, India, Japan, South Korea, and Taiwan, whereas these nations are recommended to impose energy diversification from other sources to maintain their energy security in the future (Vivoda, 2019). Most Asian importers utilize LNG for industrial needs and power plants in high quantity. Increasing demand of LNG among Asian nations, especially after Japan shifts their main energy source to LNG after Fukushima Dai-Ichi tragedy (Hayashi & Hughes, 2013), makes the price remain high and strong until now.
METHOD
This study uses literature study to obtain data about Indonesia’s policy on LNG. Data includes government’s regulation on LNG, LNG management and other production-related, the dynamics of LNG demand in domestic market, sourced from articles from corresponding ministries, research reports, journal articles, and internet. This article focuses on analyzing Indonesia’s energy security policy on LNG from the perspective of policy form to types of strategy implemented by the government to respond the dynamics of LNG demand.

RESULTS AND DISCUSSION

LNG Condition in Indonesia
The history of Indonesia’s oil and gas industry can be traced back to the end of 19th century. Indonesia’s long history of oil and gas places the industry as an essential sector for the national economy. Based on the data from Ministry of Finance of Indonesia, the oil and gas sector is one of the most reliable sector in the economy, contributing as much as 6.2% of total national income (Kementerian Keuangan, 2019). Other than directly contributing to the national income, the oil and gas sector also boosts overall economic activity.

Indonesia’s natural gas industry started developing in 1960s. The industry emerged due to gas demand from the fertilizer industry, mainly from Pupuk Sriwijaya, a company from South Sumatera. Demand for natural gas also rose in Java, whereas industries and power plants started to demand for natural gas for their operational needs. In 1977, Indonesia started exporting natural gases extracted from Bontang Refinery, then Arun Refinery a year after (Kementerian ESDM, 2018).

Existing gas supply chain in Indonesia consists of upstream business unit and downstream unit. The upstream unit focuses on exploration and production, whereas the downstream unit focuses on processing, transporting, and marketing. The chain starts with exploration of natural gas reserve exploration, then production of the commodity which consists of extraction of natural gas from the reserve and distributed to the downstream unit. Extracted gas gets processed to purify the commodity into different grades of quality. The processed gas then later transported to the market to become accessible for the consumers. Trading process is the last chain of gas supply where consumers get to buy the processed ready-to-use gases (Nugroho, 2004).

The main motor of Indonesia’s gas industry is government-owned enterprises holding with Pertamina, a state-owned enterprise, as the head of the holding. In this holding, the company responsible to manage industrial activities of natural gas, including LNG, is Perusahaan Gas Negara (PGN). As the main mandate holder in Indonesia’s natural gas industry, PGN acquired some gas sector enterprises, such as Pertamina Gas (Azzura, 2018). The acquisition was meant to improve the productivity of national natural gas industry into more focused direction by compacting the energy industry structure in Indonesia.
One of Indonesia’s main gas commodities is LNG. Indonesia is one of the most important players in global LNG trade. Indonesia owns 1.53 of world’s gas reserve and is one of the five biggest LNG exporters in the world in 2017. Furthermore, The Ministry of Energy and Mineral Resources (MEMR) stated that LNG will take bigger role in national oil and gas business scheme in the future, targeted to take 24 percent of the energy mix by 2050 (Kementerian ESDM, 2019). The majority of Indonesia’s LNG production are meant for foreign trade, while domestic utilization of LNG is only meant for power plants and industrial needs. However, it is expected that the domestic demand of LNG will rise with the upcoming 35 gigawatts LNG-based power plant.

By 2020, the LNG production in Indonesia mainly comes from three different refineries: Badak LNG in East Kalimantan, Tangguh LNG in West Papua, and Donggi-Senoro LNG in Central Sulawesi. Indonesia’s old-reliable LNG refinery, Arun refinery, stopped extracting natural gases in 2015 and shifted its focus only on regasification. Based on the data by MEMR, Indonesia’s LNG production volume in 2018 exceeded to 19 million of tonnes, whereas Badak LNG produces 8.5 million tonnes, Tangguh LNG 8.2 million of tonnes, and Donggi-Senoro LNG 2.3 million of tonnes (Kementerian ESDM, 2018).

The trend of LNG production in Indonesia weakened in the past few years. In 2021, the number is projected to weaken by 2.9% compared to the previous period (Katadata, 2021). However, by looking at abundant potential of Indonesia’s gas reserve, Indonesia owns natural gas reserve of 142.72 TSCF consisting of 100.36 TSCF of proven reserve and 42.36 of potential reserve. The majority of Indonesia’s natural reserve centers at southern part of Sumatera, including East Natuna, and eastern part of Indonesia, including Kalimantan, Sulawesi, Nusa Tenggara, Maluku, and Papua (Kementerian ESDM, 2018).

The government of Indonesia has implemented several regulations on natural gas management. These regulations are contained in the Law, Government Regulation, and Ministerial Decree of MEMR. All technical management of natural gas resources in Indonesia is regulated on UU (Law) no. 79 of 2014 on National Energy Policy where the Government Regulation regulates on the target of meeting national energy needs by 2050. In a more specific and technical scope, the Government of Indonesia imposes policy on natural gas through Ministerial Decree of MEMR no. 6 of 2016 on Provisions and Procedures for Determining the Allocation, Utilization, and Price of Natural Gas. The decree regulates Indonesia’s Natural Gas Balance that is composed annually.

**Indonesia’s Policy and Strategy on LNG**

Energy plays significant role in the production of multiple economy sectors. Other than supporting production, energy is also used for people’s personal consumption. The importance of energy is the reason of why energy shall be utilized to its maximum capacity for public interest. Energy management must also refer to sustainable development principles. One of Indonesia’s primary energies today is natural gas. In this term, Indonesia utilizes natural gas to fulfil their
domestic industrial demand, such as for power plants, and to supply international demand through exports (Buana & Agristina, 2018).

The importance of energy as the backbone of the economy demands proper management that can meet domestic industrial needs and efforts in developing supporting infrastructures. Natural gas, as one of Indonesia’s sources of energy, plays significant role in both domestic and foreign industrial demand. It is also a substitute of primary source of energy like coal and crude oil.

Considering its important role, the demand of natural gas keeps increasing from year to another. Due to the increasing demand, Indonesia holds strategic position as one of the nations that own natural gas production. However, Indonesia’s gas industry output continues to decline. Several domestic problems play as reasons to why the output keeps declining. Delays in infrastructure in the field as well as domestic prices that are set too low to attract new investment are considered as factors that cause a decline in the output of the gas industry. Foreign trade competition in natural gas production with China and Russia is also an external factor that slows Indonesia’s natural gas development. Increasing gas supply is important in considering the allocation of gas output both to meet domestic and international demand (Dutu, 2016). These are the challenges for Indonesia as one of Asia’s LNG exporters and as the main domestic supplier in maximizing their production. From these issues, the government is called to open and continue new and existing projects in order to increase natural gas production.

Rising domestic demand for natural gas comes from power plants. It is expected that the demand will continue to rise to 154% per 2016 until 2050. This is due to the rising demand to electrical power consumption. Indonesia’s gas pipelines currently centralize in Java and Sumatera, and soon will be decentralize to other regions for more gas supply (APEC Energy Working Group, 2019). It is very important to increase efforts to provide a wider gas pipeline network so that the increase in domestic demand can be met from supply sources at the domestic level.

Referring to the Appendix of Presidential Decree no. 22 of 2017, there are several targets set by the Indonesian government in developing natural gas sector: 1.) Setting target to produce 6,700 million cubic feet daily by 2025; 2.) Decreasing natural gas export by 20% in 2025 and stopping overall gas export by 2036; 3.) Forming national gas supporting body in managing natural gas price settings; 4.) Increasing natural gas reserves; 5.) Completing project targets to corresponding due dates; 6.) Finishing natural gas infrastructure according to the set targets; 7.) Commercialization of prototype drill tower; 8.) Fixing competitive gas price especially for domestic market; and 9.) Decreasing the number of LPG imports (Indonesia R., 2017).

Government regulation on cutting subsidy on fuel and boosting gas utilization also plays significant role in increasing demand of gas. It is why the Indonesian government prioritize gas supply for domestic demand such as for power plant development outside Java, fertilizer production material, and petrochemicals. Moreover, the ban on the export of raw materials is expected to support the fulfillment of domestic gas demand. Java, South Sumatera, and West Sumatera dominate domestic demand on gas. This is because the three regions are the central of
gas pipelines in Indonesia (Soetirto, 2016). Alas, we can conclude that the supply of Indonesia’s natural gas is prioritized for domestic plantation demand, which requires sufficient infrastructure to cater the supply chain.

One of the government’s efforts in increasing utilization of domestic gas is by regulating power development proposed by PLN (State Electricity Company) from 2018 to 2027. The development focuses on developing power plants that utilize gas fuel. This scheme is expected to be able to help fulfilling national electricity demand that continues to rise annually (Siahaan, Pratiwi, & Setyorini, 2020).

Regulatory policies related to gas are important given the increasing demand for Indonesian gas, but on the other hand, the volume of available gas is estimated to decrease to 44 MTOE in 2035. This increase doesn’t only come from domestic demand but also from export commitment. It is expected that the value will continue to rise by 60.9 MTOE in 2040 from 58.8 MTOE in 2020 (ERIA, 2021). This becomes Indonesia’s biggest challenge in natural gas supply because the demand is higher than what the nation can supply. Therefore, the government needs to impose gas management regulation to meet both domestic and foreign demand (export).

Given the limitations of the supply volume that is estimated to decrease, the utilization of natural gas is more directed to uses that have high-added value, such as for the industrial sector, transportation, household, and electricity sector. This utilization plan is regulated in Government of Indonesia Regulation no. 79 of 2014 on National Energy Policy Article 12 (Indonesia P., 2014). The policy regarding the priority of the use of natural gas is expected to meet domestic demand adjusted to the existing availability.

This decrease in volume resulted in the shift of the function of natural gas infrastructure like the case of Arun Terminal, which was previously meant to facilitate exports, that changed its main function to facilitate imports. Similar to this case, Bontang Reginery doesn’t optimally operate to its core function. In effect, the government anticipated the decreasing supply volume of natural gas was anticipated by expanding more projects such as in Banyu Urip, Donggi-Senoro, Jangkrik, and Tangguh, but these projects are proven to have failed in overcoming the problem. (Agarwal, Agarwal, Hansmann, Vivek Lath, & Yi, 2020). This decrease in natural gas volume certainly encourages the need of optimizing existing natural gas facilities. Project expansion is only one of few alternatives to respond limitation of gas production. The government considered this expansion as an investment; thus, the development needs high level of care in its development.

Government policies on the development of large gas fields are expected to encourage industrial players to enter the LNG business. However, developing the LNG is not an easy task for Indonesia’s government. The government faces troubles in optimizing LNG utilization in domestic level. The utilization of LNG in domestic level requires support from integrated policy that bind transportation sector and industrial sector. LNG pipelines is also important to bridge Indonesia’s LNG source that centralizes in the eastern part of the nation, to the hands of consumers that mostly reside in the western part of the nation. Therefore, the government needs to conduct policy that cover throughout the overall process, from production phase to the
distribution facility (Kontan, 2021). In other words, the government needs to pay attention closely in creating cross-sectoral policies and development of pipelines of LNG.

Distribution network holds the key to Indonesia’s gas distribution problem. The development of shipment route is one option that is considered economical and efficient in transporting natural gas (Siahaan, Pratiwi, & Setyorini, 2020). Limited distribution infrastructure results in diesel-based power plant domination in remote areas. By developing distribution network, remote areas can shift their diesel-based power plants to gas-based power plants, which also encourages the change in the use of petroleum into natural gas. Subsequently, the shift will reduce fuel costs, carbon footprints, and save more energy (Kaming, Koesmargono, & Aji, 2019). Government policies that encourage the use of gas as a fuel source require a better distribution network.

Building gas-based power plants can also overcome limited supply of electricity against its growing demand. One example of this imbalance between supply and demand can be seen from the electricity deficit that occurred in North Sumatra in 2014 (Budiyanto, Pamitran, & Yusman, 2019).

The increase in electricity demand is estimated to reach 7%-8.5% per year until 2022. The development of the LNG supply chain is important considering that Indonesia has natural gas resources in the eastern part of Indonesia and most of the demand is in the western region, especially in Java and Sumatra. The development of the LNG supply chain emphasizes cost-effective aspects which are expected to overcome logistical barriers. This is a big challenge in making effective use of domestic natural gas resources (APEC Energy Working Group, 2019).

One of the alternatives to overcome oil and gas trade deficit is by increasing domestic gas production and export, though it might be quite challenging to implement. This alternative would push the government to engage collaboration and large-scale investment with industrial players. The Indonesian government has by far developed additional LNG facility that is expected to increase quota for exports. It is LNG Tangguh, a refinery train that is built in collaboration with British Petroleum (BP). This train adds more production quota of Indonesia’s LNG to 33.1 million tonnes annually by 2027 (Harsono, 2020).

Indonesia’s policy on LNG is inseparable from the dynamics of gas market. For this issue, the government has to find new source of gas for domestic demand. So far, the government has imposed replacement of solar to gas in national power plants. Moreover, the development of capital-supplied small-scale LNG (SSLNG) chain supply is also government’s priority. Today’s challenge is not only about on supply sector, but also on market price that fluctuates over the time. This is because Indonesia’s gas price is still traditionally indexed to oil price (Adhiguna, 2021).

From this section, we can conclude that Indonesia’s government policy on LNG focuses on the dynamics of demand and production, infrastructures like distribution pipelines, priority setting of related industries, and optimization of existing projects. Through these policies, Indonesia is expected to be able to fulfil the domestic demand of gas and their commitment to gas export.
Indonesia’s Energy Security on LNG
The world’s energy consumption, especially natural gas consumption, is massive. On daily basis, natural gas is needed for fuel production, industrial operations, and our daily consumption. This condition is rather benefiting for Indonesia. For example, in 2015, Indonesia is on of the top 10 gas producer in the world and third biggest gas reserve in Asia-Pacific (Sysadmin, 2020). The potential of gas that Indonesia possesses is prospecting, especially for countries that don’t have sufficient reserves to meet their domestic needs.

Indonesia produces LNG and LPG (Liquified Petroleum Gas) where in comparison, LNG is more benefiting than LPG. LNG is non-toxic, odorless, easy to store and transport for its liquid form, and more sustainable (low emission production) (Santoso, 2014). It is why LNG utilization can be a great opportunity that can give Indonesia energy security stability for its prospecting potentials.

There are multiple components that can be analyzed from energy security concept, and one of them is sufficient supply of energy (Keliat, 2006). In this component, the most common root causes to insufficient supply of energy are instability of demand and supply, geographic distribution of reserves, and price diversification and incentive. To that causes, through LNG utilization, Indonesia can maintain their natural gas security by keeping the supply intact. From its characteristics, LNG is easy to transport for its liquid nature with the volume able to shrink to 1/600 of its original value to gas form (Nuswantara, Priharnanto, & Wibawa, 2014). These characteristics also make LNG easier to produce, hence more effective in fulfilling high demand of natural gas in the market, easier to store for longer period in places that have no direct access to natural gas reserves, and easier to transport to the hands of customers.

Indonesia shall optimize LNG’s potentials by maximizing their position as large-scale natural gas producer. They have several reliable LNG refineries, such as Badak Refinery—the biggest nationwide producer in Bontang, East Kalimantan, the pioneer of Indonesia’s LNG Arun Refinery in Aceh, and Tangguh Refinery in Bintani Bay, West Papua (Fitra, 2019). From these refineries, Indonesia’s LNG production shall make the most of it for precise and significant distribution. When done optimally, these potentials will greatly support Indonesia in achieving their energy security.

Second component of energy security is sustainability. LNG is mostly methane with no sulfur and toxic compound particles, which makes it a cleaner fuel compared to diesel/solar. Its clean characteristic is proven to be low emission and more sustainable. This benefit produces lesser carbon footprints other than other types of fuel oil. The use of diesel/solar is highly prone to producing massive carbon footprints; by shifting to LNG, Indonesia will decrease pollution rate and keep their people’s lungs healthier. It is also in line with Indonesia’s commitment to reduce air pollution from fossil fuels by shifting to more sustainable energy (Santoso, 2014).

The third component of energy security is affordability. Fulfilling quantity demand of energy is costly. This is proven by how massive Indonesia’s consumption of fuel oil (diesel/solar) that comes from domestic and import production. As an alternative, Indonesia can utilize LNG as replacement of the mentioned fuels, with 30% cheaper price compared to solar
Kencana, 2020). Hence, Indonesia can fulfil their domestic needs of energy with cheaper cost by changing to LNG domestic production. By maximizing the supply and correct management of Indonesia’s LNG, import will no longer be necessary and distribution of energy will be easier.

Indonesia’s abundant LNG potential is a promising potential for alternative energy development. Conventional energy production like oil and coal is at stagnant growth, which makes alternatives like LNG are worth to be considered. Other than the abundant reserves, LNG is a more sustainable energy compared to conventional energy, because it produces lesser emission, and it is cheaper. However, with its prospecting benefits, there are challenges that must be overcome by Indonesia before utilizing their LNG potentials to maximum. It takes proper infrastructure to connect the source to the market and the hands of customers. The chain of custody of LNG is longer than fuel oil, which means it needs more infrastructure to sustain the production (SKK Migas, 2017).

Indonesia’s lack capability and poor technology are the major challenges. It takes advanced technology and facility to distribute LNG. The development of pipeline infrastructure that distributes gas to housing and industry must also be highly considered. In contrast, Indonesia’s today’s pipelines are still un integrated. The pipelines are only installed in Sumatera and Java region, but still unable to transport commodity from Sumatera to Java because the pipes have no open access (Ridwan, 2021). Other related challenge is to determine customers before production so the infrastructure development will be expeditious. The government must be able to design their target consumers far before production starts. In gas form, it can be handful to store, so it is better to have prospecting consumers prior to production (SKK Migas, 2017).

Other than transportation facility, storage facility is also a challenge in Indonesia’s LNG development. It can be hard to return its form to gas from liquid in normal storage facility, especially in a place far from the reserves, hence harder to be distributed to the consumers (Liputan6, 2015). Storage needs to have regasification facility and small LNG terminal to distribute gas for power plants in remote area (Umah, 2021). This is a challenge for consumers and industries in remote area because the location of the gas absorber is in an isolated area with small demand of electricity.

Lack of technology is hindering Indonesia’s effort in developing LNG production. The production process of natural gas, from extraction phase to distribution phase for customers, relies on proper technology on midstream (processing and transportation) level which Indonesia is still uncapable to provide (Ridwan, 2021). Geographical gaps like the concentration of natural gas reserves which are mostly sourced in eastern part of Indonesia are also a challenge. The vast archipelago nation is still unable to provide supporting infrastructures like LNG plant, LNG hub, and small-scale receiving terminal that are necessary to supply demand from the western part of Indonesia. It takes large quantity of skilled human resources to build the facilities. Labor competition, the aftermath of the ASEAN Economic Community (AEC), requires Indonesia to accelerate in creating skilled, competent, and certified local and domestic workers to fill LNG needs in the upstream sector (SKK Migas, 2017).
CONCLUSION
The increasing people’s productivity is followed by increasing people’s mobilization. People need to transport to fulfil their basic needs and to develop their economy in larger scale. This results in Indonesia’s expanding demand of energy, while the supply of conventional energy like oil and coal remains dampened. Indonesia still has to import the two commodities to keep their fuel oil supply intact, which burdens the nation’s financial condition. This challenge pushes the government to create solutions by diversifying sources of energy and shift to alternatives like LNG. LNG is currently the most potential source of energy in Indonesia for its easy distribution, easy storage, cheaper price compared to solar/diesel, and more sustainable-low emission characteristics which makes it suitable for distribution all over the archipelago, including remote areas.

Despite its benefits and abundant reserves, Indonesia is still struggling in optimizing their LNG potentials. The major challenge for this is infrastructure. To overcome it, Indonesia has to prioritize the acceleration of LNG infrastructure development; sufficient infrastructure holds the key to national LNG energy security. The government can also connect the distant gas reserves to center of industry and dominating consumer with supporting infrastructures, such as LNG plant, LNG hub, and small-scale receiving terminal. Prior to production, Indonesian government must map their prospective consumers first to ensure clear distribution for more effective and efficient process. Lastly, the LNG potentials must be optimized along with human resources development that can meet the demand of high-skilled labors to fill LNG production posts. Indonesian government must support local workforce by granting subsidy with easy access for competence test and profession certification so they can compete confidently against foreign workforce.

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