

## Research Paper (Thesis)

Subject of Dissertation:

**Environmental Issues in Coal Mining Development in Aceh,  
Indonesia**

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## **1. Introduction**

### **1.1. Research interest and choices of topic**

The author has an interest in this research topic due to his previous research and profession in the mining world, especially in the coal mining industry in Indonesia. Over the years, the author has seen that mining in Indonesia has experienced a tidal cycle and needs special attention to development in this sector. The mining business is a high risk and high return business, hence it requires very strict discipline and management systems to optimize the benefits obtained and reduce risks that can be fatal, mainly related to work safety. Factors that need to be watched out for are natural conditions that suddenly change and are enormous in which usually proved to be difficult to predict precisely, although it is possible to reduce the negative effects. Author's experience in coordinating and consulting with various mining companies, mining consultants, the central government of Indonesia in Jakarta and the local government of Aceh, have made him question whether the possibility of the most effective method to reduce the negative impacts and excessive assumptions of both local and national communities regarding coal mining by combining methods, technique, that were previously unthinkable or already made but were not well conceptualized to provide maximum benefits for both financial and social aspects. As a researcher and practitioner in the field of mining activities, the author feels the need to create an integrated concept and reform the current system to create a more comprehensive and integrated mining management and mining business system. This initiative is also in line with the development of global research, attention and discussion on the ecological and social issues of the community in which it can be a good value and image for the company and the government.

The focus of this research is to collect data, both in the form of quantitative and qualitative, from several companies, government institutions, and professional organizations and to analyze, equalize and find patterns along with opportunities that could augment the current common practices into the best practices.

### **1.2 Structure of the Dissertation**

Chapter one is an initial explanation of the background of thinking related to the choice of this research topic dissertation with other supporting factors. Relevant literature divided into six sections. The first part explains what mining activities are, especially for coal mining. The second section describes industry overview of the mining industry itself both in global, regional, i.e., South-east Asia, national, i.e., Indonesia, and provincial level, i.e., Aceh. Furthermore, the third section describes several utilization and end products of coal, not only focusing for power plant's needs. Moreover, it is well known that coal has negativities where people refer to as 'black business', which is covered in the fourth section of its statement of problems. Subsequently, those previous explanations can be connected to the nine hypotheses that emerge which also cover previous research, existing theories, international and national cooperation, the role of government institutions and professional and developmental organizations, the latest technology and potential to be applied. Chapter two explains the research questions, limitation of the research, selection of samples, design and methodological approach used for investigation, possibility and prevention of insider role and bias as well as data collection. In this study, it was explained regarding the importance of conducting interviews and realist evaluation methods and

implementation and evaluation with action research methods to get the best results according to the development and characteristics of each specific topic under study. Following previous explanations, further elaboration and assumptions leads to strategic planning, changes and transformation including research scope. Moreover, it also explains the research methods on diagnosing, action planning, realist evaluation and specifying learning which bring everything to the critical analysis, that consist of list of problems and solutions regarding coal mining business and activities, hypothesis and results of coal mining development in Aceh, recommendations for mining company in Aceh, including recommendations for Provincial and Central Government of Aceh and Indonesia. Chapter three as the concluding part explains the summarize results of this research and how the future will be for mining in Indonesia.

### 1.3 Coal Mining

Natural resources have been well known to be one of the essential parts of every living being. Defining natural resources is quite difficult due to the intuitive idea that most people have regarding what natural resources are and will lead to future problems when dealing with ambiguous cases. However, for the purpose of this research in the field of business, it could consider the World Trade Organization (WTO) definition of natural resources as “stocks of materials that exist in the natural environment that are both scarce and economically useful in production or consumption, either in their raw state or after a minimal amount of processing” (WTO, 2010, p. 44) Referring to the definition, due to the scarcity, it is needed to properly manage the extraction activities in order to maximize its potential. For non-renewable natural resources, oil, gas, coal, and minerals have been prioritized and developed decades ago, with the extraction processes called mining. Its definition, as stated by the Law of the Republic of Indonesia/*Undang-undang Republik Indonesia* Number 4 Year 2009 regarding mineral and coal mining is defined as “part or all of the phases of activities in the framework of research, management and exploitation of minerals or coal including general investigation, exploration, feasibility study, construction, mining, processing and refining, transportation and sales, and post-mining activities.” Mined natural resources are used as raw material or ingredients needed for producing goods and energy, such as electricity. It can be categorized into three different types, in a broad view: surface, underground, and *in situ*, i.e., solution mining. The latter has limited application and sometimes used to exploit residual mineralization as grades drop at the surface or underground mines. Surface mining is commonly dominated by open-pit (e.g., base and precious metal ore extraction) or open cast (e.g., coal operations).

Underground mining method is sometimes used to extract ore from beneath or in the vicinity of pits, considering that further extension open pit operations are not economical or technically feasible. Open-pit mining is preferable in most of the mining activities due to its simpler and less risky operation. However, sometimes it is also occurring in the area that already finished with the closed-pit in several areas and another reserve is found and it becomes profitable to do the open pit. Factors that influence the choice of mining method include the size, shape, dip, continuity, depth, and grade of the ore body; topography; tonnage; ore reserves; and geographic location (Warhurst and Noronha, 1999). Aside from the kinds of operation methods, mining is also accompanied by several processing activities upon each category. Pure or homogeneous materials processing is limited to crushing or sizing (e.g., some natural zeolite extraction, quarried rock) or washing (e.g., some coal operations) which are both categorized as simple processing that is only possible where the target minerals

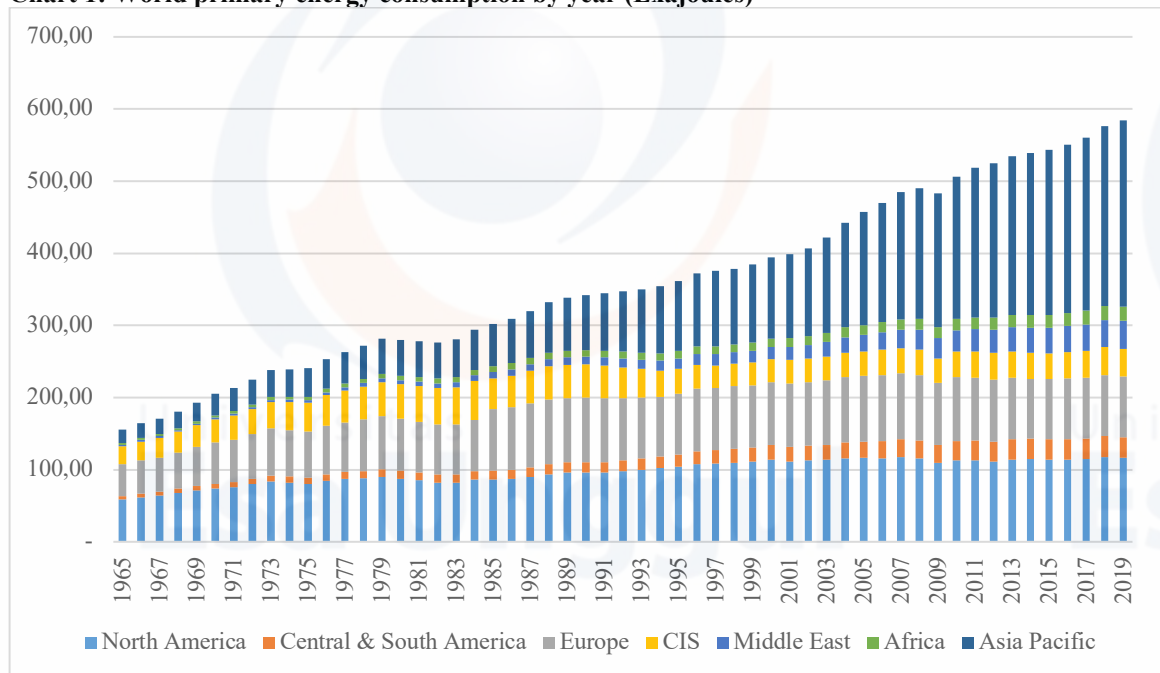
form the majority of the material mined. In these cases, the main environmental releases, effects, and impacts are associated primarily with the mining itself rather than subsequent processing. The subject of this research is mainly concentrated to coal which has been defined as "a name for a group of rocks, usually dark-colored and predominantly organic in composition, that is related to its origin, being derived from compacted, indurated, and variously altered remains of plants" (Schopf, 1966) along with its operational activities and impacts.

## 1.4 Industry Overview

### 1.4.1 Global Phenomenon

The mining sector has been recorded as one of the biggest outputs for global trading. Hence, many investors have been attracted to invest their money in this sector. It happens due to many products requiring the use of mining materials as its ingredients, which makes the role of such industry to be very vital for the advancement of technologies and researches that are in line with the necessity to produce higher quality products.

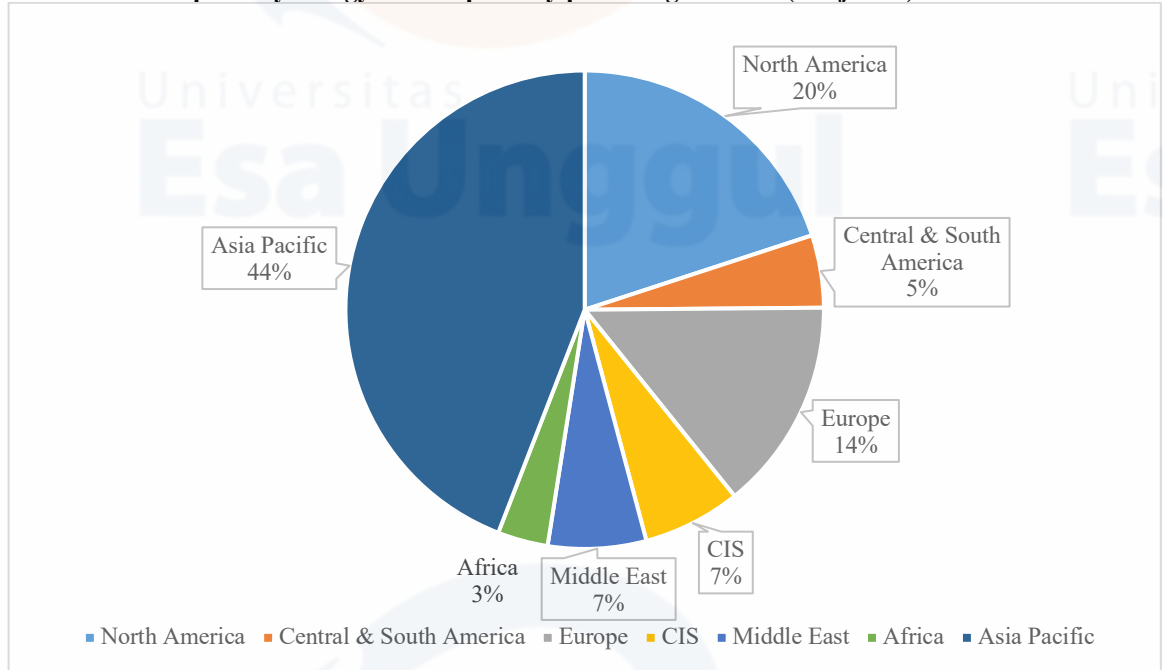
**Chart 1: World primary energy consumption by year (Exajoules)**



Source: BP Statistical Review of World Energy

One of the main supplies of the mining industry is energy, which began from the era of the industrial revolution has become a basic requirement for daily life activities, where the world's primary energy consumption growth for decades rose by 2.53%. In 1965 it was only 155.69 Exajoules, and in 2019 it was raised to 583.90 Exajoules (Chart 1). "Primary energy comprises commercially traded fuels, including modern renewables used to generate electricity. Energy from all sources of non-fossil power generation is accounted for on an input-equivalent basis" (BP, 2020). It shows the important role of the mining sector for the world economy and is expected to continue to grow in line with global growth and demand across sectors.

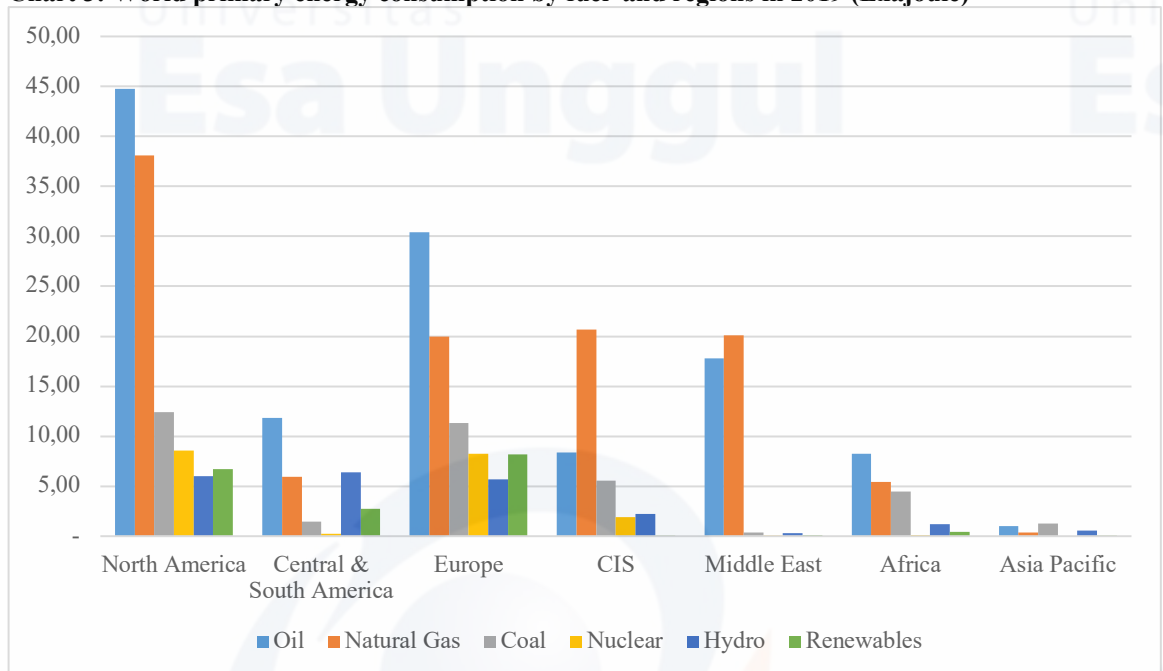
**Chart 2: World primary energy consumption by percentage in 2019 (Exajoules)**



Source: BP Statistical Review of World Energy

In terms of percentage, the biggest energy consumption percentage in 2019 happens in the Asia Pacific Region, wherein 2019, it amounts to 44% of the total world primary energy consumption (Chart 2), which is equal to 257.56 Exajoules. The region with the second largest consumption of primary energy is North America at 20% or 116.58 Exajoule which is in accordance with the population and the number of industries and offices in the region, followed by Europe at 14% or 83.82 Exajoules, Middle East by 7% or 38.78 Exajoules, the Commonwealth of Independent States (CIS) by 7% or 38.68 Exajoules, and the last is Africa by 3% or 19.87 Exajoules.

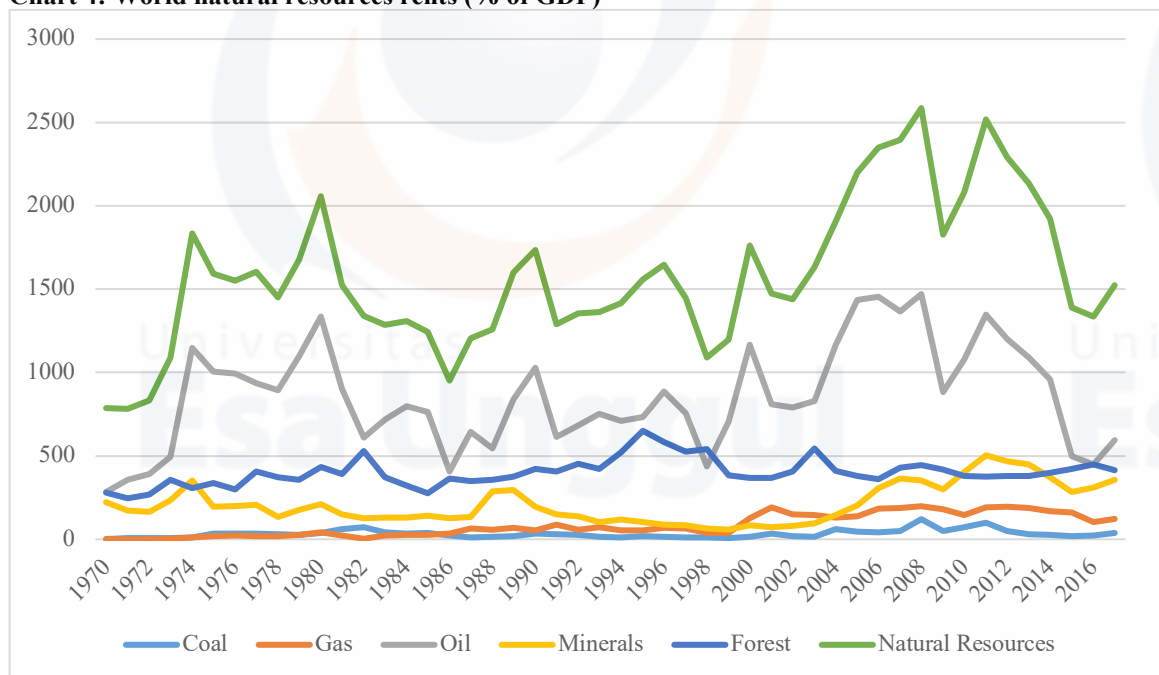
**Chart 3: World primary energy consumption by fuel and regions in 2019 (Exajoule)**



Source: BP Statistical Review of World Energy

If the data is divided into several types of fuel for world primary energy consumption (Chart 3), coal is nominated as the third-largest contributor to world energy production after oil and natural gas in 2019, at 11% or equivalent to 36.9 exajoules while oil has a contribution of 37% or 122.5 exajoules. As have been previously explained (Chart 1 and Chart 2), the North America region currently has the largest amount of coal energy consumption followed by Europe and CIS. It is widely used for several other purposes such as construction and manufactures. The second largest fuel for energy consumption is natural gas by 34% or 110.5 exajoules. Such information raised many questions even though the current global trend is to prioritize new and renewable energies, their total consumption of energy is still significantly smaller compared to fossil fuels (e.g., oil, natural gas and coal). Of the total world energy consumption, hydro only contributes 7% or 22.3 exajoules while other renewables have only amounted to 6% or 18.2 exajoules. This insignificant amount occurs due to high cost of energy production and difficulties to distribute or transfer the energy to other regions for renewables. Nuclear, which is an alternative energy, has a portion of 6% or 19.2 exajoules. It is assumed that the development is constrained due to its high level toxicity generated waste and related natural disasters, especially in Ukraine, i.e., Chernobyl and Japan, i.e., Fukushima, which can endanger the population due to the impact of radiation.

**Chart 4: World natural resources rents (% of GDP)**

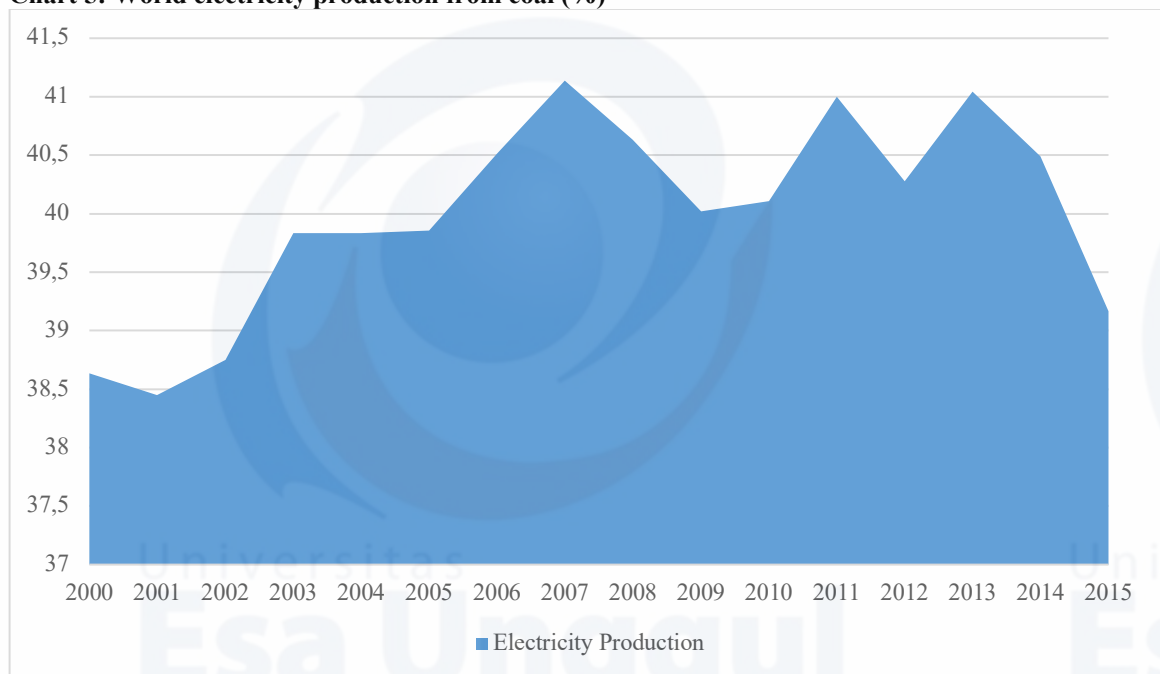


Source: World Bank

In addition to the needs, the utilization of the proceeds from the production and sale of coal becomes a substantial profit for countries with huge natural resources, especially related to the fossil fuels for energy sector through natural resources rent. By definition according to the Organization of Economic Cooperation and Development (OECD), "The economic rent of a natural resource equals the value of capital services flows rendered by natural resources, or they share in the gross operating surplus; its value is given by the value of extraction. Resource rent may be

divided between depletion and return to natural capital,"<sup>1</sup> where generally this data is shown by a percentage comparison of Gross Domestic Product (GDP), of related countries to show the contribution of natural resources. This can be a factor in considering the plans and policies taken in developing their strategic and economic resources. This can be seen clearly from the percentage of natural resource rent to GDP, where from 1970 to 2017, fossil fuels such as oil had the highest percentage position followed by other fossil fuels such as gas and coal, along with minerals and forest rent. The numbers for fossil fuels continue to change drastically from year to year and continue to decline in recent years. Mineral rents had surpassed coal in 2012 but declined again. The highest peak occurred in 2008 and had dropped in 2010 but again skyrocketed in 2012. In 2017, the smallest percentage was owned by coal due to the combination of other resources and huge domestic consumption for this type of energy source. Thus, fossil fuels are still a major factor and cannot be replaced significantly in the movement and economic growth of countries on a global scale.

**Chart 5: World electricity production from coal (%)**



Source: World Bank

As one of the key sources of electricity generation, it is vital to keep the supply of coal to support the development of modern infrastructures such as transport systems, equipment, and high-rise buildings. The percentage of world electricity production from coal continued to increase from 2000 but had dropped in 2008 by 1%, in 2012 by 2% and in 2014 by 3% (Chart 5). Annual average growth occurred around 0.10%, in which the changes in the price of oil and natural gas play an important role in this volatility where both are substitutes of coal. Leading energy forecasters, namely the International Energy Agency (IEA) suggest that coal will have a central role to play in energy generation and in industries, such as steel production, for decades to come. Despite the IEA's New Policy Scenario, which assumes promises on funding renewables and building nuclear power plants by governments will be implemented, coal consumption will be still likely to increase with little adjustment in the global energy-mix. It signifies the importance of coal in the future energy-mix and is not

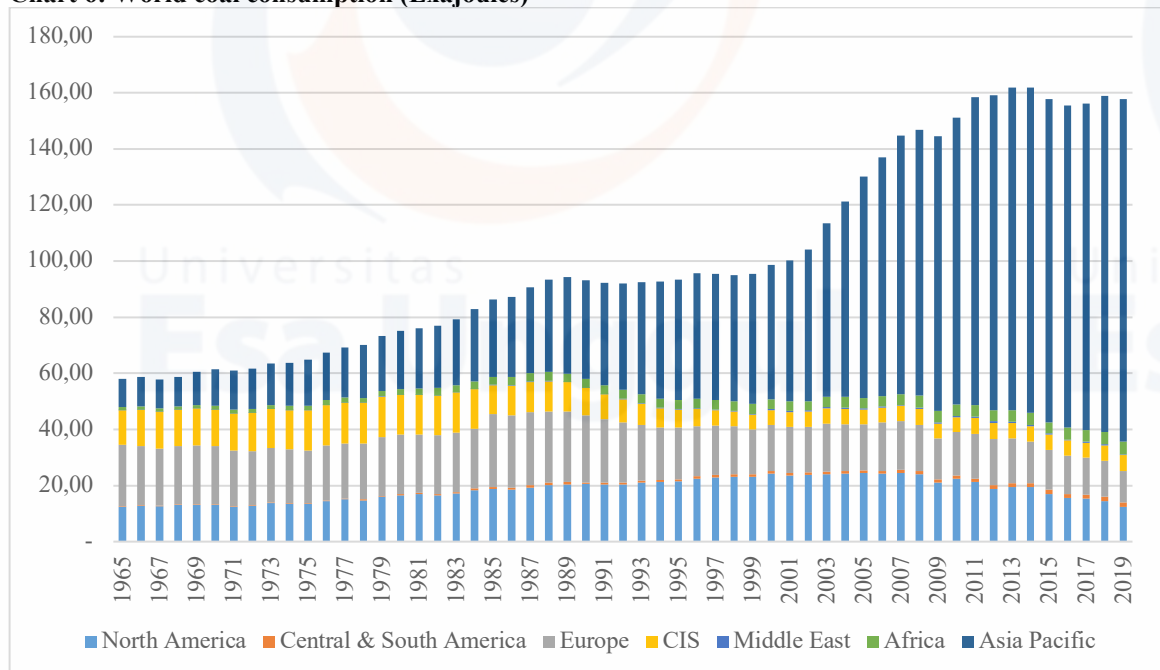
<sup>1</sup> OECD, Glossary of Statistical Terms, "Natural Resources Rents," //https://stats.oecd.org, (20 January 2020).

possible to be ignored in the global climate debate. There are two steps to reduce the emissions from coal; by utilizing the high-efficiency low emissions (HELE) power plants and the carbon capture and storage (CCS).

Several reports and regulations related to coal have been published and advised by the World Coal Association (WCA), a global network where many coal producers across the globe gather on a joint effort to encourage the acceptance of coal as one of the essential commodities in the recent and future's industries as well as the common goals to sustainable mining and lower-carbon energy. They claimed that WCA members account for 20% of global coal production and 31% of coal exports. In brief, the particular strategic objectives are divided into four points, such as:

- a. Influencing and engaging - strengthen their influence by engaging global thought leaders and policymakers in the rational, data-driven debate to position the coal industry as responsible and progressive;
- b. Powering economies - demonstrate that coal plays an indispensable role in addressing energy poverty, supporting urbanization and delivering economically competitive energy to support modern economies in developed and developing countries;
- c. Meeting environmental challenges - demonstrate that global climate ambitions can only be achieved with significant international support for cleaner coal technologies;
- d. Building sustainable societies - demonstrate that coal production and use contribute to the development of prosperous and sustainable societies.

**Chart 6: World coal consumption (Exajoules)**



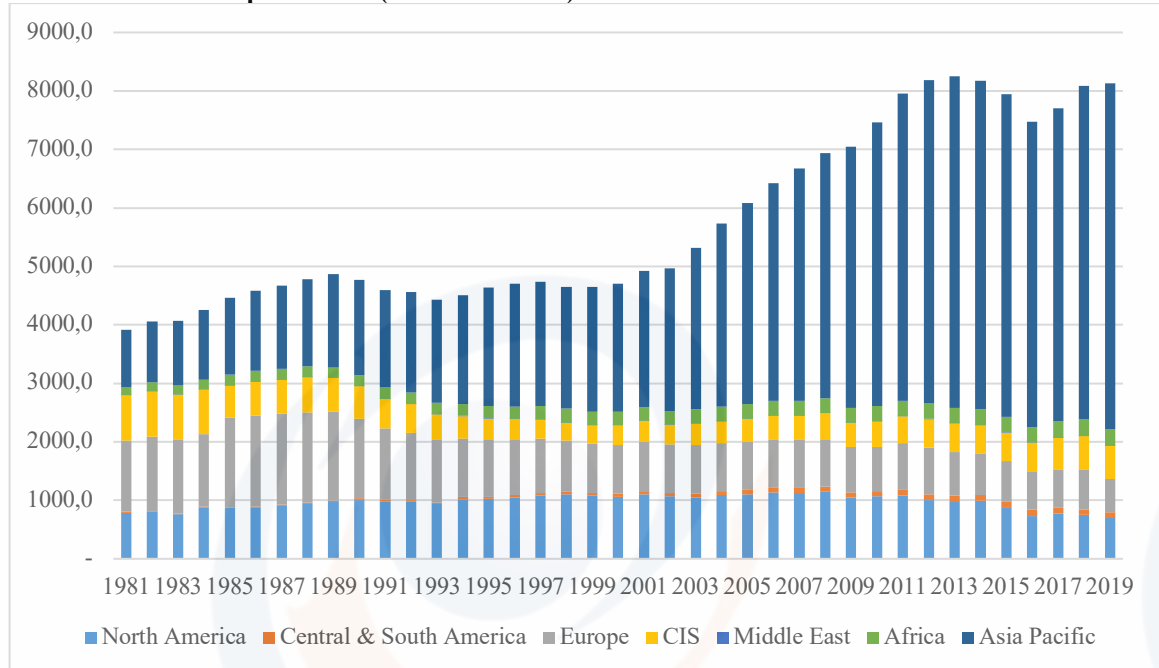
Source: BP Statistical Review of World Energy

World coal consumption continues to rise from year to year, with an annual average growth of 1.9% from 1965 to 2019 (Chart 6). The decline had occurred a little in 2009 and continues to grow significantly afterward even though it experiences some little drops in 2015 and 2016 which subsequently rose in 2017 and 2018. The data were grouped to several geographic areas such as North America, Central and South America, Europe, CIS, Middle East, Africa, and Asia Pacific. The largest annual



average growth came from the Middle East region with 7.39 % while in the current decade, i.e., 2009-2019, highest growth came from Asia Pacific region with 2,5% as the largest coal consumption that count as 77% of the world coal consumption in 2019 or equal to 122.22 exajoules. The most significant decline occurred in North America with an annual average growth of -5.75% in the current decade, which related to the issue of global warming and environmental pollution. In total, world coal consumption in 2019 is around 157.9 exajoules.

**Chart 7: World coal production (Million tons/Mt)**

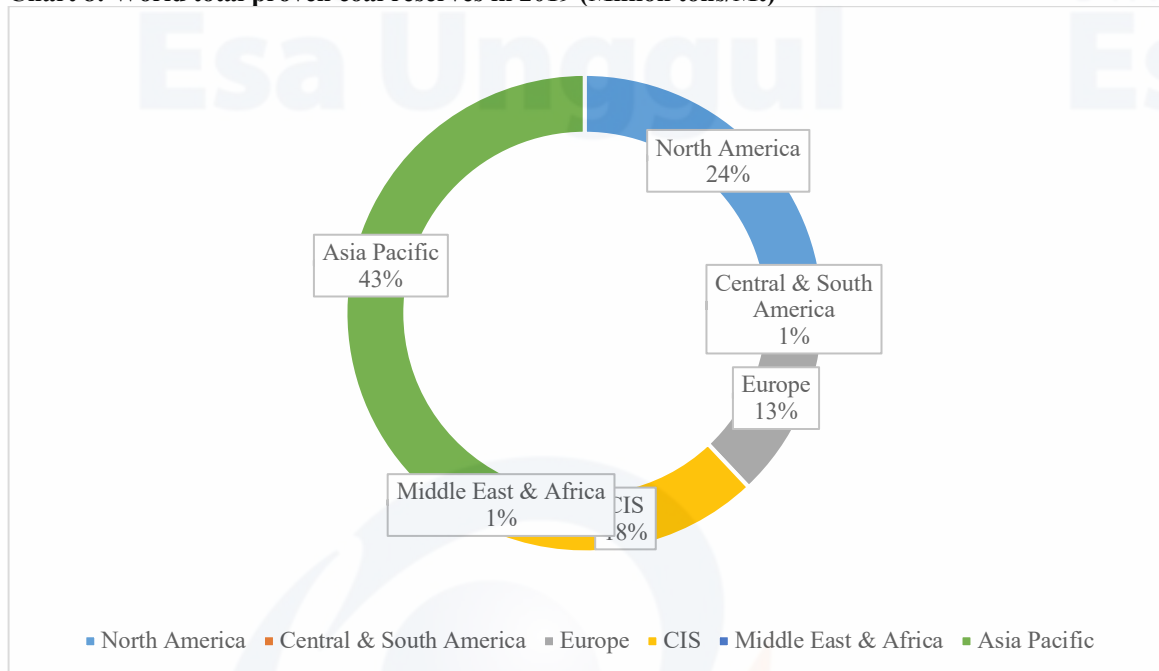


Source: BP Statistical Review of World Energy

On the other hand, coal production is also important to be observed since it serves as a trade commodity and to supply the electricity and other related needs. The increase in changes in the amount of consumption also triggers a change in the amount of production, which is almost exactly the same as the movement of its consumption (Chart 6). The data were also grouped to several geographic areas such as North America, Central & South America, Europe, CIS, Middle East, Africa, and Asia Pacific. The growth of world coal production is an annual average of 1.39% which has a difference of 4,212.9 Mt from year 1981 to 2019, with the highest increase coming from the CIS and Asia Pacific regions of 3.66% and 3.15%, where the latest is equal to 73% of the world coal production or 5,911.8 Mt (Chart 7). The amount of world coal production is only slightly more than its consumption. North America has the second largest production and the largest decline in consumption, while the decline in production was recorded at only -4.41% on an annual average of recent decade due to increased consumption needs in the Asia Pacific which is the biggest consumers and producers of coal. The third and next largest coal production is owned by the European region with a -3.25% growth, CIS with a -3.66% growth, Africa with a 1.18% growth, Central and South America with a growth of 0.81% growth and the Middle East which is the region with the least coal production along with a growth of -0.47% on the current decade. Geologically, the Middle East region, especially in the Arabian bay, has a much larger oil deposit and is not suitable for coal formation. This is one of the main factors that caused a small amount of coal production followed by its decrease

due to the significant amount of oil which makes it a more attractive and cheaper option for them.

**Chart 8: World total proven coal reserves in 2019 (Million tons/Mt)**



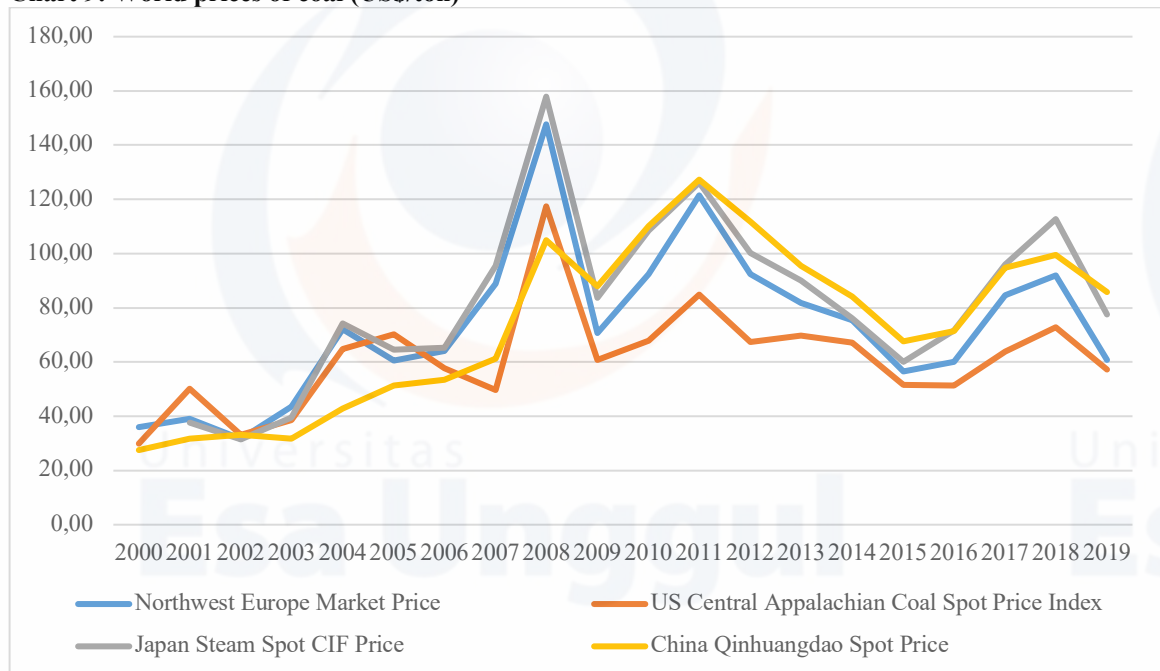
*Source: BP Statistical Review of World Energy*

Production and consumption planning certainly requires the available data on existing resources to provide realistic and practical analysis. In 2019, world coal reserves were recorded at 1,069,636 Mt, where the largest amount is in the Asia Pacific region with a percentage of 43% of the world's coal reserves or equivalent to 456,813 Mt (Chart 8). Interestingly, although the CIS region has small coal consumption and production, its reserves are the third-largest in the world after Asia Pacific and North America with a percentage of 18% of the world's coal reserves or equivalent to 190,655 Mt. As a nation with the largest coal production and consumption in Asia Pacific, along with its massive coal users. Their policy and strategy of energy and its relation to coal needs to be studied and worth to note in the global development of coal. A study case of this country as coal's biggest importer and consumer shows that due to the pollution and international pressure, the government has decided to make several regulations that serve to decrease the use of coal as its source of energy (Xu and Stanway, 2018), in which resulting in the decline of 7.9% on their coal production which is by far the largest decline on record (BP, 2017, p. 2). However, due to the reaction of investors and companies that reduce their production, the price of coal has risen by 60% in China and it also affects the world coal price market which makes it more profitable and less risky for the financial aspect to mine and sells coal both for domestic and also for international markets.

Volatility in the price of coal also happens since it is traded as a commodity. WTO defines a commodity as "a homogeneous product which can be exchanged among consumers and producers," which can also be classified as natural resources. It also needs to be easily verified in which the trading activities are facilitated by organized market place and make it centralized (UNCTAD, 2006). In a common explanation, "Trades in organized commodity exchanges are carried out either electronically or verbally in a trading pit between buyers and sellers who are anonymous to each other"

(Stroupe, 2006). It could be either on the spot or via futures contracts, which is usually done on a daily basis. In spot markets, physical delivery is immediately arranged, while in futures markets, contracts represent a commitment to buy or sell a given quantity of an underlying product on a given date in the future at a price agreed upon now (Valdez, 2007). Most of the time, contracts and purchases are paid in cash without the physical delivery of the commodity as the existing position of a trader is negated with the polar-opposite contract and his or her account is closed (Smith, 2009). This system plays a huge contribution to the increased commodity price volatility and leads to controversy. As stated above, speculations are made by investors by assuming the risk and future results based on the information received regarding demand and supply in order to gain a reward (Robles et al., 2009), often by conserve their commodity, have a strong correlation with the rising price and create a speculative bubble (Talley and Meyer, 2008). It changes the perception of the stakeholders and creates a new artificial value for the product solely based on their own expectations. The market price itself does not take into account the negative effect on its extraction processes, which led to widespread rejection of coal due to its increasing environmental damage from extraction and energy production.

**Chart 9: World prices of coal (US\$/ton)**



Source: BP Statistical Review of World Energy

Changes in world prices of coal continue to occur significantly. There are four different types of pricing sources that are used for international trading, namely Northwest Europe Market Price, US Central Appalachian Coal Spot Price Index, Japan Steam Spot CIF Price, and China Qinhuangdao Spot Price. Those are needed to look at the overall price movements that occur from the year 2000 to 2019 (chart 9). In general, coal prices are now higher than 19 years ago. The sharp increase occurred in 2007 and reached its highest peak in 2008. The fall in coal prices in 2009 was influenced by changes in oil prices that were too low along with abundant and oversupply of coal, although it had risen again in 2010, 2011, 2016, 2017 and 2018. Viewed from 10 years backward, in 2007 the price of coal was almost exactly the same as in 2017, except for China Qinhuangdao Spot Price and Central Appalachian Coal

Spot Price Index which were quite significant. The price for this commodity has a sharp decline again in 2019.

In the global market of coal, countries such as India and China choose to prioritize their domestic needs while countries like Indonesia, Australia, South Africa and Colombia choose to prioritize exports and subsidize this industry to continue augment production and investment related to this product. They are considered that coal will continue to rise and play an important role in the world energy supply. On the other hand, there are different opinions in which they tend to extract and sell as much coal as possible before this commodity will no longer be economically valuable. Since coal has been utilized and considered to be a valuable resource for centuries, 'The Coal Question' book elaborate that today's extraction will reduce the future profits, while conversely, tomorrow extraction will reduce the present profits as the basic theory upon the developing concept exhaustion of supplies and resource depletion that are called as the 'Jevons Paradox' (Jevons, 1865), where the author explained that the efficiency of the use of resources will leads to higher, rather than lower consumption of such resources due to lower prices that ultimately result in depletion. Another perspective was delivered by the seminal article "The Economics of Exhaustible Resources" that speculators will likely to preserve their resources while expecting the rising prices in the future due to shortages of non-renewable resources. The increment pricing by such an act of speculation leads to the reduction of consumption and boost the alternative products that are usually cheaper (Hotelling, 1931), which in this case occurred with the emergence of new and renewable energies along with new types of coal processing.

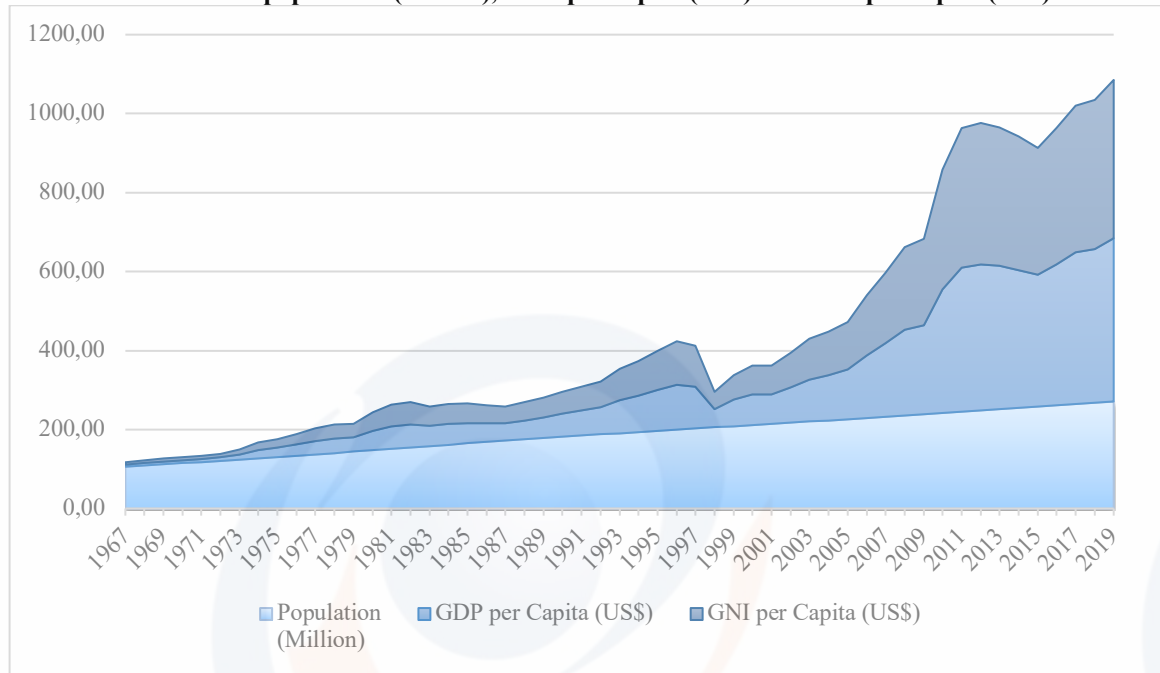
#### **1.4.2 Coal in Indonesia**

Historically, Indonesian coal began to be used on a small scale during the Dutch occupation of the 19th century, which then declined in the early 20th century due to cheap oil prices, warfare and also restrictions from political decisions. The increase occurred again in the 1960s during President Suharto's regime through the Mining Law Number 11 Year 1967. Such things occurred due to the ease of investment for foreign companies to increase state revenue through coal work contracts/*kontrak kerja* that protect it from future legal changes as a form of certainty and commitment to investors. In addition, a clear and harmless compensation mechanism is also provided if there is a decision regarding the nationalization of mining companies by the state since such practice has happened in other countries in this policy-making period. As of 2017, there are 74 work contracts that are still operating in Indonesia, in which coal constitutes the largest portion of 268 metric tons, or around 61% of the total national production (Atteridge et al., 2018, p. 11).

Furthermore, there was an adjustment in 2009, with Law Number 4 Year 2009 regarding minerals and coal, mainly related to changes from mining contracts to mining permits such as Mining Business Permit/*Izin Usaha Pertambangan* (IUP), Special Mining Business Permit/*Izin Usaha Pertambangan Khusus* (IUPK) and People's Mining Permit/*Izin Pertambangan Rakyat* (IPR). Each of them also has its own respective permit for exploration and production operations. However, for permits that have previously been issued are allowed to operate until the expired date and can be extended with the new scheme. Such law is also closely related to the government decentralization where many decisions and policies are determined by local governments, which refer to the continuation of the Law Number 22 Year 1999 and Law Number 23 Year 2014 to adjust the needs and characteristics of each province

and district who are considered different and unique, up-to-date to the local conditions and to facilitate a better supervision and implementation activities. Nonetheless, this law has exceptions related to defense, national security, national monetary, fiscal issues, foreign policy and judiciary. Moreover, changes in regulations related to decentralization from district to provincial governments that affect the mining permit processes and regulations have occurred in 2014 through Law Number 23.

**Chart 10: Indonesia's population (million), GDP per capita (tens) and GNI per capita (tens)**

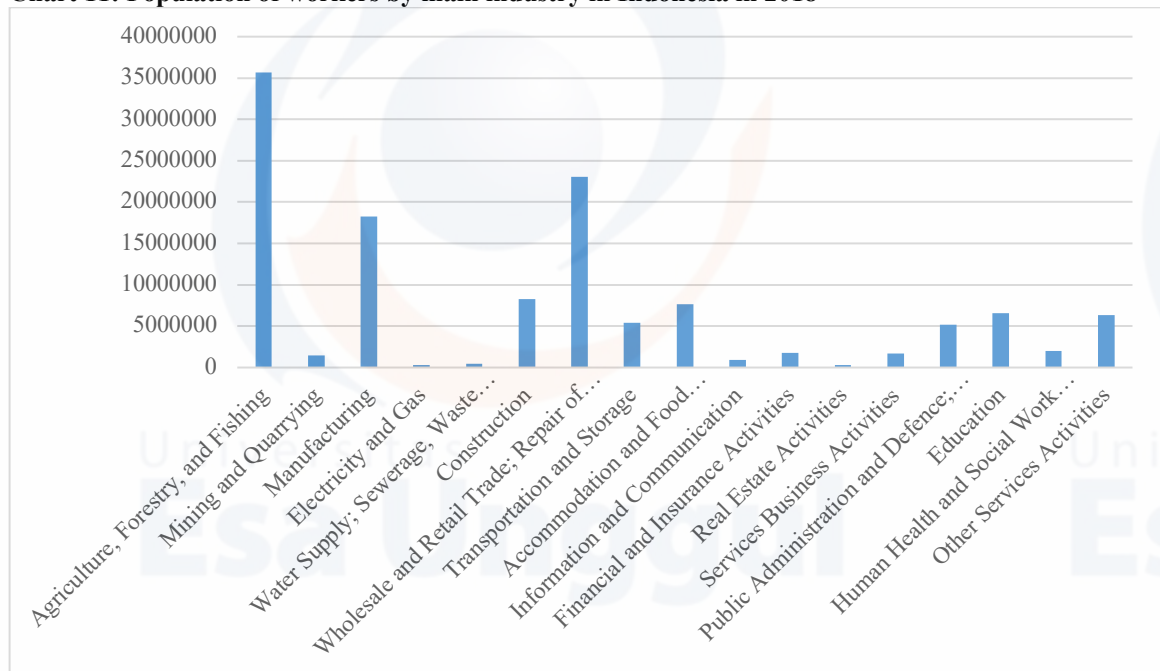


Source: World Bank

Indonesia is one of the world largest countries and in the fourth rank of the most populated country by the World Bank, with the population of 270.63 million people in 2019 with an annual average growth rate of 1.86% (Chart 10). The immense population, along with its demographics of the expected emerging middle class from 45 million or 19% of the population in 2010 to almost 60 million or 22% of the population in 2019 (Ministry of Finance of Indonesia, 2019) provide a huge opportunity for the development of industry and closely related to the mining activities as its basic needs of resources and energy. The large number of Indonesia's middle class is supported by an increase in Indonesia's GDP, as “the standard measure of the value of final goods and services produced by a country during a period minus the value of imports” (OECD, 2016, p. 30) with the amount US\$ 1,119.19 billion with annual average growth of 10.92% and GDP per capita of US\$ 4,135.57 in 2019 with a growth of 82.89% for 1 decade, i.e., 2009-2019, while its Gross National Income (GNI), that “defined as GDP plus receipts from abroad less payments to abroad of wages and salaries and of property income plus net taxes and subsidies receivable from abroad” (ibid, p. 48), is US\$ 1,085.71 billion with annual average growth of 10.88% and GNI per capita of US\$ 4,011.85 with a growth of 83.85% for 1 decade (World Bank). An anomaly occurred in 1998 with a sharp negative growth or decline of 56% for GDP and 58% for GNI due to the economic crisis, which then jumped sharply again due to the recovery policy of 45% for GDP and 42% for GNI. In 2013 to 2015, there was also a decline, although it was not significant since it was still below 6%.

The government realizes and aims at the momentum for demographic bonus that leads to the massive workforce development that, if utilized properly and in maximum preparation, will provide a large benefit to the Indonesian economy. However, if the opposite happens, it can have a negative impact on Indonesia. For example, the rising unemployment and huge poverty. In the context of broad growth, employment is considered to be more important than the quality of the workforce. In relation with these potentials and challenges, a national vision has been agreed to maximize the economic growth and potentials by the creation of the Committee for the Acceleration and Expansion of Indonesia's Economic Development/*Komite Percepatan dan Perluasan Pembangunan Ekonomi Indonesia* (KP3EI) by the President, i.e., executive office, in 2011 to coordinate the implementation of the Masterplan for the KP3EI 2011-2025 in relation to the House of Representatives/*Dewan Perwakilan Rakyat* (DPR) from commission VII/*Komisi Tujuh* of the DPR whose responsible to develop and create regulations in the areas of energy, research, technology and environment along with commission VII, i.e., legislative office, who is responsible for the approval of energy-related legislation, e.g., including electricity, and supervision of energy-related government policy.

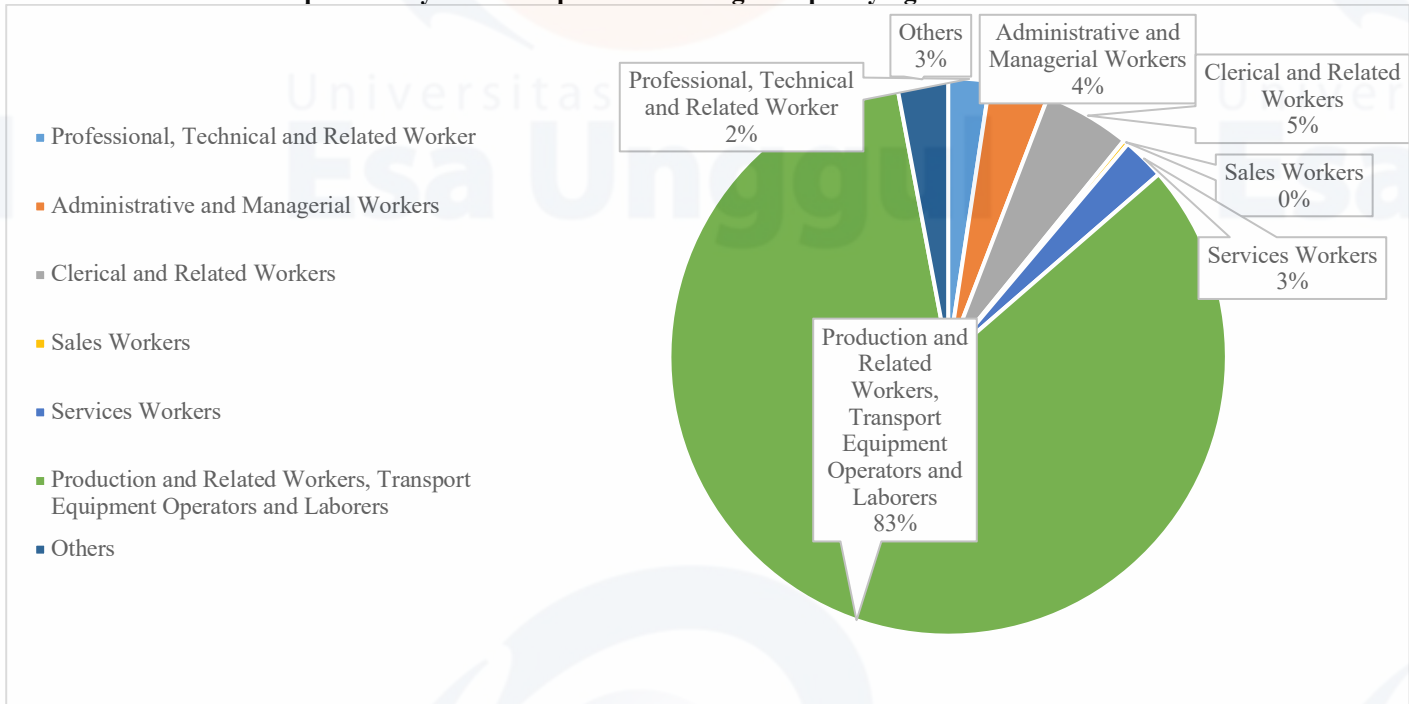
**Chart 11: Population of workers by main industry in Indonesia in 2018**



Source: Central Bureau of Statistics of Indonesia

In line with the growth and implemented policies, many industries are affected. In Indonesia based on the central bureau of statistics of Indonesia (chart 11), there are as many as 17 different main industries with a total of 125,486,174 employees. Although agriculture, forestry and fishing have the biggest percentage of workers with 28%, mining sector as the upstream and vital industry in development although only have the portion of 1% of the total workers from all the main industries, is supported by the number of employed people with essential skills and expertise in this industrial sector, which plays important role and supports basic raw materials in the Indonesian economy. Furthermore, there are around 150,000 workers in the coal mining sub-sector and 56 universities that have mining engineering study programs in Indonesia (Tasrif, 2020).

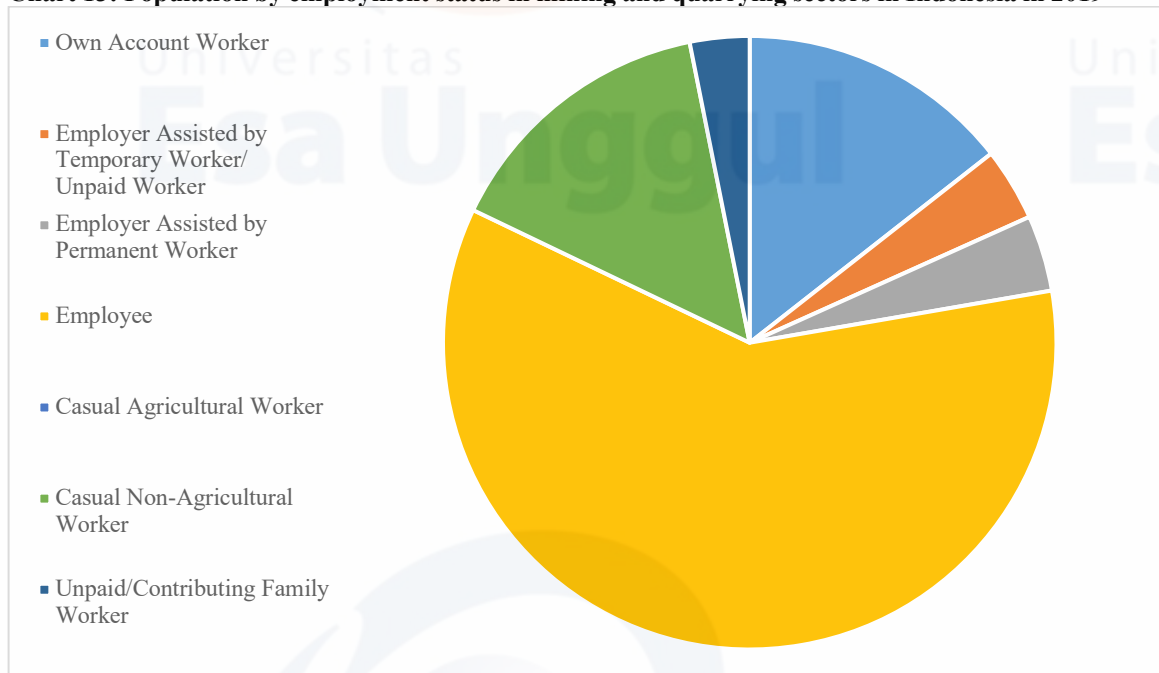
**Chart 12: Population by main occupation in mining and quarrying sectors in Indonesia in 2019**



*Source: Central Bureau of Statistics of Indonesia*

Moreover, when analysed in more detail, there are a vast amount of workers in the mining and quarrying sectors as shown in the 2019 data with a total of 1,375,035 people (Chart 12). Categorized by their main occupation, most of those people in the amount of 1,146,849 or around 83% work in the fields of production and related workers, transport equipment operators and laborers. This figure is very significant compared to the clerical and related workers which is only 5% with a number of 69,086 people. This vast amount is due to the expertise and level of knowledge that does not need to be too high to be able to run it effectively which makes the recruitment of workers becomes very easy and massive. This makes the mining industry become one of the jobs that are capital intensive due to the huge amount of labour needed, except for the type of mining and other companies that prioritize technology, automatization and efficiency. Other fields are grouped as administrative managerial workers by 3%, services workers by 2% and professional technical and related workers who have a minimum of 2% or 32,979 people if other fields are not counted. The workforce population is important since it has become one of the main drives for the development of this industry both in the short and long term, included in the future planning concept.

**Chart 13: Population by employment status in mining and quarrying sectors in Indonesia in 2019**



Source: Central Bureau of Statistics of Indonesia

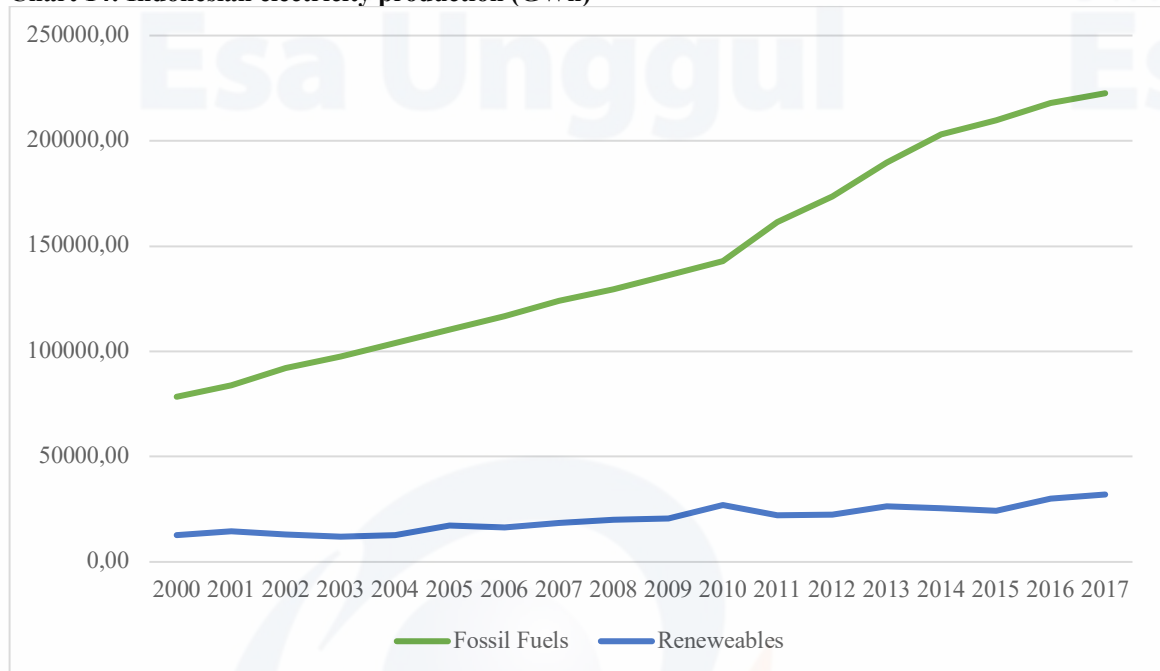
Whereas for other divisions, it is divided into the employment status category in the mining and quarrying sector where working as an employee has the largest number of 60% or 822,788 people (Chart 13). The interesting thing is unpaid or contributing family and own account workers where it shows that community mining is still quite rife even though the number is only 3% and 14% of the total workers totalling 1,375,035.

Related to the needs of mining to encourage and support the needs in economic development, especially related to energy supply for other industry, assignments are also made to the Indonesian National Electricity Company/*Perusahaan Listrik Negara* (PLN) as a state-owned electricity company that plans and implements electrical projects with long lead times. The need for the development of a long-term electricity system is driven by the need for PLN to have an efficient investment plan with long-term benefits. To achieve this, the company prepares a ten-year planning document called the Electricity Supply Business Plan/*Rencana Usaha Penyediaan Tenaga Listrik* (RUPTL), a document that serves as a guideline for the optimal development of the electricity system in the PLN business area for the next ten years and arranged to achieve certain objectives which based on related policies and criteria. Thus the implementation of electricity projects outside the RUPTL which would reduce the efficiency of the company's investment can be avoided. In addition to being driven by the internal needs of the PLN itself to have an RUPTL, the document was also made by the company to meet existing regulations and legislation in the electricity sector. Preparation of this 2016-2025 RUPTL is to fulfil the mandate of the Government Regulation Number 14 Year 2012 concerning Electricity Supply Business Activities/*Kegiatan Usaha Penyediaan Tenaga Listrik* (KUPTL). However, inevitable challenges exist in preparing the plan and the RUPTL document which must be frequently revised if new needs and problems arise on both internal and external sides. In accordance with the current global trend, the types of electrical energy sources are simplified and divided into two, namely fossil fuels (e.g., diesel, coal steam, gas steam,



oil steam, combined gas steam, gas and gas engine) and renewables (e.g., hydro, geothermal, solar, biomass steam, wind and waste).

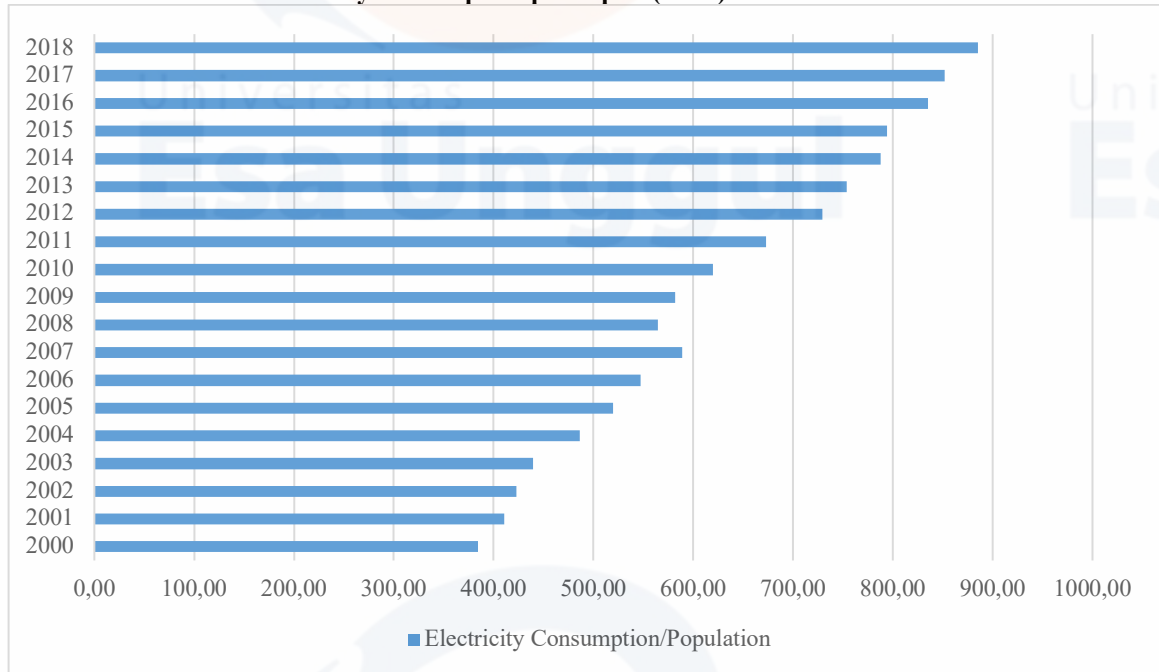
**Chart 14: Indonesian electricity production (GWh)**



Source: National Energy Council (DEN) of Indonesia

For electricity production based on the results of the analysis from National Energy Council/*Dewan Energi Nasional* (DEN) of Indonesia, there will be electricity demand growth of around 8.5% between 2015 and 2025, reaching a total of 457 Terawatt-hour (TWh) of electricity consumed in 2025 (PWC, 2017, p. 24). Fossil fuels have grown at 6.33% and renewables for 6%, which makes a total of 5.6% of growth for both energies in the amount of 254,619.51 Gigawatt-hour (GWh) in 2017 (Chart 14). Similar to world energy consumption (Chart 3), although the average annual growth of the two types of energy sources only has a slight difference, the amount of electricity production in Indonesia derived from fossil fuels also has a fairly significant distinction when compared to renewables, whose related to the utilization history of fossil energy which has been going for more than a century, especially for industrial scale that have lower cost, higher quantity and easier energy distribution. Renewables have indeed been exploited and consumed by humans for thousands of years, through the use of biomass for fire, wind power for sailboats as well as windmills in ancient Egypt, geothermal for hot springs in the ancient Roman empire, etc. However, the issue of renewables has emerged massively and globally at the end of the 21st century since fossil fuels' reserves are declining likewise due to environmental pollution that leads to global warming and climate change which affect many aspects of human life.

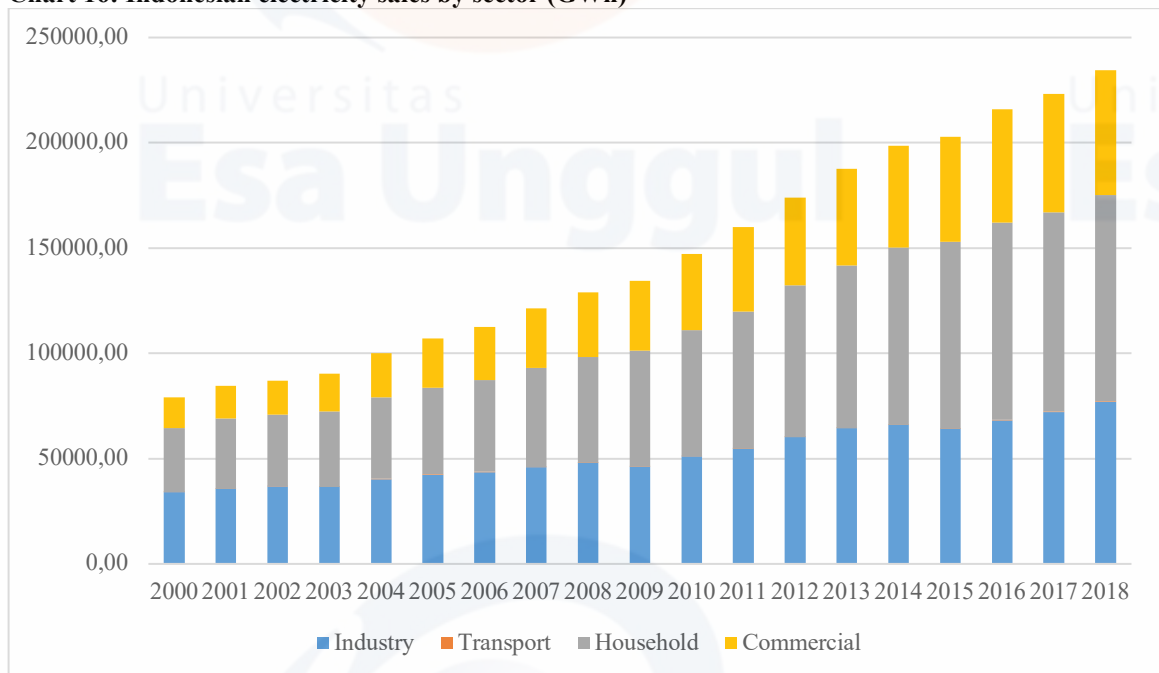
**Chart 15: Indonesian electricity consumption per capita (kWh)**



Source: National Energy Council (DEN) of Indonesia

Complementing the previous data (Chart 14), The electricity per capita reached 885 kilowatts-hour (kWh) in 2018 with an average growth of 5.02% between year 2000 and 2018 (Chart 15). In general, the number has continued to rise annually. It shows that along with the improving economic level and access to more energy sources, the electricity consumption per person will be even greater and need careful planning to supply the upcoming demands.

**Chart 16: Indonesian electricity sales by sector (GWh)**

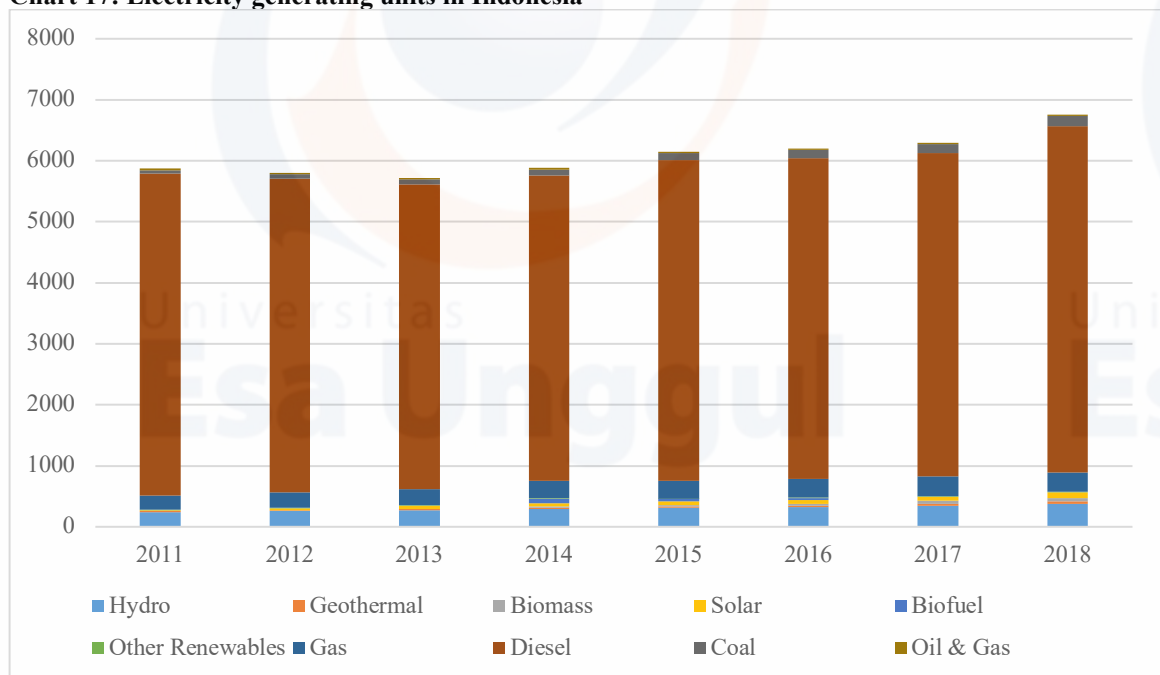


Source: National Energy Council (DEN) of Indonesia

In line with such issues and data, the Government announced stage one of a fast-track program (FTP I) in 2006 followed by a second program or stage two (FTP II) in

early 2010. Each of them were aimed to accelerate the development of 10 GW of generation capacity, with FTP II geared towards Independent Power Producer (IPP) and renewable energies. Produced energy is beneficial and utilized in various sectors such as industry, transportation, household, and commercial. The biggest surge occurred in the transportation sector, with an average annual growth of 11.36% from year 2000 to 2018 (chart 16), Where in the year 2000 energy sales only amounted to 79,164 GWh and in 2018 has increased to 234,618 GWh. The latest trend in the development of electric cars and motors will affect this huge demand to be highly dependent on the supply of electricity from power generation. However, the Household sector still has the largest portion of 42% from the total energy sales in 2018 or equivalent to 97,832 GWh and the industry sector with the second largest portion of 33% from the total energy sales or equivalent to 76,947 GWh. The commercial sector, however, only accounts for 25% of the total energy sales or equivalent to 59,565 GWh. In 2015 the President Joko Widodo government of Indonesia, announced plans to accelerate the development of 35 GW of generation capacity as outlined in the medium-term development plan 2015-2019 and further 45 GW by 2025 for the industry and infrastructure support such as roads, seaports, rails, airports, water supply and treatments as well as gas, oil refining, fibre optics, etc. Such acceleration is needed in accordance with intended developments and requires more detailed planning where his cabinet and work plan focus heavily on nationwide infrastructure development.

**Chart 17: Electricity generating units in Indonesia**

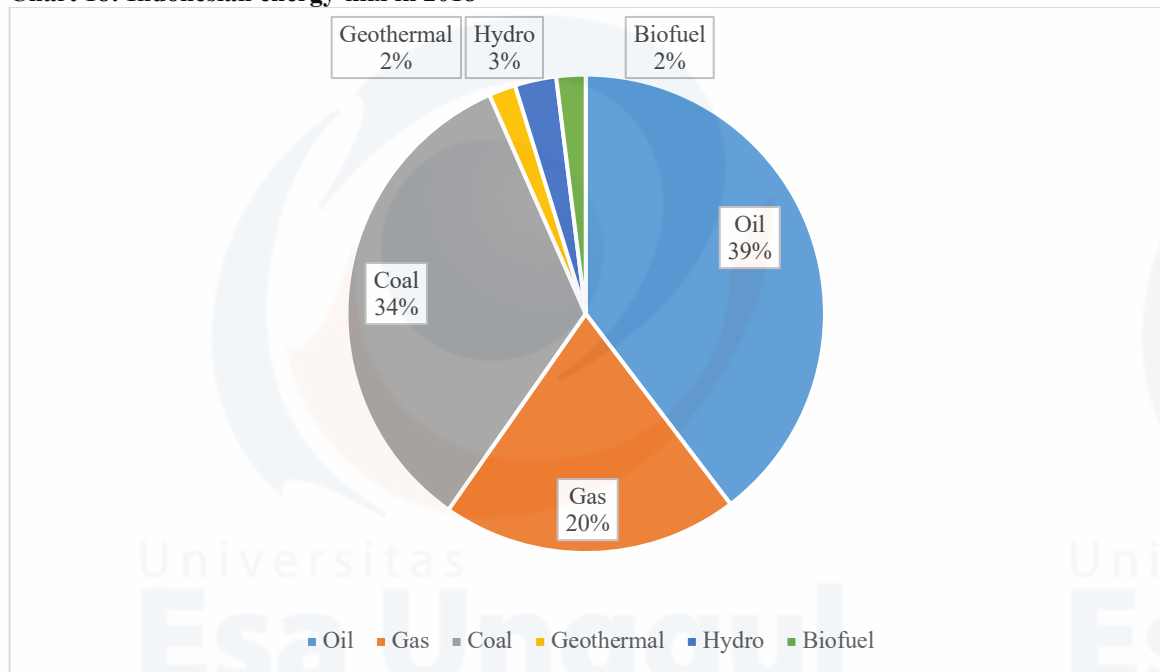


*Source: State Electricity Company (PLN) of Indonesia*

The original four energy sales sectors (Chart 16) have divided and expanded into ten different types of energy sources in electricity generating units in Indonesia. The largest number is owned by diesel, i.e., oil, power plants with a total of 5,678 units or equivalent to 84% of total units in 2018, while the second-largest number is owned by hydroelectric power plants as much as 378 units or equivalent to 6% in total (Chart 17). The existing gap is considered to be quite large for the historical reason of oil as the main priority of the Indonesian government due to its considerable amount of

resources as well as the ease of transportation and production. Nevertheless, although the number of coal power plants is small compared to the other energy sources, the power generating capacity is considerably large enough therefore show a significant portion of produced electricity in comparison. Such a fact is different from oil in which its generated electricity can be obtained with various sizes of machine, especially with the availability of its minuscule sized generator which is possible to be carried individually and in accordance to working conditions with a more flexible requirement. In fact, households and home industries prefer to utilize small-scale oil power plants with diesel generators due to its massive availability and common use in Indonesia. Overall, the growth of electricity generating units in Indonesia is 2.36%, where in 2011 the number was only 5,871 units and in 2018 has increased to 6,752 units, while for other energy sources such as gas, coal, solar, biomass, geothermal, combined oil and gas, biofuel as well as other renewables only have a combined portion of 16%.

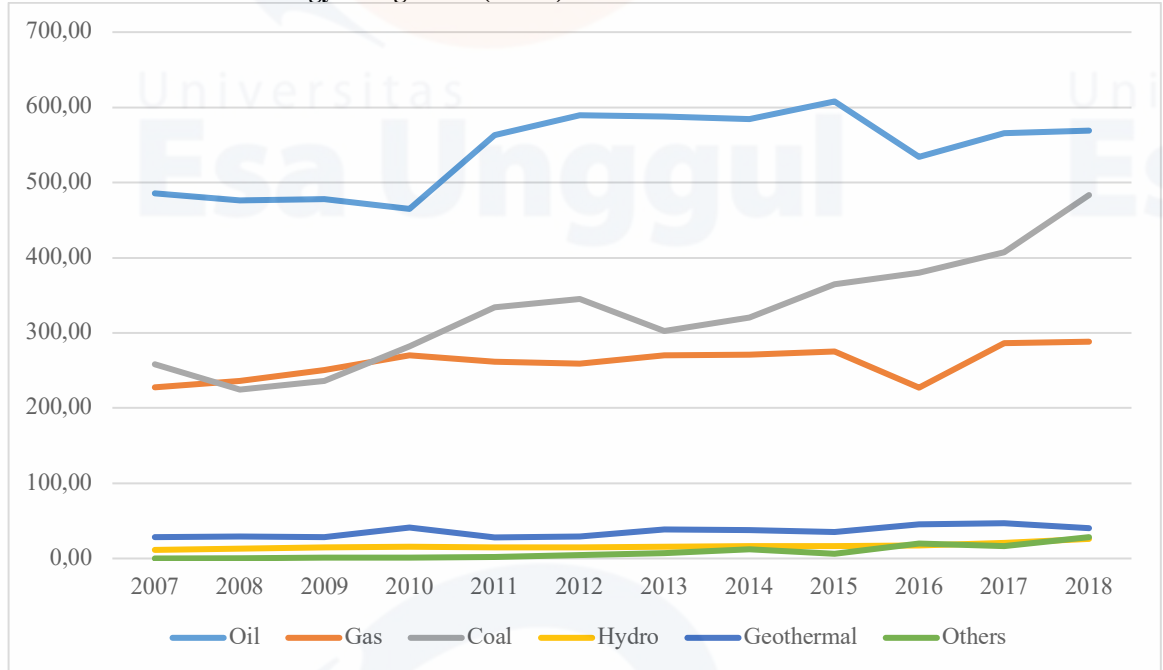
**Chart 18: Indonesian energy-mix in 2018**



*Source: National Energy Council (DEN) of Indonesia*

The plan to develop a 35 GW power plant relies heavily on coal where the portion of this energy source is 34% or 4,083.34 million barrel of oil equivalent (Mboe) in 2018 compared to other energies such as oil, gas, geothermal, hydro and biofuel (Chart 18). The largest portion is still owned by oil with 39% or 569.02 Mboe while gas has a portion of 20% or 288.31 Mboe and occupies the third largest percentage of energy-mix. On the other hand, renewables has only a very small portion with hydro of only by 3% or 40.2 Mboe, geothermal by 2% or 26.04 Mboe and biofuel by 2% or 28.38 Mboe. This shows the focus of the Indonesian government who still prioritizes fossil fuels for the short and medium term due to high energy demand from its emerging massive population, industry and technology advancement that cannot be 100% fulfilled by renewables due to cost constraints, difficult energy distribution and unqualified current technology related to efficiency and effectiveness. In total, fossil fuels have a combined portion of 93.41% or 1,340.67 Mboe while renewables only have a portion of 6.59% or 94.62 Mboe.

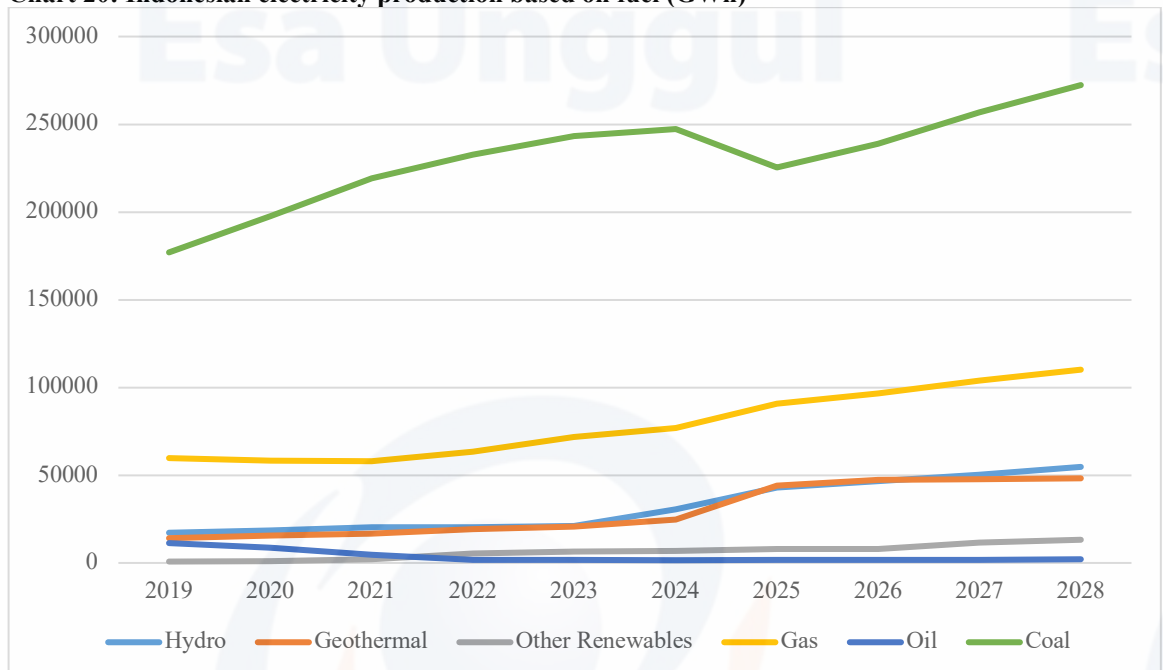
**Chart 19: Indonesian energy-mix growth (Mboe)**



Source: National Energy Council (DEN) of Indonesia

In terms of growth, energy sources that have the highest rise are hydro by 8.61% and geothermal by 3.46% (Chart 19), where Indonesia has committed to using renewable energy in developing its electricity plans due to its abundant sources. Coal has an average growth of 6,47% per year from 2007 to 2018 and predicted that in 2025, it would have a portion of 40% of the national energy-mix, especially where Indonesia's oil reserves are running low and coal reserves are still abundant. This is indicated by oil and gas growth which is quite small, of only 1.59% and 2.41%. The Indonesian government targets coal to have a 30% share of the total energy of 2.7 thousand Mboe in 2025 and 25% of the total energy of 6.8 thousand Mboe in 2050 (Siswanto, 2020).

**Chart 20: Indonesian electricity production based on fuel (GWh)**



Source: State Electricity Company (PLN) of Indonesia

These information can be explored further on Indonesian electricity production based on fuel, where it is evident that coal has been nominated as the largest electricity producer of 176,985 GWh in 2019 and is expected to reach 272,354 GWh by 2028, with annual average growth of 6% (Chart 20). Oil is the second-largest source of electricity production in 2019 and amounts to 11,294 GWh. Even so, the number is expected to drop dramatically to just 2,019 GWh in 2028 with an annual average growth of -19%. This is attributable to the decreasing availability of oil in Indonesia as well as limited infrastructure for processing including more environmentally friendly and cheaper gas prices. Generally, oil in Indonesia is mostly processed in Singapore which increases the production costs significantly, whereas gas has a difference in its processing activities that can be fully carried out in Indonesia. Gas fired power plants which only produce electricity of 59,911 GWh in 2019 are expected to jump to 110,150 GWh in 2028 and become the second-largest source of electricity production behind coal. The annual average growth of gas is 8%, and in total the total energy production in Indonesia has an annual average growth of 7%.

**Chart 21: Indonesian coal sales by sector (thousand tons)**

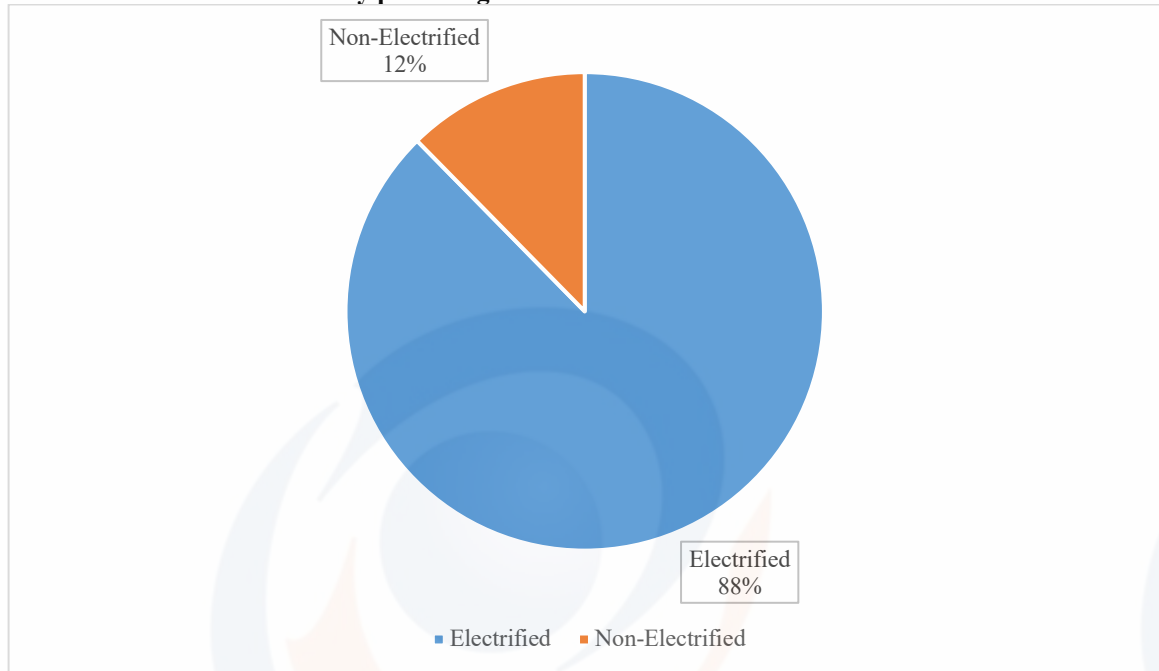


Source: National Energy Council (DEN) of Indonesia

As one of the main fuel sources for electricity, coal sales itself is divided into three sectors, namely industry, power plants, and briquettes. Strong government support for the development of Indonesia's electricity supply has made Indonesian coal sales for power plants soaring rapidly from 2011, with an annual average growth of 10% from 2000 to 2018 (Chart 21). This causes the portion of coal sales in the power generation sector to increase from 61.4% in 2000 to 79.2% in 2018. The industrial sector has not experienced significant growth due to its small quantity along with a substantial number of industries that prefer to depend on the government's owned power plant for their energy supply. This can be seen from the portion of coal sales in the industrial sector, which has decreased from 38.4% in 2000 to only 20.8% in 2018. On the other hand, the growth of coal briquettes varies considerably with the cycle of ups and downs. However, in general, the growth of coal sales continues to increase per annum,

with an annual average of 10% and becomes one of the industries that is appealing to investors. In 2018, Indonesia's total coal sales reached 115,080 thousand tons which increased by 415% from 2000 with only 22,341 thousand tons. Thus, various data have shown the huge role of coal in fulfilling electricity needs in Indonesia where the potential for sales and consumption will be monumental in the future, in its main focus as major fuel sources for power plants along with other retail sales for industrial needs.

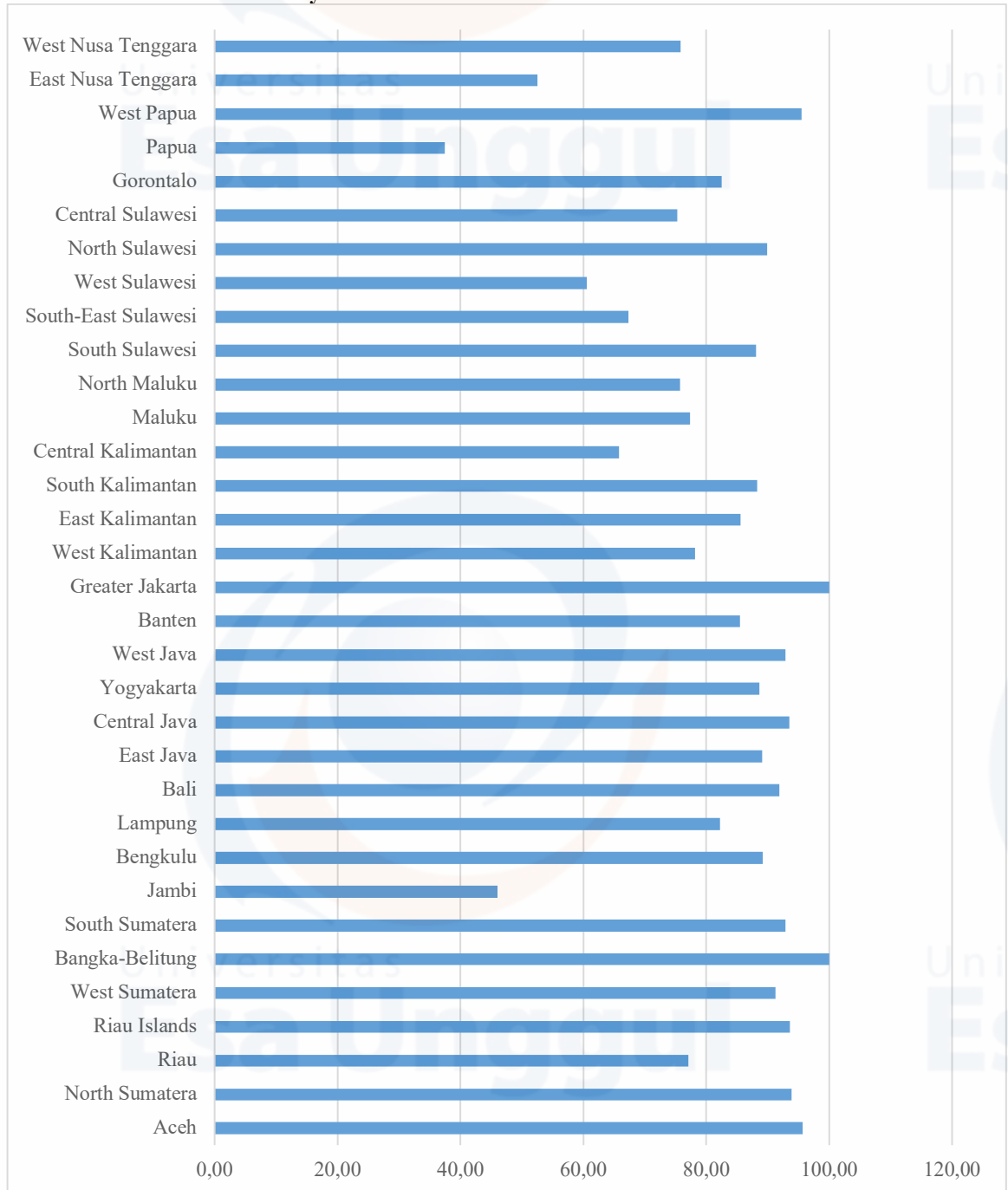
**Chart 22: Indonesian electricity percentage of 2017**



*Source: National Energy Council (DEN) of Indonesia*

As prescribed by law, the majority of power-generating assets in Indonesia are controlled by PLN, where the government attempts to increase the optimism of investors in the power sectors by combining the regulatory framework and economic fundamentals. In 2017, Indonesia's electrification ratio reached 88%, while 12% of the population or area are not yet electrified (Chart 22). Such a fact happens due to Indonesia's vast area that consist of many islands separated by sea and mountains, which makes it remarkably challenging to build electricity infrastructures and gain 100% electricity access status in a short period of time. Most areas with electricity shortages are located outside of Java and Sumatra islands, including Bali, especially in the eastern part of Indonesia where development in this area has been slow for several decades and is lagging behind western and central Indonesian regions, due to the policy of the centralized New Order/*Orde Baru* Presidential period administration (i.e., 1966-1998), that focused the infrastructures and administrative development on the island of Java and parts of Sumatera that caused many migrants came from other island in which impacted the economic growth of their originated area. However, the period of government in the recent decade has brought an alteration in the focus of infrastructure where the central and eastern regions of Indonesia are experiencing development and connected to a fairly large logistic system and will certainly have a significant impact on Indonesia's energy development in the coming years.

**Chart 23: Indonesian electricity ratio of 2017**



*Source: National Energy Council (DEN) of Indonesia*

For electrified areas, The 100% electricity access is only found in Jakarta, which is the capital and economic centre of Indonesia and in Bangka Belitung due to its small size, while the area with the least electricity access is in Papua due to its massive size and unique contours including mountains and dense forests (Chart 23). By 2025, the government targeted to have at least 99.7% of an electrification ratio based on the RUPTL, which will consume another additional 80.5 GW from power plants that plays essential and vital role to support this agenda, where 34.8 GW or 40% of energy needs will be provided by coal from both PLN and IPP.



**Table 1: Indonesian coal resources and reserves in 2018 (million tons)**

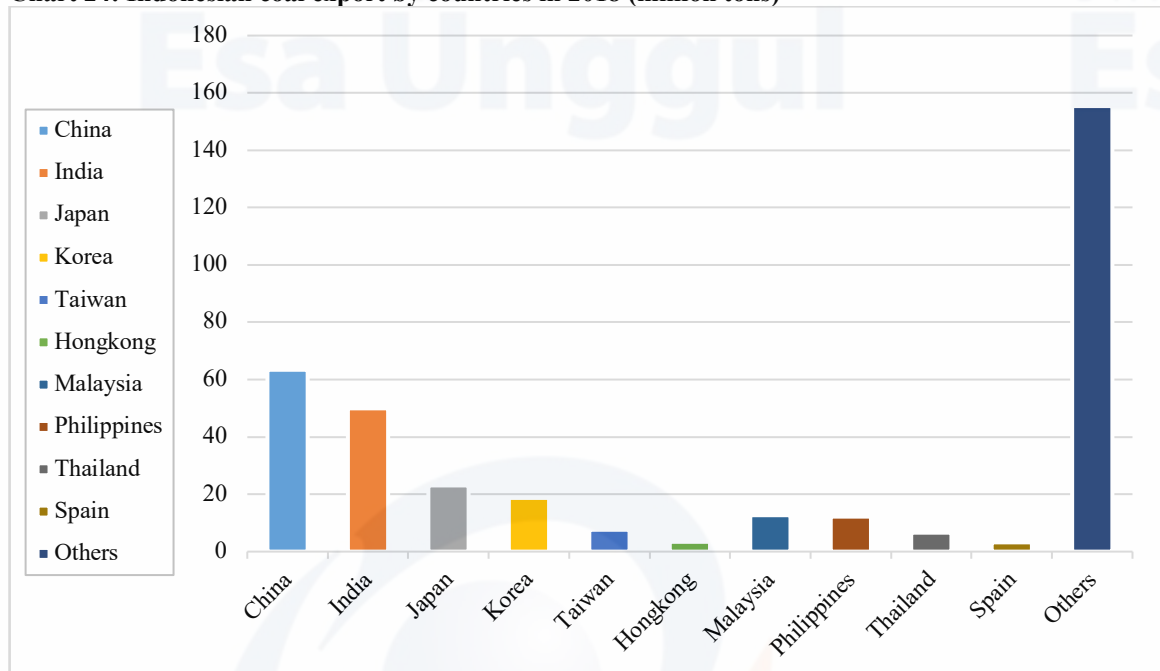
Province	Resources					Reserves
	Hypothetic	Inferred	Indicated	Measured	Total	
Banten	5.47	38.98	23.59	24.47	92.51	0.00
Central Java	0.00	0.82	0.00	0.00	0.82	0.00
East Java	0.00	0.08	0.00	0.00	0.08	0.00
Aceh	0.00	98.22	149.81	572.53	820.56	416.68
North Sumatera	0.00	7.00	1.84	5.78	14.62	0.00
Riau	3.86	298.62	808.85	668.78	1,780.11	521.07
West Sumatera	1.19	329.15	77.08	148.38	555.80	66.78
Jambi	138.75	1,212.14	973.97	1,051.04	3,375.90	1,044.39
Bengkulu	0.00	84.16	73.70	43.08	200.94	69.95
South Sumatera	3,322.74	11,612.68	11,915.85	12,328.29	39,179.56	7,778.50
Lampung	0.00	30.00	8.21	3.53	41.74	11.74
West Kalimantan	2.26	375.69	6.85	3.70	388.50	0.00
Central Kalimantan	22.54	11,396.47	3,940.54	2,858.59	18,218.14	1,993.51
South Sumatera	0.00	6,094.63	5,544.47	5,569.54	17,208.64	3,997.06
East Kalimantan	869.92	11,058.61	13,370.59	15,490.61	40,789.73	7,365.55
North Kalimantan	25.79	829.46	547.08	904.58	2,306.91	974.73
West Sulawesi	8.13	15.13	0.78	0.16	24.20	0.00
South Sulawesi	10.66	13.90	7.63	0.44	32.63	0.00
South-east Sulawesi	0.64	0.00	0.00	0.00	0.64	0.00
Central Sulawesi	0.52	1.98	0.00	0.00	2.50	0.00
North Maluku	8.22	0.00	0.00	0.00	8.22	0.00
West Papua	93.66	32.82	0.00	0.00	126.48	0.00
Papua	7.20	2.16	0.00	0.00	9.36	0.00
<b>Total</b>	<b>4,521.55</b>	<b>43,532.70</b>	<b>37,450.84</b>	<b>39,673.50</b>	<b>125,178.59</b>	<b>24,239.96</b>

Source: Ministry of Energy and Mineral Resources (ESDM) of Indonesia

The Ministry of Energy and Mineral Resources/*Kementerian Energi dan Sumber Daya Mineral* (ESDM) has estimated around 125,178.59 million tons of coal resources and 24,239.96 million ton of coal reserves in Indonesia, which proves its capability as one of the world largest coal producer and exporter (Table 1). Coal resources are part of coal deposits that are expected to be utilized and divided into resource classes based on the level of geological confidence determined qualitatively by geological conditions/level of complexity and quantitatively by the distance of information points, while coal reserves are part of coal resources whose dimensions, quantity and quality are known, which at the time of the feasibility study were declared to be mineable (National Standardization Agency, 1998, p. 2-3). Resources can transform into reserves if declared feasible after a feasibility study has been conducted. On provincial basis, the biggest coal resources is in the province of East Kalimantan with the amount of 40,789.73 million tons or 32,59% of the total amount of Indonesian coal reserve and South Sumatera with the amount of 39,179.56 million tons or 31.30% of the total reserve. In contrary for the coal reserves, the province of South Sumatera has the highest amount of 7,778.5 million tons or 32,09% of the total reserve and the

province of East Kalimantan has the second largest amount of 7,365.55 million tons or 30,39% of the total reserve.

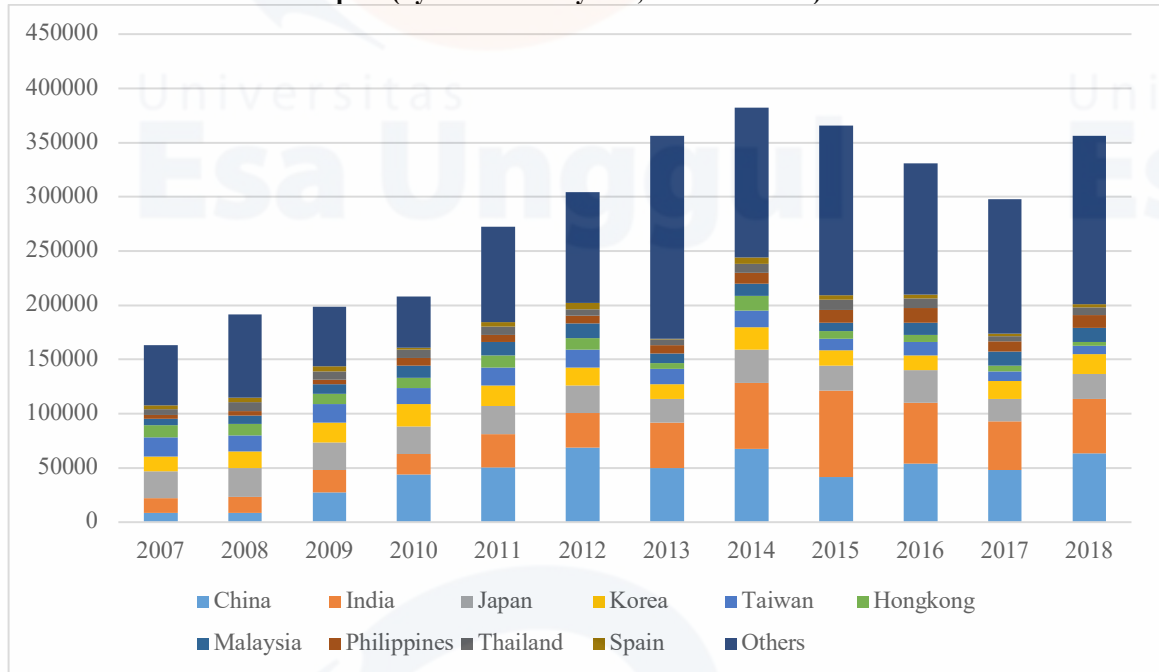
**Chart 24: Indonesian coal export by countries in 2018 (million tons)**



*Source: National Energy Council (DEN) of Indonesia*

Indonesia has various coal export destination countries wherein 2018 the largest export destination country was China with the quantity of 63.43 million tons or equivalent to 17,8% of Indonesia's total exports while India was the second-largest destination for coal exports with a total of 49.97 million tons or 14,02% of total exports (Chart 24). This is in line with the needs of the two countries, which are the two largest industrial nations for both upstream and downstream, from low end products to high end products, from the results of investment companies that come from within the country and from abroad. The order of other coal export destinations were continued by Taiwan, Japan, South Korea, Malaysia, The Philippines, Hong Kong, Thailand and Spain. Total exports to other nations aside from the previously mentioned were 155.4 million tons or equivalent to 43.6% of total exports. The number of Indonesian coal exports surged starting in 2008 and slowly declined in 2015. The peak of Indonesian coal exports occurred in 2014 with a total exports of 381 million tons, and in 2018 where the amount of export was only 356.4 million tons. This decline was also related to the growing domestic demand as the realization of the 35 GW Indonesia project as well as the coal consuming industries. Coal originating from Indonesia must be prioritized in advance for the needs of the domestic power plants and processing industries, where the obligation to supply domestic goods to fulfil the domestic needs is called the Domestic Market Obligation (DMO). To ensure the achievement of DMO target, the government stipulates the Minister of Energy and Mineral Resources Regulation Number 34 Year 2009 concerning Prioritizing Supply of Mineral and Coal Needs for Domestic Interest. World coal prices also have influence on its yearly target, although it depends on the type and quality of exported coal.

**Chart 25: Indonesian coal export (by countries & years, in million tons)**



Source: National Energy Council (DEN) of Indonesia

As with the percentage in Indonesia's export data for 2018, Indonesia's largest coal export growth from 2007 to 2018 is owned by China with an annual average growth of 22%, while India as the second largest coal export has an annual average growth of 14% and the Philippines with the third-largest coal export has annual average growth of 14% (Chart 25). The decline in exports on an annual basis occurs in Japan with 1%, Spain with 0% along with Taiwan and Hong Kong, which have the largest decline of 8% and 11%. The policy of reducing carbon emissions and focusing on local coal reserves are some factors that affect the decline in the number of exports.

**Chart 26: Indonesian coal reference price (US\$)**



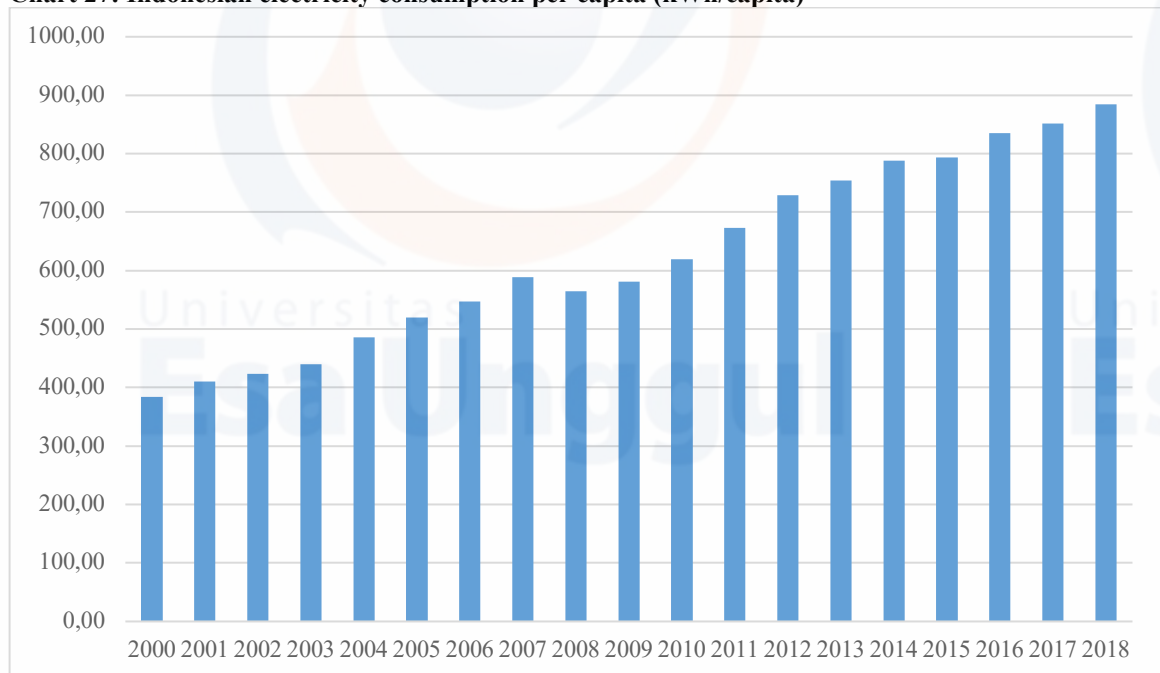
Source: National Energy Council (DEN) of Indonesia

Indonesian coal reference price/*Harga Batubara Acuan* (HBA) is obtained from the average Indonesian Coal Index (ICI), the Newcastle Export Index (NEX), the Global Coal Newcastle Index (GCNC), and the Platts 5900 using the US\$ currency as an international standard. The quality is equal to calories of 6,322 kilocalorie (kcal) per kg of Gross Air-Received (GAR), total moisture of 8%, total sulphur of 0.8% and ash of 15%. HBA had the highest position in May 2011 at a price of US\$ 122.4 but continued to fall until it finally rose again in a constant and sharp changes in July 2016 even though it had dropped slightly and increase again in July 2017 and in mid 2018, with the average price of US\$ 81.9 on the same year (Chart 26). Significant and frequent changes in coal prices makes business activities in this sector must be carefully considered and planned, which certainly affects the development of industries and national planning on coal production, consumption and sales. Aside from the common knowledge of the use of coal for power plants, it is also used for several needs and products, such as iron, steel, ceramic, cement, pulp, paper, briquette, etc. The government rely on coal for further development, especially in the field of energy in the next ten years due to lower cost of construction and operation, particularly with the coal mine-mouth power plant which being prioritized by the ministry to create a more economical cost on their coal deposit, i.e., especially the low-rank coal, in order to utilize it to the maximum potential even though some are located in remote areas with minimal infrastructure, which generally considered to be costly for the needs to supply coal to the currently existed power plants located near big cities.

Related to the risks and potentials that exist, to assist government planning and strengthen the bargaining of coal companies, especially those of small and medium scale, there are several related organizations that have actively collaborated between associated parties. One large and recognized organization is the Indonesian Mining Coal Association (ICMA)/*Asosiasi Pertambangan Batubara Indonesia* (APBI), a non-government and non-profit organization consisting of companies that operate in both upstream (e.g., exploration and exploitation) and downstream (e.g., marketing, utilization and mining services) coal industry in Indonesia. Their aim is to discuss and to collaborate on mutual concern with government and related institutions for the benefits of the coal mining industry, particularly to create and also maintain a fair and healthy business environment on investment and competition. It consists of 152 members that are composed of 89 coal producer companies and 63 coal mining service companies, which contribute around 80% of total national coal production. Another relevant organization is the Association of Indonesian Mining Professionals/*Perhimpunan Ahli Tambang Indonesia* (PERHAPI) that was created based on massive products and services that needs and sourced from mining products for its ingredients and processes. The usual organizational programs are mainly focused on discussion, conferences and general meetings where they have the Annual Professional Gathering Program that aims to present challenges and potentials in the mining sector, where it is usually done in September or October. The topics are closely related to environmental, social, economic, legal fields (e.g., which include as a field of strategic mining studies), reclamation, post-mining activities, etc. There are various fields and sciences related to mining activities that need to be linked and collaborated to produce the best planning, executions and results, such as sociology, anthropology, geology, physics, chemistry, marketing, finance, supply chain, information and technology (IT), psychology, etc. People with previously mentioned scientific fields are welcomed to join this organization as long they have the affiliation or working experience related to the mining industry. The number of members in PERHAPI based on the current data of 2019 is 5,653 people that are located throughout Indonesia

(Kasli, 2019). They are divided by clusters/working groups per field of science, in the specific topic, including exploration, mine plans, safety, social, ventilation, etc., while in the general topic include: studies of mining strategies, economics, including technology, etc. The organization has a partnership with the stock exchange, where a junior mining company can enter and become a part of the Indonesia Stock Exchange (IDX), which are mostly small companies specializing in exploration activities. If a company already has valid coal resources, i.e., not reserves, it is possible to take parts in the stock exchange activities. On the other hand, the government in terms of licensing does not want permits to be traded rapidly like a commodity (Kasli, 2020). Hence, the junior or small mining company must reach the valid reserve document's level first prior to executing the release or selling act. Concerning this issue and as a complementary service, the 2017 version of PERHAPI's Indonesian Mineral Reserve Code/*Kode Cadangan Mineral Indonesia* (KCMi) has been recognized by the stock exchange. In this regard, the Committee for Mineral Reserves International Reporting Standards (CRIRSCO), plays the vital role as the institution that accommodates countries that have reporting codes such as KCMi. The members consist of Australia with their Joint Ore Research Committee (JORC), Canada, USA, Brazil, Indonesia, South Africa, European Union, Russia, Chile, Kazakhstan, Mongolia and India. PERHAPI and the Indonesian Geological Association/*Ikatan Ahli Geologi Indonesia* (IAGI) have collaborated and created a joint committee to help the Philippines and China to gain full membership status of CRIRSCO (Kasli, 2020).

**Chart 27: Indonesian electricity consumption per capita (kWh/capita)**

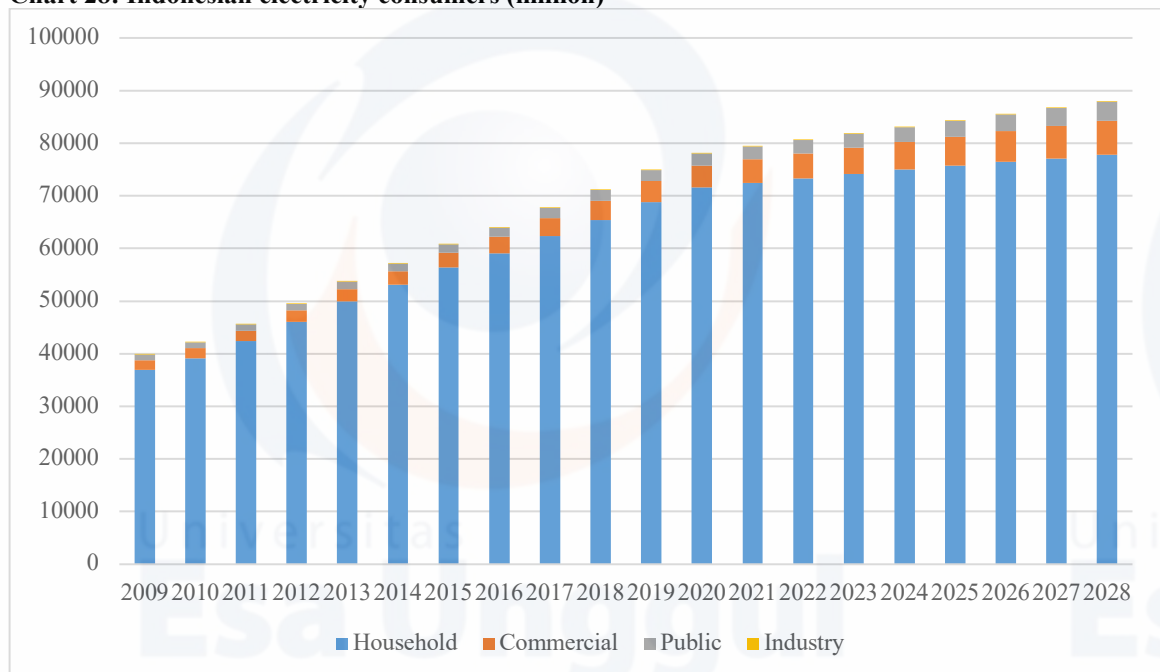


Source: National Energy Council (DEN) of Indonesia

From price comparisons based on energy sources, coal is considered as one of the cheapest electricity sources at the moment, especially if the Steam Power Plant/*Pembangkit Listrik Tenaga Uap* (PLTU) is built nearby the mine-mouth. Electrical cable is connected from Aceh as the northernmost province in Sumatra, to Lampung as the southernmost province and continues to the Java Bali electrical network. It is possible to optimize electricity usage with coal, by developing electricity-based vehicles such as electric-powered train/*kereta rel listrik* (KRL), tram

and electric buses that use the special lane to avoid traffic jams. This is also reinforced by the latest technology for environmentally friendly power plants, namely the ultra-supercritical power plant developed by Japan, Europe and other research collaborated countries. Alternative sources of energy from renewables, such as solar, wind, hydro and geothermal are possible to be used, while however, the existing costs are still expensive, which makes it uneconomical. It requires a combination of renewable energy, i.e., energy-mix, to optimize electricity needs and supply in Indonesia (Kasli, 2019). National electricity consumption per capita in Indonesia continues to increase yearly with an annual average growth of 5% from 2000 to 2018 (Chart 27). In almost 2 decades, there was a rise of 500.41 kWh per capita where in 2000 electricity consumption was only 384.59 kWh per capita and in 2018 the consumption amounted to 885 kWh per capita, even though there had been a decline in 2016. in general, with various economic development conditions in Indonesia and globally, electricity consumption per capita is still increasing due to the increasing population that leads to augmented energy needs.

**Chart 28: Indonesian electricity consumers (million)**



*Source: State Electricity Company (PLN) of Indonesia*

The number of electricity users in Indonesia is 75,025 million or 92% of the total electricity consumers in 2019, which was only 39,911 million in 2009 and is expected to rise to 88,076 million by 2028 or 120.68%, with an annual average increase of 4% (Chart 28). The largest portion is owned by the household sector with a total of 36,920 million consumers in 2009 and increased to 77,765 million consumers in 2028 or 110.63%, with an annual average growth of 4%. The commercial and public sectors have the same annual average growth of 7%, while the industrial sector only has a growth of 6%. In 2028, the portion of consumers in the household sector is estimated to be 88%, the commercial sector to be 8%, the public sector to be 4%, and the industrial sector to be less than 1%. It should be noted that the total number of electricity customers in total has a greater number of Indonesia's population due to electricity users registered in one sector, and can also be registered in the same identification (ID) for other sectors.

Related to import needs and also investment potential, Japan as one of Indonesia's main partners in infrastructure development, has been very fond of introducing its environmentally friendly power plant with the newest technology called supercritical and ultra-supercritical boilers. Due to its effectiveness, efficiency and more environmental friendly, it has become a key priority for the government to develop large-scale power plants throughout the regions. Countries in East Asia, such as Japan, China and South Korea, also bankrolling 18 coal-fired power plants across Indonesia. The total amount of loans financed by foreign banks for this project is US\$ 16.7 billion (Green Peace, 2019, p. 9), while the local and national banks of Indonesia only provide around 2% of the projects' financial resources. However, the RUPTL of Indonesia does not accommodate research and the use of other types of technology, such as integrated combined cycle gasification as well as carbon capture and storage.

**Table 2: Indonesian coal-fired power plant acceleration project of 10 GW**

Power Plant	Province	Area	Capacity (MW)	COD
PLTU 2	Banten	Labuan	2 x 300	2009-2010
PLTU 1	West Java	Indramayu	3 x 330	2011
PLTU 1	Banten	Suralaya (unit 8)	1 x 625	2011
PLTU 3	Banten	Lontar	3 x 315	2011-2012
PLTU 2	West Java	Pelabuhan Ratu	3 x 350	2013-2014
PLTU 1	Central Java	Rembang	2 x 315	2011
PLTU 2	Central Java	Adipala	1 x 660	2016
PLTU 1	East Java	Pacitan	2 x 315	2013
PLTU 2	East Java	Paiton (Unit 9)	1 x 660	2012
PLTU 3	East Java	Tanjung Awar-awar	2 x 350	2014-2016
PLTU	Aceh	Meulaboh/Nagan Raya	2 x 110	2014
PLTU 2	North Sumatera	Pangkalan Susu	2 x 220	2016
PLTU 1	Riau	Bengkalis	2 x 10	Cancelled
PLTU	Riau	Tenayan	2 x 110	2016
PLTU	Riau Islands	Tanjung Balai	2 x 7	2014-2015
PLTU 4	Bangka Belitung	Belitung	2 x 16.5	2015-2016
PLTU 3	Bangka Belitung	Air Anyer	2 x 30	2014-2016
PLTU 2	Riau	Selat Panjang	2 x 7	Cancelled
PLTU 2	West Kalimantan	Pantai Kura-kura	2 x 27,5	2019-2020
PLTU	West Sumatera	Teluk Sirih	2 x 112	2013-2014
PLTU	Lampung	Tarahan Baru	2 x 100	2014
PLTU 1	West Kalimantan	Parit Baru	2 x 50	2019
PLTU	East Kalimantan	Teluk Balikpapan	2 x 110	2016
PLTU 1	Central Kalimantan	Pulau Pisau	2 x 60	2016-2017
PLTU	South Kalimantan	Asam-asam	2 x 65	2013
PLTU 2	North Sulawesi	Amurang	2 x 25	2012
PLTU	Gorontalo	Anggrek	2 x 25	2019

PLTU	North Maluku	Tidore	2 x 7	2016
PLTU 2	Papua	Jayapura	2 x 10	2017
PLTU 1	Papua	Timika	2 x 7	Cancelled
PLTU	Maluku	Ambon	2 x 15	2026
PLTU	South-east Sulawesi	Kendari	2 x 10	2012-2014
PLTU	South Sulawesi	Barru	2 x 50	2012-2013
PLTU 2	West Nusa Tenggara	Lombok	2 x 25	2016-2018
PLTU 1	East Nusa Tenggara	Ende	2 x 7	2015-2018
PLTU 2	East Nusa Tenggara	Kupang	2 x 16,5	2014
PLTU 1	West Nusa Tenggara	Bima	2 x 10	2021
PLTU 1	North Sulawesi		2 x 25	2021-2022
PLTU 2	Central Kalimantan		2 x 7	Cancelled
<b>Total</b>			<b>9,927 MW</b>	

Source: State Electricity Company (PLN) of Indonesia

There are power plants that have been built and planned by the Indonesian government, with their 10 GW coal-fired power plant acceleration project where after the process and developments occur, it can only reach 9,927 Megawatt (MW) from 2009 to 2022 (Table 2). Large capacity power generating units are generally built in provinces on the island of Java who have the largest population and energy needs. Such a fact is related to previous government policies that made Java island as the centre for industries and businesses. The largest capacity power plant is located in Banten province in Pelabuhan Ratu area with a capacity of 3 x 350 MW, with a total of 1,050 MW that has Commercial Operation Date (COD) in 2013 – 2014 and the smallest capacity are located in the provinces of Sumatra, Kalimantan, Maluku and Papua with a capacity of 2 x 7 MW that scattered throughout Indonesia. Of the 39 PLTU units, 4 were cancelled, while 35 are still under construction and planning.

**Table 3: Indonesian plan of supercritical/ultra-supercritical coal power plant**

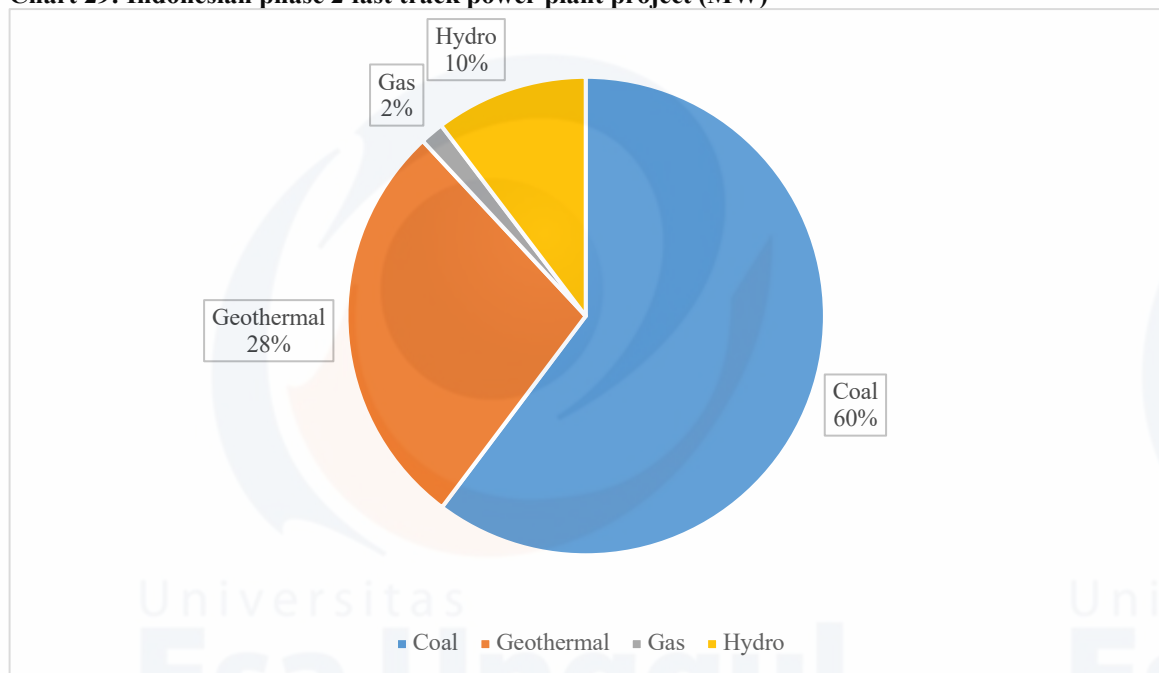
No	Power Plant	Capacity (MW)	COD	Developer	Location
1	Steam PP Lontar Exp	1 x 315	2018	PLN	Banten
2	Steam PP Jawa Tengah	2 x 950	2019	IPP	Central Java
3	Steam PP Indramayu	1 x 1000	2019	PLN	East Java
4	Steam PP Jawa 1	1 x 660	2019	IPP	East Java
5	Steam PP Jawa 3	2 x 1000	2019	IPP	East Java
6	Steam PP Jawa 4	2 x 1000	2019	IPP	Central Java
7	Steam PP Jawa 5	2 x 1000	2019	IPP	Banten/East Java
8	Steam PP Jawa 7	2 x 1000	2019	IPP	Banten
9	Steam PP Jawa 8	1 x 1000	2018	IPP	Central Java
10	Steam PP Jawa 9	1 x 600	2020	IPP	Banten
11	Steam PP Sumsel 8	2 x 600	2019	IPP	South Sumatera
12	Steam PP Sumsel 9	1 x 600	2020	IPP	South Sumatera
13	Steam PP Sumsel 10	1 x 600	2020	IPP	South Sumatera

Source: State Electricity Company of Indonesia (PT PLN)



In addition, the Indonesian government is also committed to building steam coal-fired power plants (Steam PP) with supercritical and ultra-supercritical technologies. There are 13 power plants on the islands of Java and Sumatra that have these technologies with the smallest capacity of 1 x 315 MW in Lontar, Banten province and with the largest capacity of 2 x 1,000 MW (2,000 MW in total) that spread in several regions on the island of Java (Table 3). In total, there are 15,875 MW of power plant capacity being built, where 1,800 MW or 12% of total capacity is located in South Sumatra province, as well as 2,915 or 19% of total capacity that is located in Banten province, another 4,900 MW or 32% of total capacity that is located in Central Java province and 3,660 MW or 24% of total capacity that is located in the province of East Java. The rest of 2,000 MW or 13% of total capacity is divided into a combination of two provinces in Banten and East Java. Most of the construction of these power plants are done and owned by IPP, where only two are developed by PLN.

**Chart 29: Indonesian phase 2 fast track power plant project (MW)**

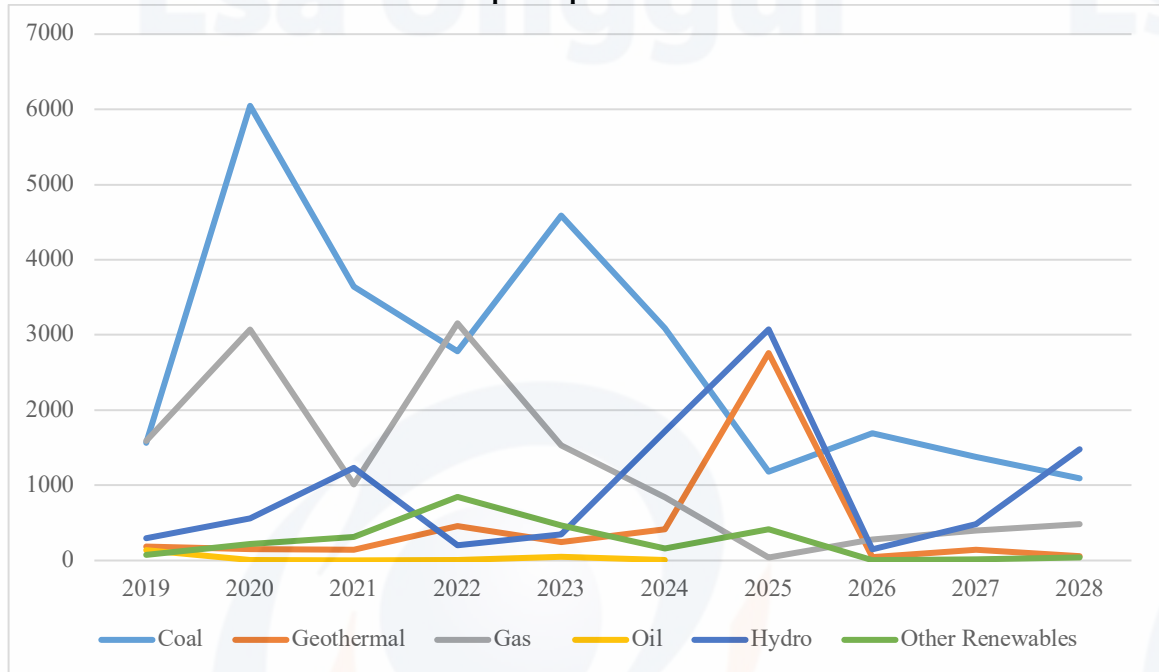


*Source: State Electricity Company (PLN) of Indonesia*

For the phase 2 fast track power plant project with the total of 17,458 MW, which is a continuation of the previous program above, in overall of 10,520 MW or 60% of the planned power plants are coal-fired, followed by geothermal power plant as the second-largest portion with 4,855 MW or 28% of the total, continued by hydro power plants by 1,803 MW or 10% of the total and gas power plants by 280 MW or 2% of the total (Chart 29). Coal remains the largest source of energy with a significant percentage compared to other energy sources in this phase 2 project, while oil is not included in the priority list by reason of government that tries to reduce the dependency of this energy source, that leads to the exclusive use of oil for only in transportation, besides the development electric and hybrid cars. Other renewables still need further improvement by cause of its cost and effectiveness prior being included in the planning of fast track power plant projects. Geothermal and hydro are two energy priorities pursued by the government due to its abundant existing resources in Indonesia and its relatively low costs, along with the capability of local human resources to develop and operate the latest and current technology for these energy sources. Mass transportation

development trends such as Mass Rapid Transport (MRT), Light Rapid Transport (LRT), Commuter Line, Monorail as well as the development of electric cars and motorcycles require large energy distribution therefore makes coal as one of the main focuses in providing national electricity to meet these growing needs.

**Chart 30: Indonesian needs for additional power plants**



Source: State Electricity Company (PLN) of Indonesia

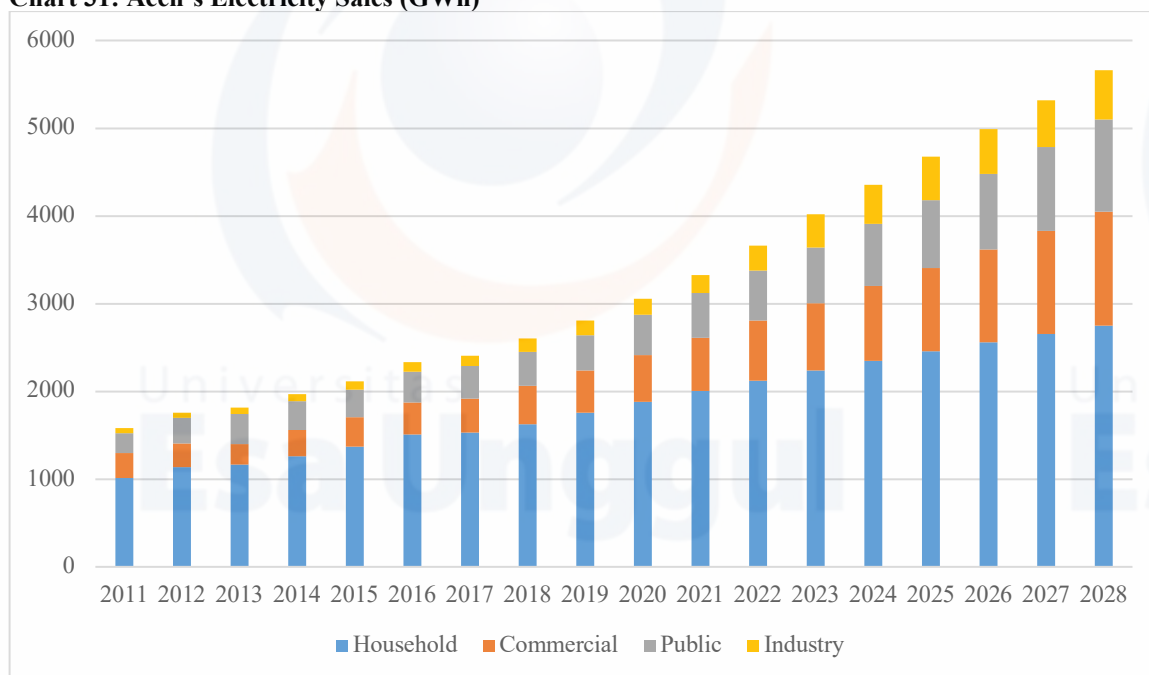
Statistically speaking, Indonesia requires additional power plants of 3,858 units in 2019 and 3,152 units in 2028 (Chart 30). The peak demand is expected to occur in 2020 with a total requirement of 10,060 units, and the smallest demand is expected to occur in 2027 with only 2,423 units. It can be seen that the most needs for additional power plants, in general, are from coal energy sources with a peak in 2023 of 4,590 units where the opposite for oil decreases, even though there is an increase in 2023 similar to coal of 47 units, although it will be disappear starting from 2025. Significant increase occurred in the needs of hydro power plants to 2,037 units and of geothermal power plants to 2,759 units, where abundant resources are available all over Indonesia and considered as one of the renewable and clean energy sources, despite difficulties in transporting and storing these energy products still occur in at least the next few years. On the other hand, gas has a high demand after coal and is still larger than oil, with a significant increase in 2020 of 3,073 units and 2022 of 3,155 units, as the result of numerous and sufficient processing facilities in Indonesia and its fairly environmentally friendly combustion results. The ease of storing and transporting this type of fuel are some of the reasons for its high demand, in which it has also been used in the modes of transportation for cars, buses and motorcycles.

Throughout the provided data, Indonesia is considered to have great potential for coal mining along with developing technologies and researches, which will further increase its potential. For this reason, it requires research, management systems and integrated business planning, along with effective collaboration with various parties, such as the central government, regional governments, local mining area's communities, mining associations, mining companies and other businesses related to coal mining.

### 1.4.3 Coal mining and energy development in Aceh

Based on the information in Table 1, Nanggroe Aceh Darussalam (Aceh) is one of the provinces in Indonesia that have sufficient amounts of coal resources and reserves. It is located in the westernmost part of the archipelago of Indonesia. Its strategic position has made this province as a trade gateway of commerce and culture that connects Eastern and Western part of the world since centuries ago, including for coal export demand to India as shown in chart 21 with a relatively short delivery duration due to geographical proximity between these two places via the Indian ocean. The province has a population of 5,371,532 people (Aceh Provincial Statistics Agency, 2019) with an area of 57,365.57 square kilometres (Km<sup>2</sup>) (2,88% of Indonesia's total area) stretched in 6,770,81 km<sup>2</sup> of 119 islands, 35 mountains, 73 important rivers and has abundant natural resources spread over 6,450 villages/*gampong* (Aceh Energy and Mineral Resources Service). For centuries, Aceh is known as a producer of spices and a vital trade hub that served as the motives of the Portuguese, Netherlands, England and several other European nations along with Japan to visit and occupy this area. In the post-independence era of the Republic of Indonesia, the region is also well-known for its agriculture, fisheries, animal husbandry, minerals, fuel production and also tourism due to its archipelagic geography with a tropical climate.

**Chart 31: Aceh's Electricity Sales (GWh)**



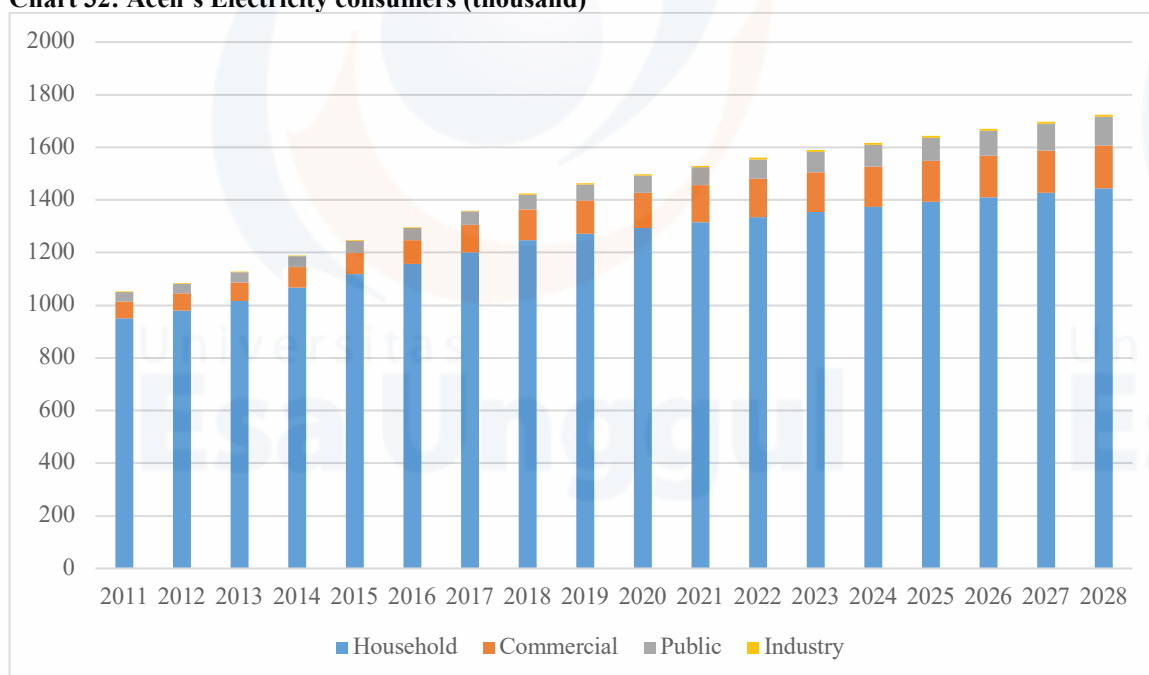
Source: State Electricity Company (PLN) of Indonesia

These potentials can be considered as remarkably important capitals to support the implementation of development in Aceh towards a prosperous society. However, several facts show that the citizens have not obtained a life commensurate with the wealth of natural resources owned by the province for the sake of its people. Along with population and also economic growth in Aceh, it affects local people's needs, especially related to electricity and energy as their main requirement for work, entertainment and other modern living activities. Electricity sales in Aceh continued to increase from year to year wherein 2011 it has amounted to 1,580 GWh, and in 2028 it is expected to increase to 5,664 GWh, with an annual average growth of 8% (Chart

31). As with energy sales (Chart 16) and electricity consumers (Chart 28) in Indonesia, the largest sector, in this case, is household, which in 2011 had electricity sales of 1,016 GWh and it is estimated that it will reach 2,747 GWh by 2028, with an annual average growth of 6%. In 2028 the portion of the household sector in electricity sales in Aceh is estimated to be 48%, followed by the commercial sector at 23%, the public sector at 19% and the industrial sector at 10%. The highest annual average growth occurred in the industrial sector by 15%, followed by the public and commercial sectors respectively at 9%.

Continuing the explanation on Chart 31, further data regarding electricity sales is also related to electricity consumers in Aceh. There is a significant increase in the number of consumers wherein 2011 there were only 1,050 thousand people, and in 2028 it is estimated to reach 1,723 thousand people with an increase of around 64.10% and annual average growth of 3%. The portion of consumers, in general, is almost similar to electricity sales in Aceh (Chart 28). The largest annual growth is found in the industrial sector at 12% with an increase of around 622.22% from 2011 to 2028 and the second largest in the public sector at 7% with an increase of around 212.57%, followed by commercial sector at 6% with an increase of around 157.53% (Chart 27). Household remains as the sector with the largest number of electricity sales, where in 2011 there were 951 thousand people and in 2028 it is expected to be 1,445 thousand people with an increase of 51.91% and an average annual growth of 2%.

**Chart 32: Aceh's Electricity consumers (thousand)**

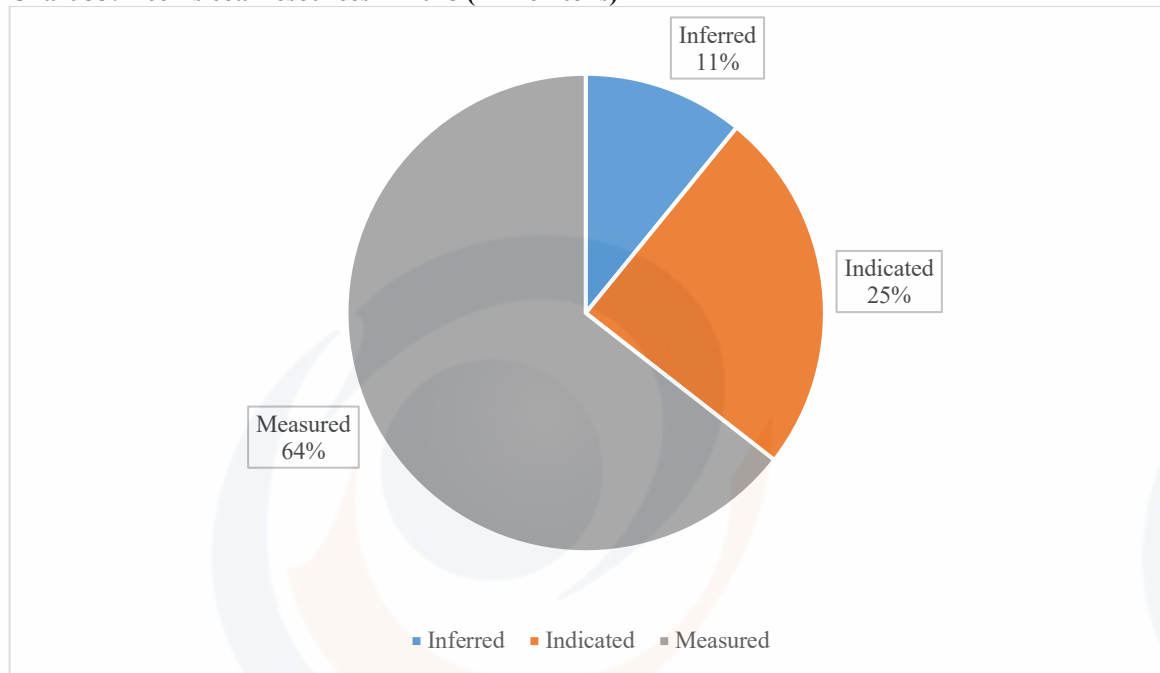


*Source: State Electricity Company (PLN) of Indonesia*

Although the number of electricity sales and electricity consumers in Aceh is quite small compared to other regions in Indonesia, especially in Java, which has a much denser population, the potential energy produced by coal can support electricity needs in other areas on the island of Sumatra. Prospective coal sales to other regions and exports also become a major supporter for the development of the mining industry. Point of issue is also related to the supply of coal for the existing power plant in Nagan Raya in Aceh that uses products from Kalimantan due to the unmatched coal requirements in terms of quality and quantity of a very few operating coal mining

companies in Aceh. Going forward, if other mines are already operating, supplies for existing and planned power plants will be required to use coal from Aceh to help the regional economy and reduce the cost of shipment. Taxes generated from mining operations also boost provincial government income, where such revenue acquired since historically from 1900, Aceh has started several mining business activities of coal, oil and gas in the north, east and off the coast of the Strait of Malacca with sharing contracts. Exploration data from the past which was perfected from time to time shows that coal deposits are concentrated in the Meulaboh Basin in West Aceh District.

**Chart 33: Aceh’s coal resources in 2018 (million tons)**



*Source: Ministry of Energy and Mineral Resources (ESDM) of Indonesia*

There are several classifications to determine the existing resources. “Inferred resources are part of resources whose quantity and quality are obtained based on the results of the prospecting stage, estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes. Indicated resources are resources whose quantity and quality are obtained based on the results of the general exploration stage, for which quantity, quality, densities, shape and physical characteristics, can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration and testing information gathered through appropriate techniques from locations. Measured resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are so well established that they can be estimated with confidence sufficient to allow the appropriate application of technical and economic parameters, to support production planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations” (National Standardization Agency, 1998, p. 6, Canadian Institute for

Mining, Metallurgy and Petroleum, 2010, p. 4-5). Based on this classifications, total coal resources in Aceh are estimated with the amount of 1,273.97 million tons, along with the resources of about 570.97 million tons that consist of 11% or 138.51 million tons of inferred resources, 25% or 314.22 million tons of indicated resources and 64% or 821.24 million tons of measured resources (Chart 30).

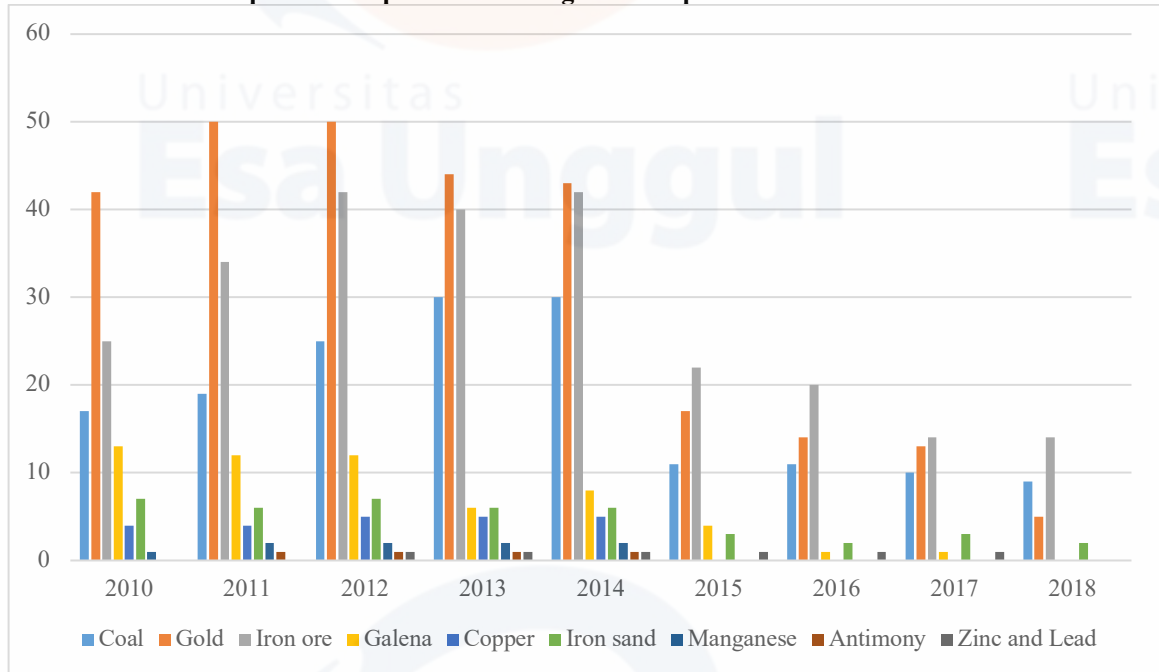
**Table 4: Aceh's coal mining companies**

No	Company	Land area (Ha)
1	PT Bara Energi Lestari	1,495
2	PT Mega Multi Cemerlang	10,000
3	PT Mifa Bersaudara	3,500
4	PT Aceh Mining Lestari	8,562
5	PT Indonesia Pasific Energi	4,937
6	PT Alam Aceh Resources	5,718
7	PT Aceh Mineral Gemilang	10,000
8	PT Mega Fiume International	10,000
9	PT Rimbaka Mining Makmur	9,825
10	PT Antik Unggul Mineral	9,935
11	PT Prima Bara Mahadana	10,000
12	PT Aceh Tuwan Sinagawi	8,197
13	PT Agrabudi Jasa Bersama	5,000
14	PT Surya Makmur Indonesia	1,600
15	PT Nirmala Coal Nusantara	3,918
16	PT Mineral Kencana Mandiri	9,679
17	PT Mulia Kencana Mandiri	9,958
	<b>Total</b>	<b>122,324</b>

*Source: Provincial Mining Office of Aceh*

With vast number of coal resources in Aceh, foreign and Indonesian companies are interested to access the region for further research and in turn will lead to natural resources exploitation and mining operational activities which are expected to bring economic impacts both in terms of infrastructure, Corporate Social Responsibility (CSR), employment, etc. Currently, there are 17 coal mining companies that have being granted the permits to operate in Aceh, each with different land areas. Ownership of the several largest territories with the size of 10,000 hectares (Ha) are held by four limited companies/*Perusahaan Terbatas* (PT) such as PT Mega Multi Cemerlang, PT Aceh Mineral Gemilang, PT Mega Fiume International and PT Prima Bara Mahadana. The ownership of the smallest area of 1,495 hectares is owned by only one company, namely PT Bara Energi Lestari. The total land owned by all coal mining companies in Aceh is 122,324 hectares. In addition to the coal natural resources, Aceh also has a variety of metal mining materials. The Aceh Provincial Mining Agency's inventory results According to the Aceh Mining and Energy Agency's report, the region has 21 potential and highly prospective industrial mining materials to be developed with locations spreading to almost all districts or municipalities in Aceh. For almost a decade, there have been many companies that have entered this area and explored to prove the assumptions and values with a more accurate way and standardized methods.

**Chart 34: The development of exploration mining business permits in Aceh**

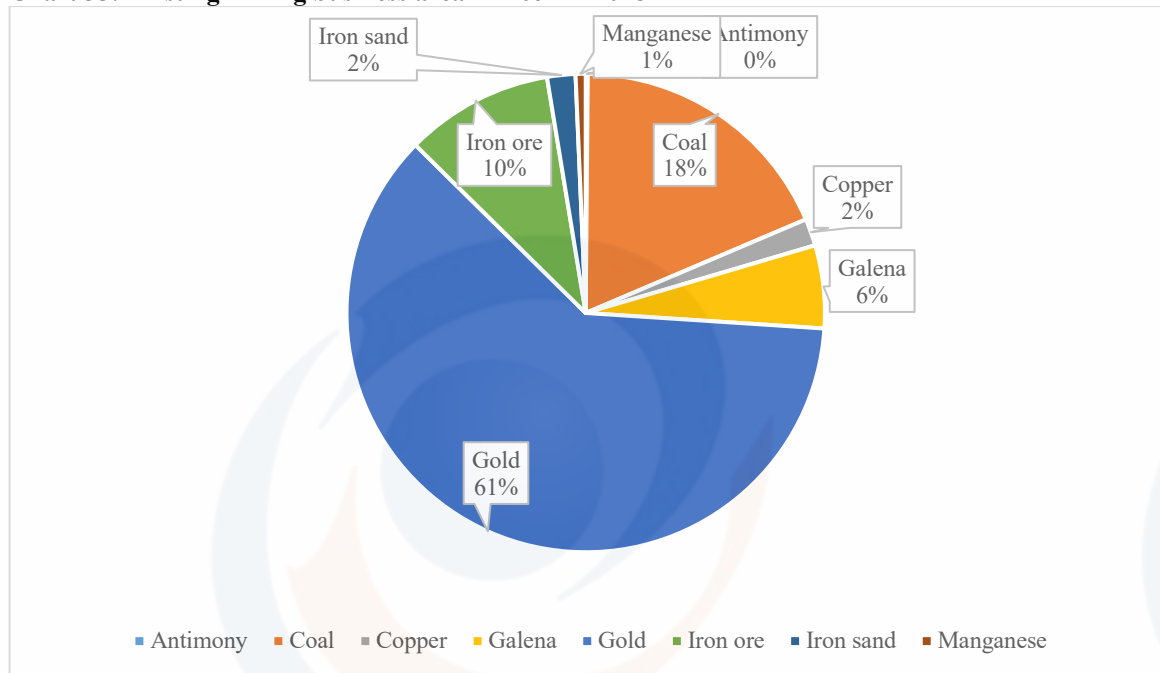


Source: Provincial Mining Office of Aceh

Based on data from Provincial mining office in Aceh, from 2010 to 2014, there were many issued exploration permits where gold became the mineral with largest number of permits in the amount of 50 permits in total at its peak in 2011 and 2012, followed by iron ore with 42 permits at its peak in 2012 and 2014 (Chart 34). On the other hand, in terms of quantity, coal mine is considered to be compelling based on its huge number of permits with 30 permits in total at its peak in 2013 and 2014 which ranks third, after the two previous minerals. Other issued permits are for galena, iron sand, manganese, antimony, zinc and lead. However, in 2015 a moratorium occurred which caused a significant decrease in mining exploration permits, where in 2015 up to 2018, the highest number of permits was owned by iron ore which competed with the number of gold and coal permits, that in the end, the number of coal permits exceeded gold in 2018. The amount of permits continues to decline each year along with exploration results that are considered to be uneconomic or unfeasible, whereas in 2010 the total number of permits were 109 and has been drastically decreased in 2018 by 72.48% to only 30 permits, in which coal permits have decreased by 47.06% from 2010 as many as 17 permits to only 9 permits in 2018. The most severe decrease occurred to galena, copper and manganese. Antimony along with zinc and lead, which previously had only 1 permit, currently does not have any existing permit afterward. This refer to the moratorium on mining permit in 2016 based on the Aceh Governor's Instruction/*Instruksi Gubernur Aceh* Number 9 Year 2016 concerning the moratorium on mineral, metal and coal mining business permit that was issued to improve mining business governance in a strategic, integrated, and coordinated manner as well as to conduct sustainable mining management and to encourage environmentally friendly mining system along with conducting evaluation and verification of clear and clean (C&C) for mining activities that already possess a permit. In addition, there are several obstacles in exploration activities that the government is trying to solve through Law Number 3 Year 2020. Firstly, the lack of greenfield exploration that is anticipated with support for junior mining companies, assignments to state-owned companies or private companies to explore new areas and conduct reviews on assessments of Information

Data Compensation/*Kompensasi Data Informasi* (KDI) for certain areas. Secondly, is the delay in exploration activities that are anticipated by synchronizing activities with other sectors in the same area, cooperation agreements with the Ministry of Environment and Forestry and the obligation to carry out further exploration every year by providing a budget in the form of a reserve security fund. Lastly, the anticipated application of information technology with the management of exploration data and information by the government and regulations to maintain data confidentiality and data utilization procedures (Tasrif, 2020).

**Chart 35: Existing mining business area in Aceh in 2018**

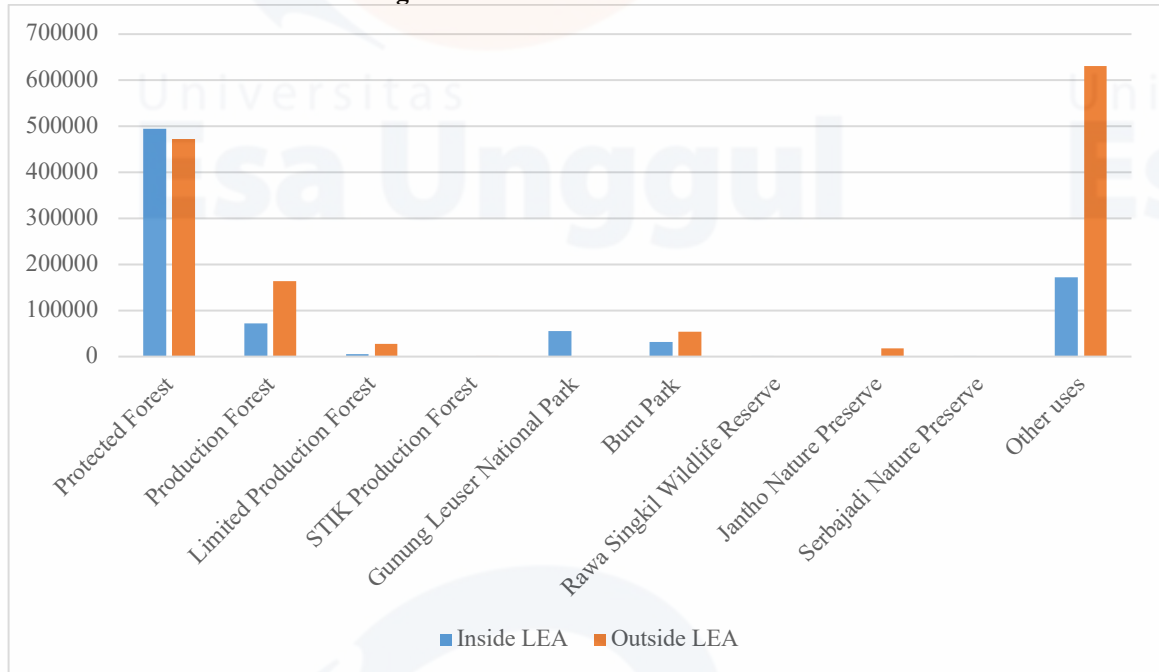


*Source: Provincial Mining Office of Aceh*

The total mining area in Aceh is 545,447.49 hectares, of which 60% or 334,661.22 hectares is the largest land area reserved for gold mining, followed by coal mining area of 18% or 100,706 hectares as the second largest, iron ore of 10% which is the third largest, galena of 6% or 30,544 hectares, iron sand of 2% or 10,433.07 hectares, copper of 2% or 10,000 hectares, manganese of 1% or 3,710 hectares and antimony at less than 1% or 751 hectares (Chart 35). Due to not heavily populated areas and a not yet massive infrastructure development and economic activities compared to Java, the size of green areas and which have not been optimally utilized in Aceh are still considered to be very large and massive. This results in a lot of issued and existing permits and a vast area of land use, although not as many as in Kalimantan.



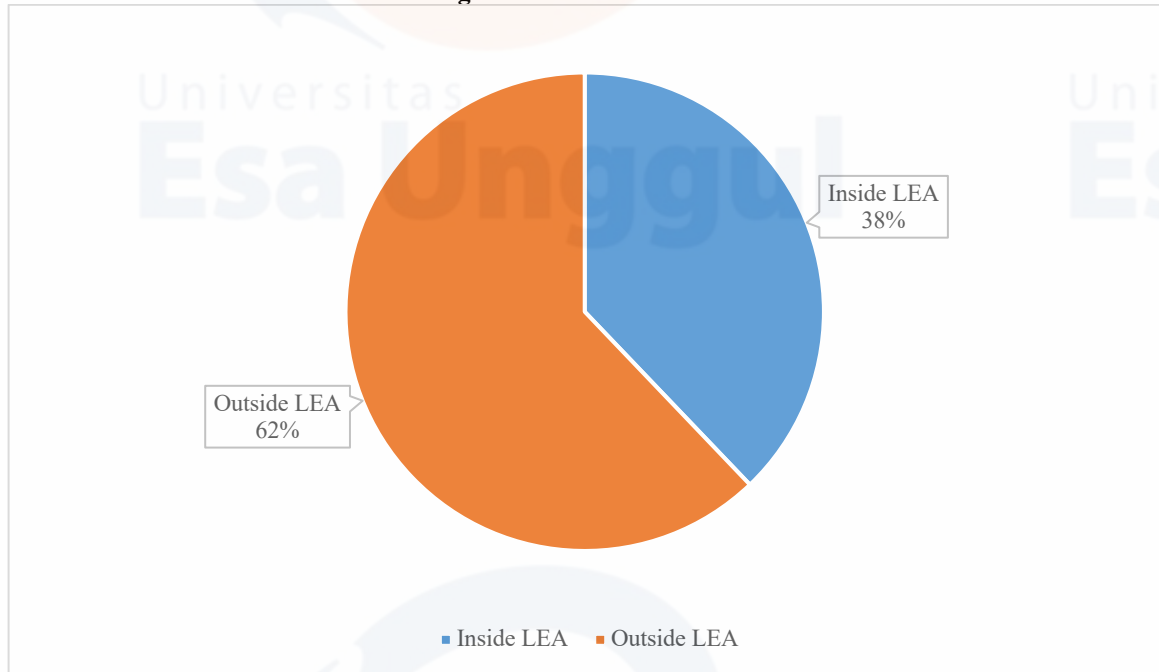
**Chart 36: Area functions in mining business area in Aceh**



Source: Provincial Mining Office of Aceh

If divided into areas of functions in mining business, where there are regions inside and outside the Leuser Ecosystem Area (LEA), protected forests occupy the largest area for inside and outside LEA of 966,618.08 hectares if other uses area are not taken into account (Chart 36). Production forest that is defined as “forest area designated primarily for production of wood, fibre, bio-energy and/or non-wood forest products” (FAO, 2011, p. 11), ranks second for the mining area of 235,582.4 hectares, especially outside LEA and Buru Park of 86,713.22 hectares ranks third. Other areas included in the division of area functions are Gunung Leuser National Park of 55,935.86 hectares, Limited production forest of 32,444.76 hectares, Jantho nature preserve of 17,988.03 hectares, Rawa Singkil wildlife reserve of 369,06 hectares, Serbajadi nature preserve of 312.65 hectares, College of Forestry Sciences/*Sekolah Tinggi Ilmu Kehutanan* (STIK) production forest of 300.96 hectares and other uses area of 804,115.29 hectares. The vast area in protected forests that is defined as “areas especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means” (ibid, p. 15) is by reason of mineral content that easily formed and yet to be excavated in well-maintained forest areas. However, on the other hand, the issue of environmental damage would arise if it is not carefully planned and managed not only on the natural aspect but also related to the social aspect.

**Chart 37: Total area functions in mining business area in Aceh in 2018**



*Source: Provincial Mining Office of Aceh*

If the simplification is carried out in the functions in mining business area, from the total area of 2,200,380.31 hectares, 62% or 1,367,242.71 hectares are located outside the LEA while 38% or 833,137.6 hectares are located inside the LEA (Chart 37). This is important due to its conservation purposes, the amount of occupational land within the LEA should not be significantly large. However, there is a possibility that it will change in the presence of a new regulation and policy that converts LEA land into non-LEA for industrial and economic purposes.

As for the regulations and regional unique characteristics, the Indonesian government has passed a special autonomy law for Aceh. It is a form of autonomy designed with an offer above the usual autonomy. The aim is to dampen the independence movement that wants a complete separation from the Republic of Indonesia by giving the region greater authority to govern on its own to certain extent, which makes it unique and possess a different approach to exploration and exploitation of mining activities in this region. Bhenyamin Hoessein (2005) explained that in the context of a unitary state such as Indonesia, the application of decentralization and centralization principle within the state organization is not dichotomous but rather the continuum, which means that the Central Government (in Jakarta) is unlikely to administer all government affairs in its hands in a centralized manner, and vice versa, the Local Government of Aceh, is unlikely to administer all submitted government affairs. Thus, governmental affairs concerning the interests and survival of the nation and the state are usually held in a centralized manner, while matters containing and related to the interests of local communities are decentralized. The granting of different autonomy to one region or territory from several regions is a fairly common practice of administering the government in the experience of political arrangements in many countries. The case of special autonomy, like in Aceh, is explained as the special authority granted to organize and manage the interests of the local Acehese community on its own initiative but in accordance with the rights and aspirations of the people in the area. This authority is granted to ensure that Aceh's people and its government is able to manage the region and parts of its area to ameliorate certain

aspects in a particular field in accordance with its regional aspirations (Malahayati, 2015).

For companies in Indonesia, it is preferable and possible to export concentrates, i.e., raw materials, due to high selling price compared to the local market, in accordance with Indonesian Law Number 4 Year 2009 for Mineral and Coal Mining. Yet, it is unworkable by reason of declining reserve conditions. Coal is one of the main supports for the industry, both for energy and smelter. The amount of reserves and coal content in Indonesia is massive (Table 1), which makes it ranked third in global level (Chart 8). However, since the existence of the Conference of Parties (COP), there have been many restrictions in using coal. The needs that can be met are for the domestic market. Prior to the COP, a massive amount of coal was exported to India and China while in the current development, sales are more concentrated for domestic needs. If local quota is already secured, companies may be given permission to export, for around 100 million tons (Hariwan, 2019). The plan for a 35 GW of electricity project creates an enormous and challenging needs. With a dominant role of oil and gas, aside from renewable energy, the soaring cost will be not feasible. In the 2018 RUPTL, the portion for coal as one of the energy sources is still dominant, with an energy-mix percentage of 50%. Occasionally in the coal mining area, other elements are also detected during the exploration and exploitation phase, such as minerals. Although there are differences in required permits and longer arrangement time for a combination of coal and minerals mining, yet all the potential complementary resources must be taken into account that will lead to a huge loss if such opportunity cannot be exploited and obtained. Furthermore, there is a roadmap which covers from upstream to downstream planning and strategies in order to maximize the potential and maintain the balance of economic, social, and environmental aspects. It is worth to be noted that even though Indonesia has abundant natural resources, not all kinds of the minerals are available. One of the biggest amounts of natural resources in Indonesia is copper, and even the quantity is declining along with its other 'expensive' resources such as gold that were plentiful (ibid). For demand of unavailable minerals, it is possible to obtain via import activities, since mineral resources are important to support the baseline of industry, which makes it an obligation to be allocated and utilized for industrial development. Unfortunately, such matter does not appear in the Indonesian roadmap which hampered the development of minerals for its lack of concern.

In order to export raw materials that enable the country to continue utilizing its benefit without losing profits due to diminishing of local resources, the amount of Non-Tax National Income/*Pendapatan Nasional Bukan Pajak* (PNBP) must be enlarged. Other methods such as increasing royalties, and if necessary, inflating prices of every mineral along with its taxes can be done to guarantee received amount of profits. The mindset of the Indonesian government and its people regarding plentiful natural resources has made the country to suffer on severe policy towards the development of its resources. For more than 30 years, Indonesia has had its own respective mines. However, the established research and development (R&D) program is only adequate if it is focused specifically for technological development purposes. The main problem is not due to the quality of human resources, yet caused by the Indonesian Government that is reluctant to invest in this technological program due to several factors, resulting in outrunning of advancement by other countries due to long delay on related research. It is surely important to invite foreign investment into the country including the inherent obligation for technological sharing or transfer of knowledge agreement and not just the concern to acquire PNBP, without other benefits. The Ministry of Energy

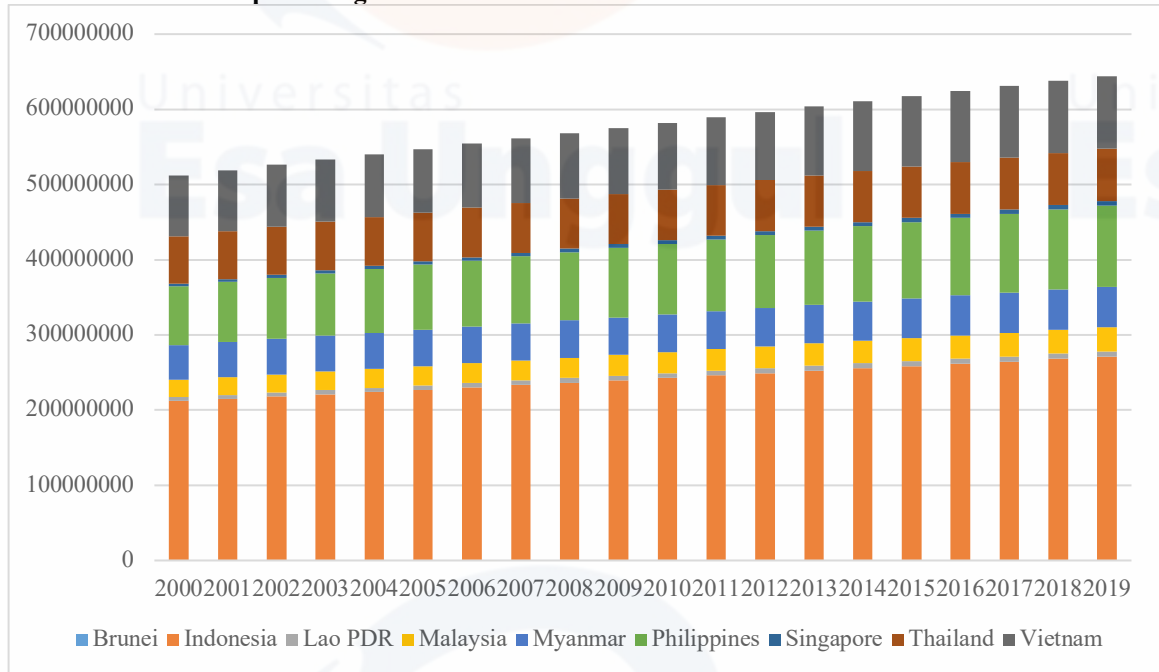
and Mineral Resources policy is still focusing on the upstream activities, while the downstream activities are controlled by a different institution, which is the authority of the Ministry of Industry. There is no coordination between Ministries as the result of sectoral ego issues, which commonly happens in Indonesia. The Ministry of Energy and Mineral Resources itself wants to have authority from upstream to downstream due to the need for integration and combined planning and system (ibid).

Related to the micro managerial of mining activities in Aceh, there is another system that is being used, namely the cooperative system (Indonesian: *Koperasi*) for the local or native people in the region. Münkner (2015) divided Cooperative based on the western (i.e., capitalist) and socialist concept, while the third countries used the mix of two concepts. Based on the western concept, Cooperative is a private organization, formed voluntarily by people who have the same interests and intent to take care of the interests of their members and create mutual benefits for members of cooperatives and its own cooperative company or institution, as confirmed by the International Cooperative Alliance (ICA) in their statement. On the contrary, the socialist concept of cooperative means that it is planned and controlled by the government, and formed with the aim of rationalizing production, to support the national plans. In Indonesia, Cooperative as an institution can be created and supported by the government while maintaining its autonomous planning, decisions, and activities, as related to current research in Aceh. Plans for collaboration with local communities through cooperatives systems to support key businesses in mining and related supporting businesses have become ideas that are planned to be executed and implemented. Such action will manage to support the local community with a well-organized system that will result in the emergence of professionalism and legal guarantees and hopefully will be able to reduce conflicts between communities and companies.

#### **1.4.4 ASEAN influence on the coal industry**

As part of Asia in which the largest continent in the world that possess various kinds and types of natural resources in addition to be actively involved in global political and trade activities, Indonesia with all its potentials and challenges feels the need to cooperate with regional partners to overcome constraints and maximize existing prospects. One of the issues that has been done is by establishing the Association of South-east Asian Nations (ASEAN) in 8 August 1967 in Bangkok, Thailand, where Indonesia has the initiative and honour as one of its founders along with Malaysia, Philippines, Singapore and Thailand. The association was created due to conflict-prone situations in the 1960s, for the influence of the ideologies of the major powers and conflicts between countries in the region which, if left unchecked, could disrupt the stability of the region and thus hinder development. South-east Asia has enormous numbers of mining activities and mining reserves spread around the continent with a massive amount of quantity and great value, with additional members of Brunei Darussalam, Vietnam, Myanmar, Lao People Democratic Republic (PDR) and Cambodia, that makes the total current members to be 10 countries including its founders.

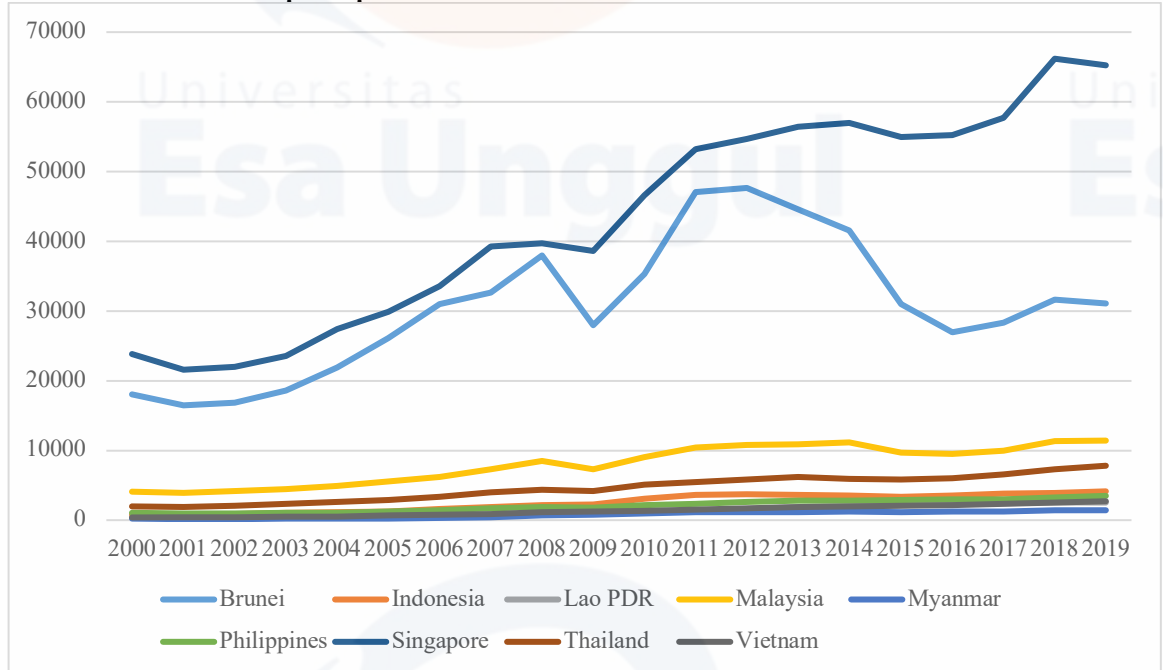
**Chart 38: ASEAN Population growth**



Source: World Bank

The total population in this region is approximately 631 million people in 2017, which shows its huge potential, especially after the implementation of the ASEAN Economic Community (AEC) policy that could drive economic growth up to 4.6% of GDP per year (IEA, 2015, p. 22). In total, the average annual growth is 1.24% where in 2000 there were only 511.74 million people and in 2019 the population grew by 23.38% and have become 644.13 million people (Chart 38). Indonesia has the largest population in the region with a portion of 41.81% of the total population in ASEAN and is also one of the countries with fairly high annual growth rates. With a reasonably dominant population, Indonesia has a huge role in the economy and decisions making of joint policies in this region, including to seek aid and establish cooperation with other ASEAN members, especially for mining industry and fulfilment of energy needs such as for export market. Huge and rapidly growing population would also create additional needs from potential customers for business and industry activities as well as the factor of growth in the future, where ASEAN as one of the regions with the fastest growth and strong economy, plays an important role in the development of energy and the environment. With huge demographics of youth and increasing professional workforce as well as its potential consumers, has become the main driver of economic and industrial growth. With an economic power of US\$ 2.5 trillion in 2015, making it the sixth-largest economic power in the world and the third-largest in Asia (Vinayak et al., 2014), whereas in 2050, McKinsey predicted that ASEAN would rise to rank four in the global position. Therefore, ASEAN's potential in the development of the Indonesian mining industry, particularly Aceh, is vital and essential to be analysed and included in this research.

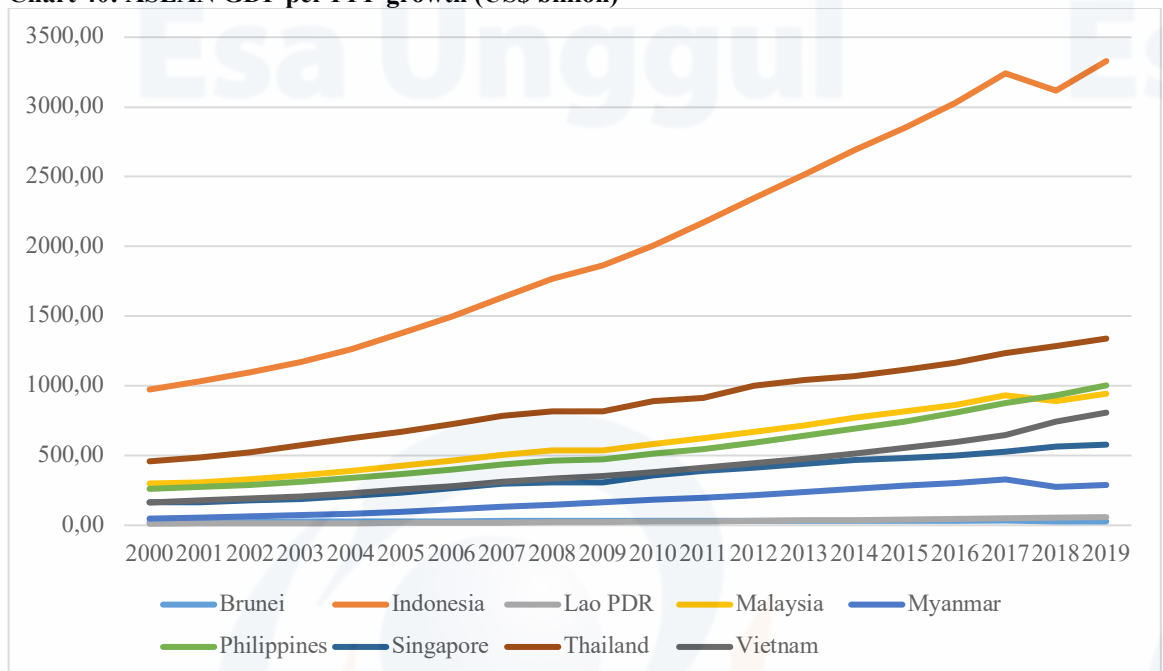
**Chart 39: ASEAN GDP per capita**



Source: World Bank

Its economic growth has increased rapidly in the last few decades, where the largest growth is possessed by Lao PDR by 12.1% along with Myanmar with 11.7% and Vietnam with 11.4%. Indonesia itself has a growth of 9.7% and an increase of 430.14% from 2000 of US\$ 780 to 2019 with the amount of US\$ 4,136, which is considered to be high (Chart 39). The biggest GDP per capita is owned by Singapore with the amount of US\$ 65,233 in 2019, which comes from their trading and financial activities, followed by Brunei Darussalam in the amount of US\$ 31,087 from their oil industry. In total, the average annual growth of GDP per capita in ASEAN is 5.4% with an average figure of US\$ 5,620 from 2000 to US \$ 14,425 in 2019.

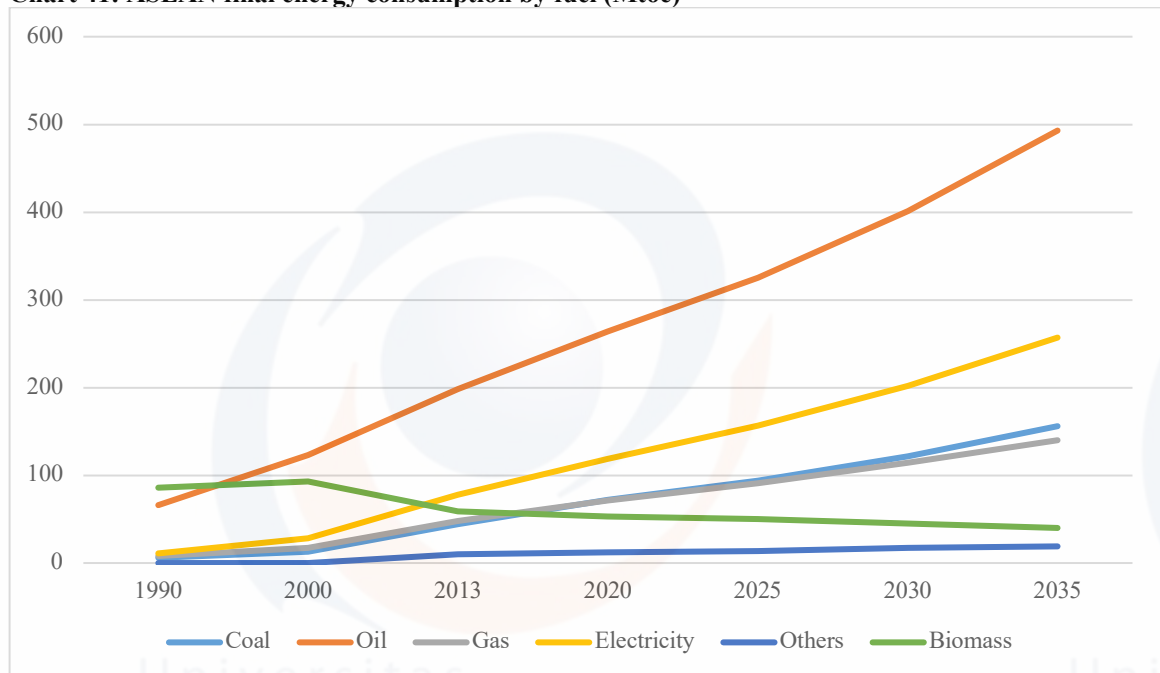
**Chart 40: ASEAN GDP per PPP growth (US\$ billion)**



Source: World Bank

As for Gross Domestic Product (GDP) growth per Purchasing Power Parity (PPP), a method used to calculate an alternative exchange rate between the currencies of two countries, the annual average of ASEAN is 7.19%, with the highest growth being different, owned by Myanmar by 10.53% and the second-largest growth owned by Lao PDR by 10.01% (Chart 40). Interestingly, Indonesia is recorded as the highest amount of GDP per PPP, even though its growth is only 7.07% with a value of US\$ 3,329.17 billion in 2019. Generally, economic growth has a positive correlation with the growth of energy needs, due to the increase in purchasing power which affects the consumption and use of electronic devices.

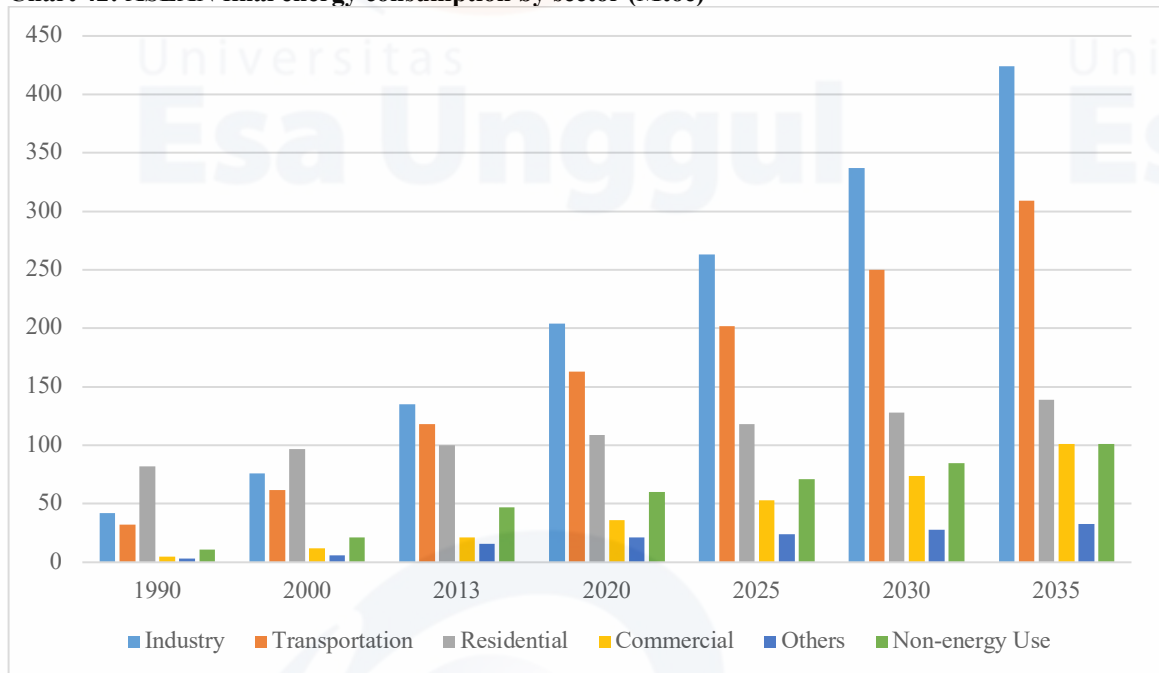
**Chart 41: ASEAN final energy consumption by fuel (Mtoe)**



Source: ASEAN Centre for Energy

Based on data from the International Energy Agency (IEA), energy demand has increased by more than 524% from the last 45 years starting from 117 Mtoe in 1990 will become 1,105 Mtoe in 2035. The forecast from IEA states that there will be an annual increase in average growth in ASEAN for its energy consumption of 4.25% up to 2035, along with several challenges that need to be faced to meet those needs (Chart 41). The biggest energy consumption is still dominated by oil wherein 2035 will reach 493 Mtoe and is closely followed by electricity that will reach 257 Mtoe in 2035 along with significant growth in coal energy consumption that will reach 156 Mtoe due to its abundant resource and reasonable price in this region. Biomass had experienced a slight growth but tended to decline until 2013. Coal has the largest annual average growth of 7.69%, which is two times the growth of total energy consumption. This shows that in the future, these resources will be urgently needed and should be developed to meet forthcoming needs.

**Chart 42: ASEAN final energy consumption by sector (Mtoe)**

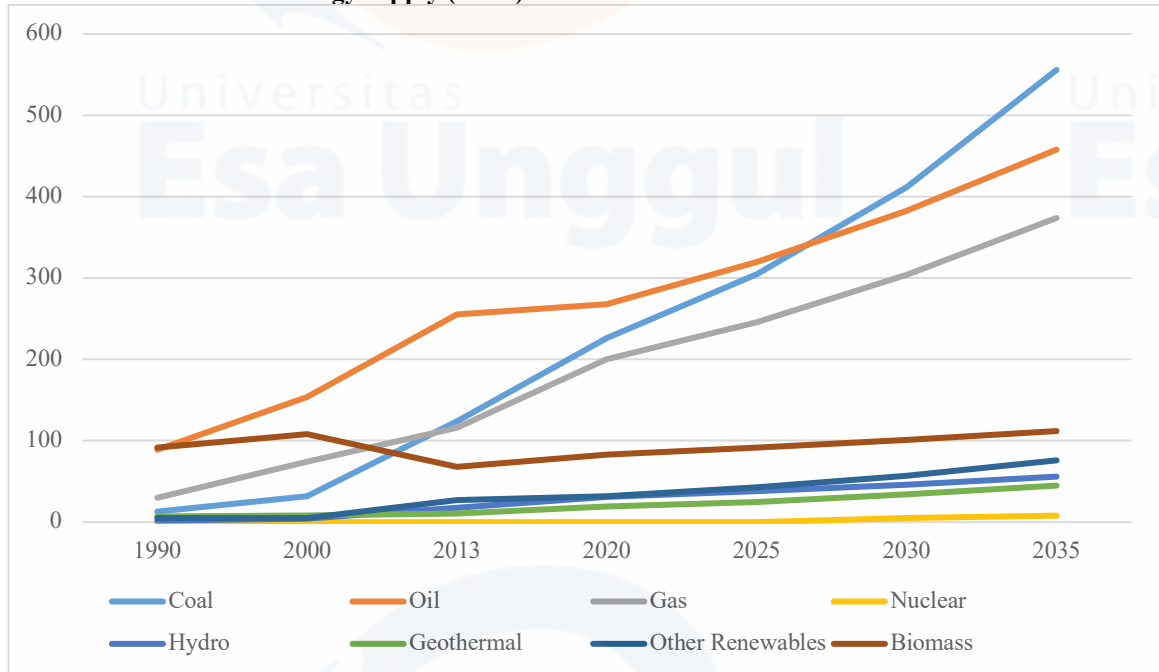


*Source: ASEAN Centre for Energy*

In connection with the above, final energy consumption by fuel (Chart 41) can be collaborated with the final energy consumption by sector. In total, the amount and energy growth are the same, where differences occur in the existing sectors. The biggest energy consumer is in the commercial sector with a growth of 1,920% from 1990 at 5 Mtoe to 101 Mtoe in 2035 followed by others sector of 1,000% from 3 Mtoe to 33 Mtoe (Chart 42). Growth in the industrial sector needs is forecasted to grow at 910% from 1990 at 42 Mtoe to 424 Mtoe in 2035 due to the massive expansion and development along with great influence on energy policy in ASEAN countries. This is closely related to the progress of the economy and industry in this region, which is highly significant and is expected to continue to grow until the next few decades due to transition and economic shifting from the European and American Regions as a consequence of excessive costs and its consumer's number and growth that are outnumbered by Asia. In general, an increase in energy consumption continues to occur without any reduction in which serves as a positive outlook for development and stability in the region, at least prior 2035 which has a total consumption of 1,107 Mtoe with a growth of 533% from 175 Mtoe in 1990. The largest annual average growth occurs in the commercial sector by 7,07% and is followed by other sectors at 5.6%, beside industrial sector at 5.4%, transportation sector at 5.29%, non-energy use sector at 5.17% and residential sector at 1.21%.



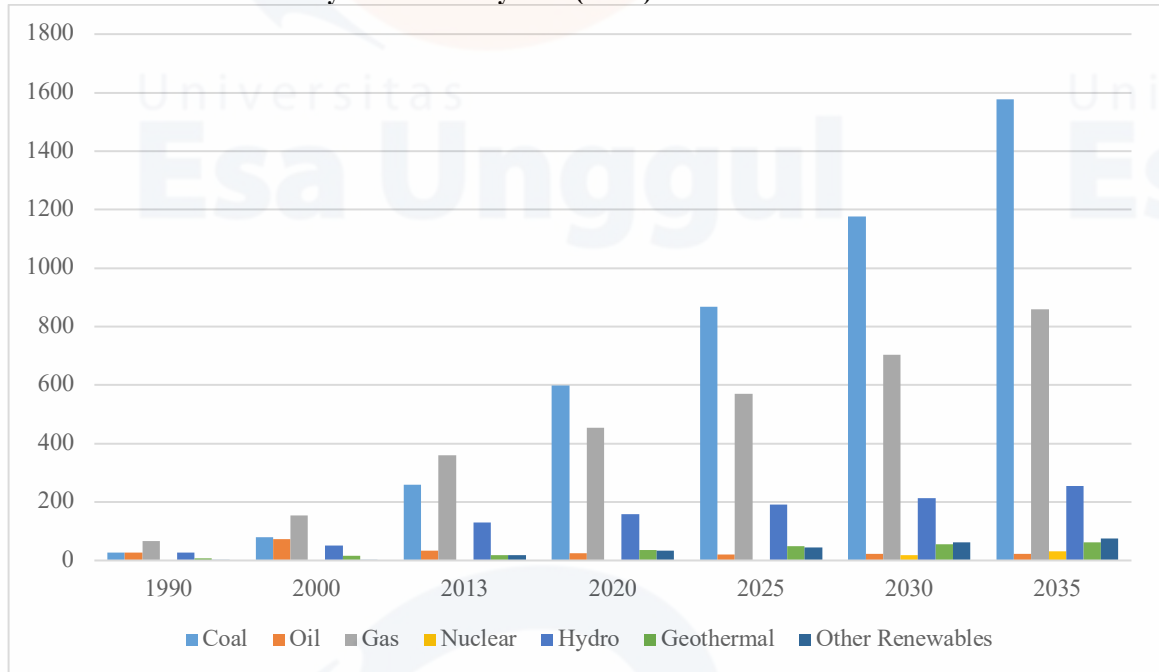
**Chart 43: ASEAN final energy supply (Mtoe)**



*Source: ASEAN Centre for Energy*

With the demand and the consumption of energy, energy supply is, by all means, certainly needed. In 2035, it is estimated that the largest energy supply comes from coal, which is as much as 556 Mtoe or increased by 4,177% from 1990 at 13 Mtoe, with an annual average growth of 9%, that makes it the highest of all available energy sources (Chart 43). The second-largest supply energy, that is possessed by oil is expected to reach 458 Mtoe in 2035, which is increased by 415% from 1990 at 89 Mtoe, with an annual average growth of 4% and will be overtaken by coal starting from 2025. In contrast to oil, the quantity of gas in 2035 is not similar, with only 374 Mtoe. However, it has the third largest annual average growth of 6% behind hydro with 8%. The total annual average growth of ASEAN final energy supply is 5% with an estimate of 1,685 Mtoe in 2035, that is quite a surge compared to 1990 which was only 238 Mtoe and a growth of 608%. The increasing demand for energy in South-east Asia is also in line with the increment of electricity generation where coal still has the largest inflation up to 2040 and exceeding the energy demand data available on Chart 41. However, there are differences where the demand for oil will grow until 2035, but very little for electricity generation. This could be related to government policies to reduce fossil fuel subsidies and environmental problems along with adaptation of more efficient power plants in the latest technology along with changes in government policies due to political turmoil.

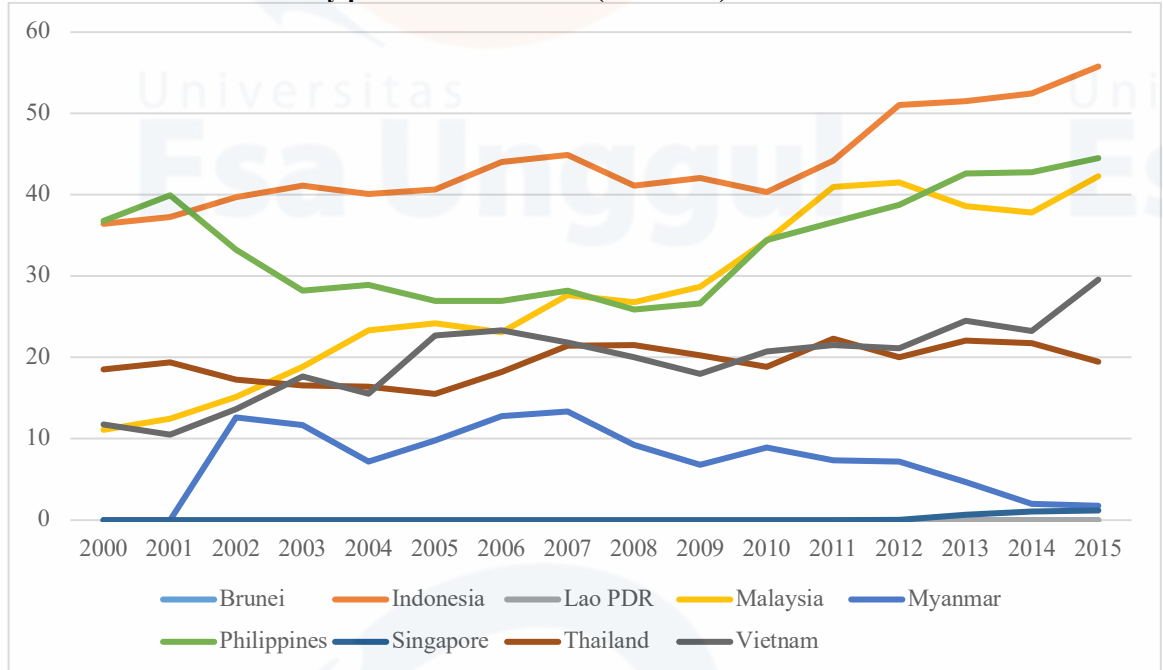
**Chart 44: ASEAN Electricity Generation by Fuel (TWh)**



*Source: ASEAN Centre for Energy*

The annual growth rate of electricity generation of 6.87% for total energy and 9.6% for coal is greater than the growth in the average annual energy demand of only 4% for total energy, compared to 8% for coal (Chart 44). Based on forecasts of ASEAN, in 2025 it is estimated that coal will generate electricity and surpass gas by 868 TWh compared to gas by 445 TWh, which later continue to rise to 1,177 TWh in 2030 and 1,578 TWh in 2035. Other energy sources such as hydro and geothermal also increase on an annual average of 5% which was from 27 TWh and 7 TWh in 1990 and furthermore will be 254 TWh and 63 TWh in 2035. Other renewable energies received priority in global planning, which lead to a positive influence on the ASEAN region with a growth of 10.34% from 1 TWh in 1990 and will be 76 TWh in 2035 that nonetheless still far less than coal. Oil, due to the depletion of resource reserves and also the issue of global warming, has decreased from one year to another, with an average of 0.28% from 26 TWh in 1990 which has the highest increase to 72 TWh in 2000 and continues to decrease until it will only become 23 TWh in 2035. Nuclear on the other hand, is estimated to emerge in 2030 and continue to rise in 2035 due to its massive amount of energy that can be produced and as one of the main alternatives to meet ASEAN energy needs, assuming that fossil energy continues to be reduced while renewables still do not meet the existing energy needs. The total electricity generation in ASEAN in 2035 will be 2,885 TWh, growing 1,761% from 155 TWh in 1990.

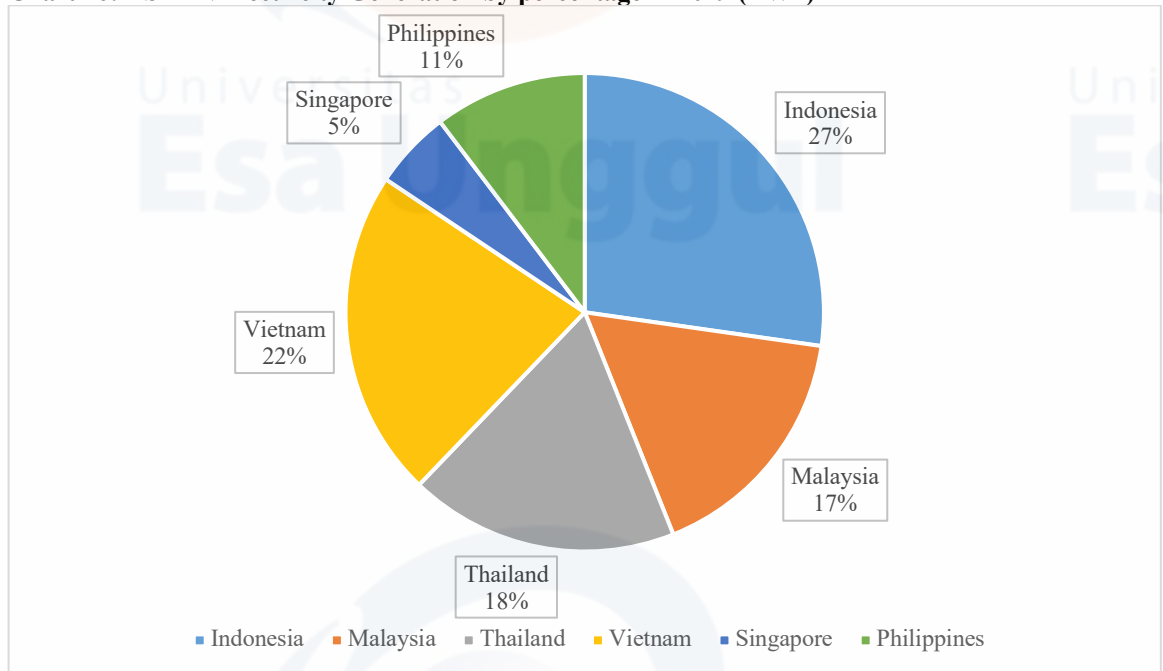
**Chart 45: ASEAN Electricity production from coal (% of total)**



Source: World Bank

Depending on the information, the largest percentage of the total electricity production from coal in South-east Asia comes from Indonesia, followed by Malaysia and the Philippines (Chart 45). The decline occurred only in two countries, namely Myanmar and Thailand, although the latest only had less and a little decline. Singapore, as a country without coal natural resources, only produces a very small percentage, from trading activities of such commodities.

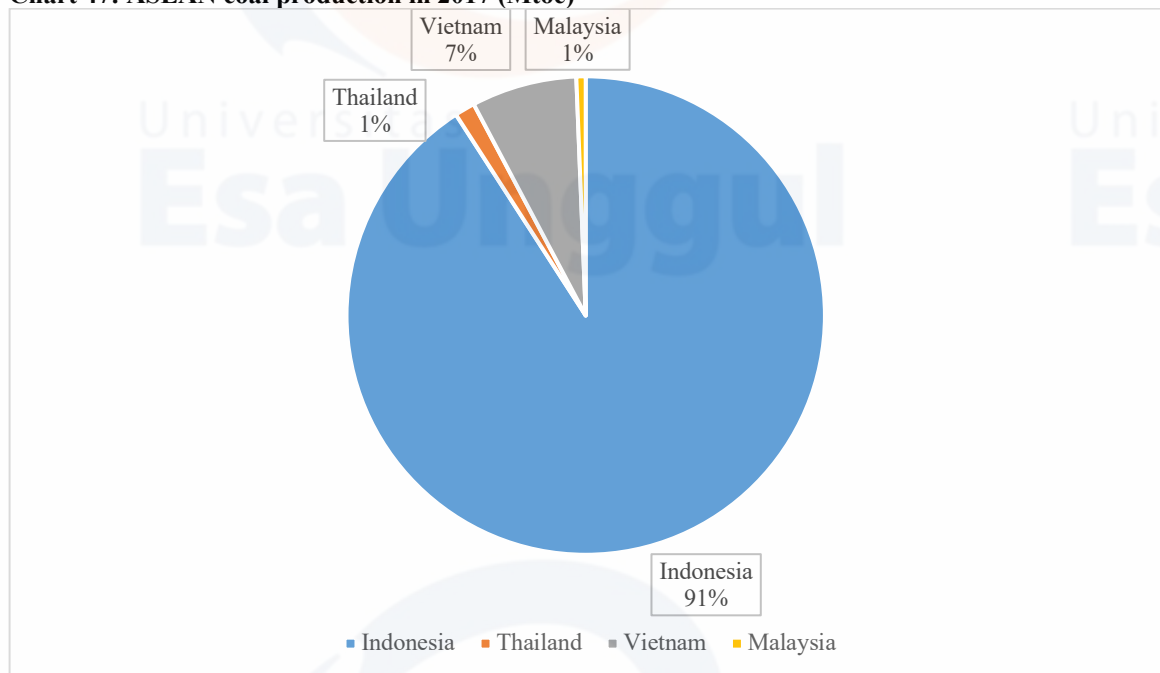
**Chart 46: ASEAN Electricity Generation by percentage in 2019 (TWh)**



Source: BP Statistical Review of World Energy

The use of coal in electricity generation rose around 5,536% from 1990 to 2035, where other fossil energy sources dropped by percentage. This refers to competitive prices and the availability of abundant resources in this region. The three biggest energy-consuming countries in South-east Asia, namely Indonesia, Malaysia, Vietnam, and Thailand have given statements to increase their use of coal, which is in contrast to other countries that are trying to reduce their coal share in the energy-mix. Indonesia remains the largest electricity generation in ASEAN with a portion of 27% or 279.1 TWh followed by Vietnam with a portion of 22% or 227.4 TWh, Thailand with a portion of 18% or 186.5 TWh and Malaysia with a portion of 17% or 171.0 TWh, Philippines with a portion of 11% or 105.8 TWh and Singapore with a portion of 5% or 54.1 TWh (Chart 46). However, this development becomes a paradox where there is a growing need for energy as well as greenhouse gas and environmental damage that must be limited, handled and reduced. Pollution issues regarding fossil fuel, especially from coal, are quite sizable and attract local and global attention. It requires a work plan that is able to balance between the environment, economy, and society. Solution has been made by making the series of ASEAN energy blueprint: 2016-2025 ASEAN Plan of Action for Energy Cooperation (APAEC) with the theme of 'Enhancing Energy Connectivity and Market Integration in ASEAN to Achieve Energy Security, Accessibility, Affordability and Sustainability for All', which has a focus on seven programs where Clean Coal Technology is one of the important points in this matter, due to the reason that electricity needs are inevitable and must be fulfilled in large portions by coal. The IAE and the World Coal Association estimate that coal will replace natural gas as the main source of energy in 2020 and will replace oil as the main energy source by 50% in 2040 (IEA, 2015, p. 39). The agency also states that efficiency of steam power plants using coal increases due to the fast growth of electricity needs, along with cheap and abundant coal resources.

**Chart 47: ASEAN coal production in 2017 (Mtoe)**

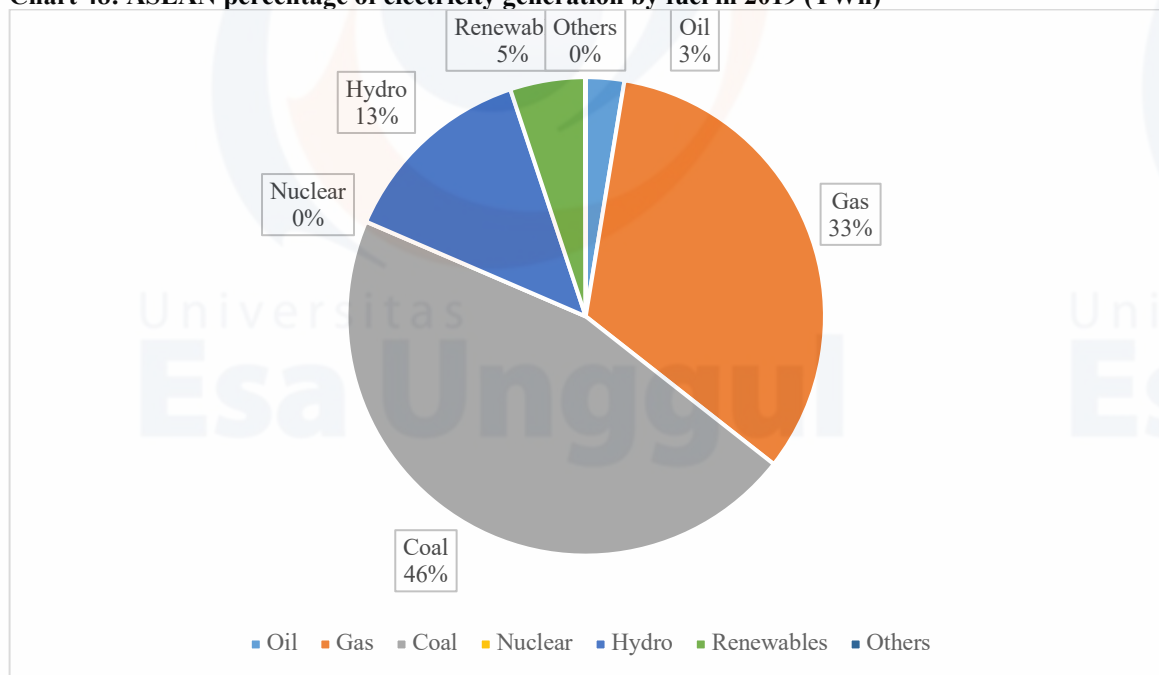


*Source: BP Statistical Review of World Energy 2018 and Malaysia Energy Information Hub*

It is necessary to develop an efficient and environmentally friendly coal technology for this inevitable need, where it has helped the ASEAN economic growth. The

development of the latest coal technology requires costs that can be facilitated by international financial institutions and access to global technology, which is in line with Nationally Determined Contributions (NDCs) that were made to support the UN's Sustainable Development Goals and the Paris Agreement. Those planning and responsibility are closely related in South-east Asia as the world's largest exporter of coal, where 271.6 Mtoe or 91% of its production comes from Indonesia, a country that was previously the largest coal producer in the world before being taken by Australia. Vietnam, even though positioned as the second-largest producer of coal, has only 21.3 Mtoe or 7% of the total production due to the enormous size of Indonesia's coal resources and reserves, let alone Malaysia and Thailand with both of only 1% of the total production (Chart 49). However, The two biggest ASEAN export destination countries for coal, China and India, have policies to limit their coal imports by prioritizing domestic products and diversifying energy sources which affect Indonesian coal activities and development. Similar issues also happen to some countries in ASEAN where economic problems and energy security are their focus to consider different energy resources. It is also in line with the 4th APAEC, which focuses on energy efficiency, development, and procurement of renewable energy resources, increasing electricity connectivity between countries, and cooperation in clean coal technologies development. Such a thing illustrates the need and dependence on coal for this region, where even the slightest change can have a large impact on the development of the regional economy.

**Chart 48: ASEAN percentage of electricity generation by fuel in 2019 (TWh)**



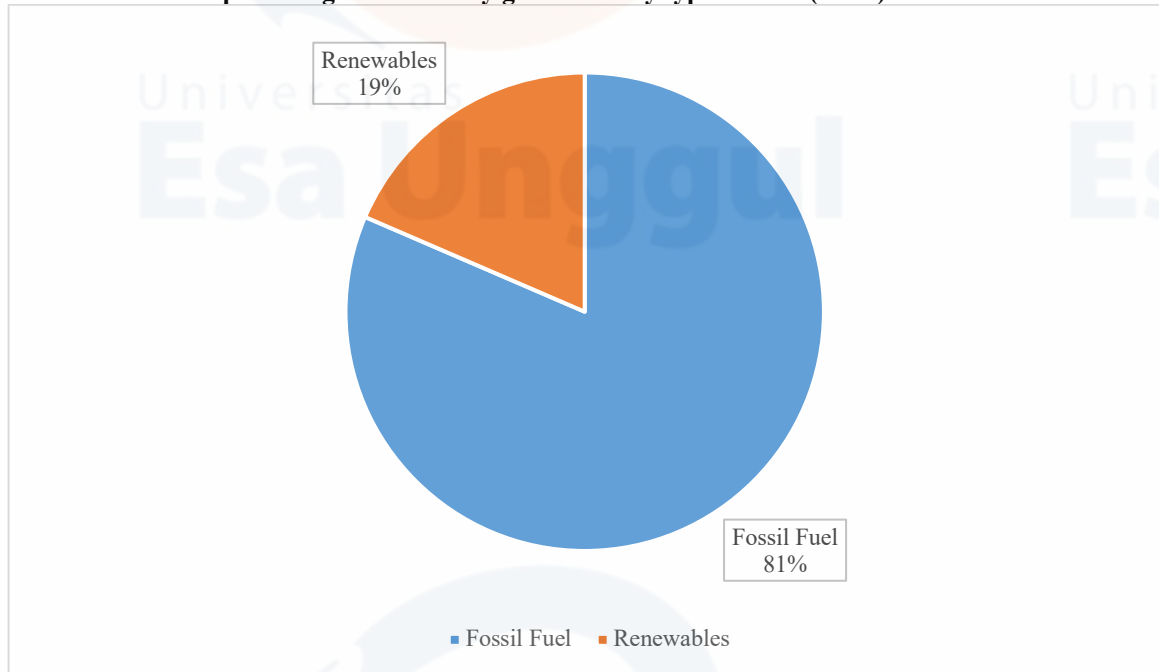
*Source: BP Statistical Review of World Energy*

One of the world-class organizations that is also a main source of data, references, collaboration and negotiations with other parties, i.e. The World Coal Association, explains that changes in the balance of coal and its increasing role in electricity supply are caused by energy diversification, in which countries in ASEAN are very dependent on one or two energy sources, as reflected in the available local resources. However, along with the diminishing resources, the policy of diversifying energy sources is needed for their long-term interest; ASEAN energy-mix, where its member countries

regard coal as a low-cost energy resource, which noted in the Oxford Institute for Energy Studies report (2016), where 25 GW of additional capacity from coal power plants occurred from 2010-2015, that constituted 42% of the increase in total capacity in the period, the largest portion of the energy-mix up to 2010 is still owned by coal at 46% or 396.4 TWh, followed by gas at 33% or 285.1 TWh (Chart 48). It is predicted that the energy needs of coal in ASEAN will last for a long period of time. Despite efforts that were made to add portions of renewable energy, coal is still needed as the backbone of basic energy needs in this region. Policies to reduce or even eliminate other fossil energy subsidies such as natural gas and petroleum makes coal as the first choice due to the inexpensive cost;

Increasing demand, along with the increase in living standards due to economic growth, demand for energy for the consumption of both society and industry also elevates. The rise of electricity access in the region also plays an important role in increasing the number of customers or electricity users by two-thirds of the previous amount (IEA, 2015, p. 119). Such augmentation in turnover and capacity of the company, as well as the increasing number of consumers, suppliers, and other supporting businesses, have caused additional power needs to support these activities. Coal by all means plays an important role in fulfilling such needs, in addition to also being assisted by other energy sources; and it is affordable price, that is undeniable as the most important element in determining policies and decisions to be taken, including in the energy sector. Low costs and prices, along with the ease of construction and operation of coal power plants, are the main considerations in the regional energy planning. As mentioned previously, the reduction of subsidy for other fossil energy sources, global competition, and price changes make coal the best option for the cheapest energy source at the moment. Coal prices have also weakened in recent years, where there are two factors that play vital roles, such as smaller coal demand from China's which is distinct from previously expected numbers along with rising supply and competition between coal companies and producers. Even though the price of high-level calorie and high-quality coal is still acceptable, it is predicted that in the future ASEAN will still focus on the use and production of low-calorie and low-quality coal, due to its lower cost on a large scale. The region also continues to have coal in its energy-mix up to 2040, where coal demand will increase to the largest, followed by oil and gas, where energy requirements will also rise to a monumental level. Coal is in great demand as the result of the prices of products and investments that are still relatively cheap and the abundant amount available, where other resources, especially other fossil energy sources, are becoming increasingly expensive due to the diminishing number of quantities.

**Chart 49: ASEAN percentage of electricity generation by type in 2019 (TWh)**



*Source: BP Statistical Review of World Energy*

The increase in the industrial sector and services likewise contributes to the enormous energy needs, especially in South-east Asia that are still deeply dependent on fossil fuels, with a share of 81% or 704.05 TWh in 2019, compared to renewables with a share of 19% or 160.01 TWh (Chart 49). There is a trend towards changing energy sources from petroleum to less expensive products such as coal, especially in countries like Indonesia, Malaysia, the Philippines, and Vietnam. Energy demand in the industrial sector rose due to the increase in the economic condition of the community, which causes an increase in living standards and access to electricity that escalate in rural areas. Higher energy needs breed a further challenge in controlling air pollution caused by fossil fuels. However, technology and new discoveries will be useful as some solutions for the future problems. It is related to the higher efficiency of coal and other complementary issues. To achieve such objectives, the International Financial Institutions (IFIs) have provided financial assistance for coal power plants (IEA, 2014) in recent years, with Indonesia as one of the largest recipient countries to obtain this treatment. The largest portion of this financial assistance is aimed at more efficient coal-fired power plants with the use of the latest technology. However, in 2013, things have changed where several top-tier banks have restricted their aid programs for the construction of coal-fired power plants, specifically intended to only provide assistance to development programs that use a more environmentally friendly coal technology. In reality, the funding becomes increasingly difficult to access even though the proposed strict conditions have been fulfilled. The IFI's strict policies do not significantly affect every related country, where those with strong economy and attractive financial potentials for investors in their industries such as China can freely continue their construction. However, other countries, especially in South-east Asia, cannot run their energy development programs properly due to their limited financial resources and minimal experience as well connections with prospective investors. With a small and less varied power generation system in South-east Asia, coal still plays an important role in economic stability and industrial development in the region. On the other hand, there are many alternatives that can be chosen for funding, such as

the Chinese banks, where a report from 2014 states that China is nominated as the largest source of funding for coal power plants in South-east Asia (Ueno et al., 2014). This is in line with China's interests to secure their energy needs and expand their influence and cooperation with other countries, especially in Asia. New institutions created such as the Asian Infrastructure Investment Bank, the new Development Banks, and the Silk Road Fund can be complementary sources of funding that other than the conventional earlier institutions.

**Table 5: ASEAN cost of power generation (2014 US\$)**

Type	Capital cost (\$/kW)	Fixed O&M cost (\$/kW)	Thermal efficiency	Capacity factor	Construction time (years)
Coal Supercritical	1600	64	41%	75%	5
Gas CCGT	700	25	58%	60%	3
Wind (onshore)	1700	43	n.a.	27%	1,5
Solar PV (large scale)	1600	24	n.a.	17,5%	1,5
Large hydro	2500	55	n.a.	33%	4
Geothermal	3200	64	10%	75%	4

*Source: International Energy Agency (IEA)*

Along with the development of coal, environmental considerations need to be followed to achieve a sustainable balance. The costs required to produce electricity are one of the main considerations in the construction and development of a power plant, with the calculation of variable costs and fixed costs. Based on available data, the cost of building a coal-fired power plant is one of the cheapest among the types of energy available, after the Gas Combined-Cycle Gas Turbine (CCGT). The coal supercritical power plant also has the second largest thermal efficiency of 41% and the largest capacity factor of 75% even though the required construction time is the longest, for around five years and also one of the highest fixed operation and maintenance (O&M) cost at 64 \$/kW along with geothermal (Table 5). This has caused ASEAN countries to be more interested in developing and building infrastructure for coal-fired power plants to meet their energy needs and development going forward due to economic growth and to obtain and secure more opportunities in the future.

**Table 6: ASEAN Technology differences for coal-fired power plant**

Technology	Capital cost (2016 US\$ Billion/GW)	HHV Efficiency	Emission Rate (T/MWh)
Subcritical	1,21	32%	1,04
Supercritical	1,46	37%	0,87
Ultra-supercritical	1,7	40%	0,8

*Source: International Energy Agency (IEA)*

Subcritical technology is more desirable due to its lower costs and shorter lead times, as well as a small number of experts to make and run higher technology plants and abundant availability of low-quality coal. However, when viewed in more detail,



the cost of subcritical power plants is more expensive due to its low efficiency, where supercritical and ultra-supercritical power plants can achieve efficiencies of 37% to 40% compared to subcritical which is only around 32% (Table 6). Indonesia with its abundant coal resources is not very keen on strengthening the development of supercritical and ultra-supercritical power plants even though there are related plans while Thailand and Malaysia whose more dependent on coal imports prefer to build a more efficient new generation of power plants. In general, the age of sub-critical coal power plants is approximately 40 to 50 years, which is the driving force for the conversion of higher and more efficient power generation technologies. This has become one of the solutions to reduce pollution and environmental impacts, that leads to climate change, as one of the main issues in South-east Asia, where there is a high dependence on natural resources, agriculture, and forestry, which can have a significant impact if it continues to occur. Countries in ASEAN that have lots of islands and bordering with sea will receive severe impacts in the current situation as well as in the near future. The energy sector plays an important role due to the many greenhouse gas emissions produced by this industry. IEA has made the World Energy Outlook Special Report on energy and climate-related steps that need to be taken to address the problem of climate change (IEA, 2015). Internationally, there is an agreement to slow the rise of global temperature below two degrees Celsius, where the prepared scenario in the report is up to 2030, with five benchmarks, such as increasing energy efficiency in the industrial, buildings and transportation sectors; progressively reducing the use of the least-efficient coal-fired power plants and banning their construction; increasing investment in renewable energy technologies in the power sector from US\$ 270 billion in 2014 to US\$ 400 billion in 2030; gradual phasing out fossil-fuel subsidies to end-users by 2030; and reducing methane emissions in oil and gas production. The benchmark is certainly focused on fossil-fuel where coal is one of the main targets. It is also related to increased efficiency in coal-fired power plants where old and inefficient power plants will be reduced and prohibited from being rebuilt except by using new technologies that are more environmentally friendly.

South-east Asia still feels the importance of using fossil fuels in its energy-mix both in the current situation and in the future. Increasingly coal production is needed to support rapid economic development in this region. Indonesia is also considered as one of the major players of coal in global trade. However, its status as the biggest coal exporter will be taken by Australia due to the influence of rising domestic demand and the decline of the global market. ASEAN as one of the main producers of coal that largely comes from Indonesia, where its production and exports rose significantly due to the low-priced type of coal reserves and little sulphur content that meets the demand of both China and India. However, in its development, these two countries are trying to reduce their dependence on coal imports and prioritize their domestic production as well as reduce the portion of coal in their planning and energy-mix, which caused difficulties for the coal mining industry in Indonesia. The countries' large influence in coal also helps to boost South-east Asia's position and bargaining in global coal trade activities. In its progress, coal production in the region is still increasing, where Indonesia is still considered as one of the big players in this industry. However, this development is expected to increase in domestic demand in the region to support existing energy and industry. The majority of exports are sub-bituminous types that have high water content and low-calorie levels. Hence, such modest-quality coal is alluring due to the low sulphur content which will reduce the impact of pollution and corrosion on the boiler of the steam power plant. Low sulphur also makes the coal useful as another coal mixture material that buyers can gain benefit of its various uses

and higher profit characteristics. Even so, Indonesia's coal production will continue to increase despite an expected decline in its growth rates, with coal demand centred on two islands, namely Sumatra and Java. Those islands have been recorded to have a monumental economic and industrial growth along with its high population density. However, most of the coal production comes from the island of Borneo, which is used to supply this island's needs or exported to other countries.

Indonesia's strengths in the coal sector are considerable resources, cheap labour, ease of transportation due to the geographical location that is commonly close to the seaport and large buyer countries such as China and India. The contour of coal reserves that can use open-pit systems with an easier way to excavate the coal and low average levels of sulphur obviously makes Indonesia possess a very strong positioning in the global market. Generally, coal production in Sumatra is used for domestic needs due to the development of industry and energy needs on the island and also related to production costs and locations that are reasonable for the transportation of these commodities and characteristics of lower quality coal, while the production in Kalimantan is used for export needs due to its expensive costs for local transportation and local market compared to higher price in the international market. Thus, it would be only possible to cover existing costs with great coal quality. The development in the mining sector that has been carried out by the Indonesian government is growing rapidly, such as progress in reducing bureaucratic processes to create a comfortable and better business environment. However, there are still challenges and difficulties faced by businessmen, especially from foreign countries, such as the obligation to reduce share ownership to only 49% after operating for ten years and the political uncertainty. In addition, the DMO in Indonesia proved not to be a burden to mining companies, although there is a possibility of increasing the percentage of liabilities due to future needs, where normally prices given by the government are usually below market prices which can lessen company's revenues.

In 2018, the ministry of energy and mineral resources set a DMO of 115 million tons or 21% from the national production (Avirianty, 2019), whereas the need for coal imports in the Philippines and Thailand is gradually increasing, that mostly comes from Indonesia. The raise in domestic consumption in the region greatly affects the coal trade, where ASEAN will still be a significant area as coal exporters. It is strongly influenced by Indonesia, as one of the largest coal producers in the world. In the future, such matters can change as the need for coal for electricity and industry will be bigger and will reduce export quantity to meet domestic needs of the region, especially in Indonesia. Thus, it will greatly affect the status of coal trading in the ASEAN region. Meanwhile, the Chinese government has issued several policies related to coal, such as banning certain types of coal and imposing import taxes on coal products. Although Indonesia is not severely affected since the two countries have trade agreements, however it will affect the international market and will change the coal prices which ultimately affect both local and international coal companies. India also proceeded to do the same policy in an effort to reduce coal imports by prioritizing domestic production. Other elements that can affect Indonesian coal exports are changes in the dry bulk shipping rates that previously have been already competitive due to its high supply of goods. Rising rates will have a negative impact on Indonesian coal exports, which is dominated by low quality products, but inversely proportional to Australia that has higher quality and pricey coal products.

Nonetheless, quite the opposite with the ASEAN Power Grid policy, coal needs will continue to increase to meet their growing demand in the region, which is also needed to overcome the depletion of oil and natural gas reserves which makes the

potential price of these commodities will be even higher. In addition, Malaysia's dependence on Indonesian coal is also due to the location of their coal reserves in the remote areas of Sarawak and Sabah that are sensitive to environmental issues. On the other hand, this integrated power grid can help the spread and effectiveness of energy distribution from other sources such as renewable energy, including increasing the growth potential of business, industry, and quality of life in the connected region. The concept of electricity interconnection has actually been planned by ASEAN for decades, where it began in 1971. However, there are challenges in its realization, such as the country's foreign policy, infrastructure readiness, and long-term commitment. Other things that need to be conducted are equating work methods and standards as well as preparation and licensing for electricity producers and importers.

**Table 7: ASEAN Average annual energy investment (billion 2014 US\$)**

Type	Year			
	2015-2020	2021-2030	2031-2040	2015-2040
<b>Total energy supply</b>	<b>75</b>	<b>86</b>	<b>113</b>	<b>94</b>
Oil	17	15	20	17
Gas	16	20	25	21
Coal	2	2	3	2
Power	38	48	64	52
Plants (all fuels)	17	22	31	24
T&D	21	26	33	27
Biofuels	1	1	2	1
<b>Energy efficiency</b>	<b>8</b>	<b>15</b>	<b>23</b>	<b>16</b>
<b>Total</b>	<b>83</b>	<b>102</b>	<b>136</b>	<b>110</b>

*Source: International Energy Agency (IEA)*

Related to the policy development and adaptation, based on the average annual energy investment in South-east Asia, future energy investment is predicted to be more adequate where the level of efficiency in 2015 to 2040 is US\$ 16 billion, which has doubled compared to 2015 to 2020 of US\$ 8 billion (Table 7). The biggest investment undoubtedly comes from the power sector which is divided into two components, such as power plants along with transmission and distribution (T&D). However, a closer look at the source of energy shows that in the short term, oil will possess the biggest value while in the long term, gas will overcome other sources of energy and obtain the highest value. As for coal in its short, medium and long term, it will not have many changes and tend to be stagnant for the average annual energy investment value, which only ranges from the US\$ 2 billion to US\$ 3 billion. In the future, it could be expected that energy investment in ASEAN will be higher, and more supply will be demanded to fulfil the eventual needs.

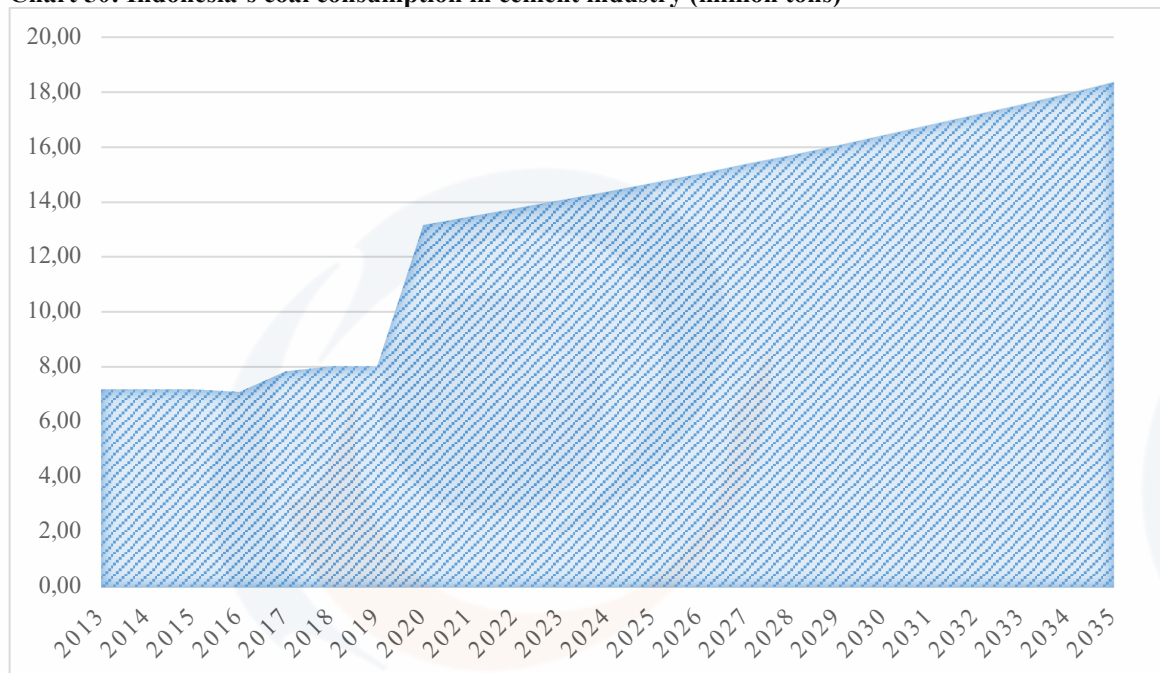
#### 1.4.5 The Use of Coal

The growth of production and consumption of coal confirms the importance of this resource in providing human needs. Besides being used for power plants, coal can also be used for various industrial and household needs, although in quantity it is still far smaller than the scale of consumption for power plants.

### 1.4.5.1 Cement

Coal itself is used as an energy source to mix cement's material for creating numerous products with various uses, according to the criteria needed regarding architectural types and environmental conditions. Cement is made from silica, calcium carbonate, alumina, and iron oxide. The high temperature at the Kiln, which is generally produced through the coal combustion process changes the nature of the substance chemically and physically becomes a clinker, which is a binding agent for cement. Besides, derivative products from coal such as Coal Combustion Products (CCPs) can be used as a mixture for cement and in the construction industry.

**Chart 50: Indonesia's coal consumption in cement industry (million tons)**



*Source: Ministry of National Development Planning (Bappenas) of Indonesia & Ministry of Energy and Mineral resources (ESDM) of Indonesia*

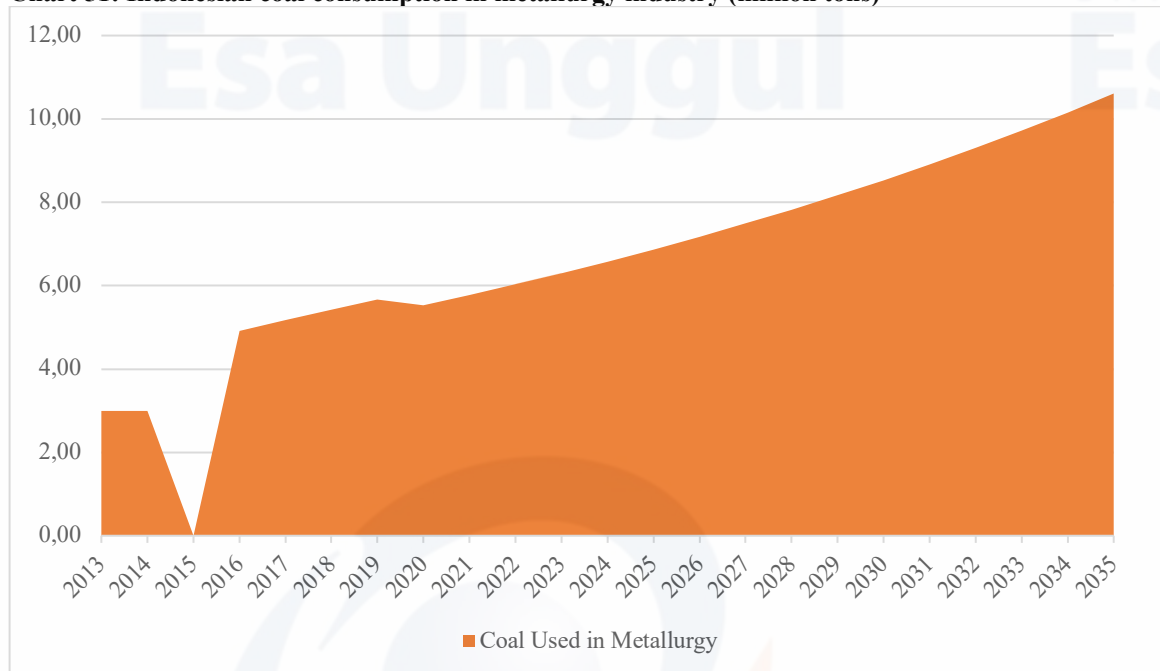
In Indonesia, the cement industry is mainly carried out by PT Semen Indonesia, PT Holcim and other cement companies. From 2016 to 2035, coal needs for the cement industry are expected to steadily increase, as economic developments begin to improve in the country, as well as an increase in electricity supply from the completion of the planned electricity program of 35 GW. Coal consumption in the cement industry has had a fairly constant increase for several years. Growth from 2013 is in the amount of 7.19 million tons towards 2035, which is estimated at 18.34 million tons or equal to 155%, with an annual average growth of 4% (Chart 50). This is also in line with population and industrial growth in Indonesia, which requires a lot of additional infrastructures and buildings to support the development, where cement is generally one of the vital components in such advancement and progress.

### 1.4.5.2 Metallurgy

Minerals such as iron are widely used as necessary materials to supply the industrial needs, where the final products are beneficial and vital for everyday life including for transportation, telecommunication, electricity, agriculture, and plantations. One of the practical uses of coal is to stimulate the process of refining and producing metals for

industrial basic needs. The development of the metallurgical industry and manufacture in Indonesia contributed significantly to the advancement of this sector.

**Chart 51: Indonesian coal consumption in metallurgy industry (million tons)**



*Source: Ministry of National Development Planning (Bappenas) of Indonesia & Ministry of Energy and Mineral resources (ESDM) of Indonesia*

Coal consumption in metallurgy is in line with the growth of sales value and quantity of metal production, which is directly proportional to the coal supply needs, that are expected to reach 10.61 million tons in 2035 for the metallurgical industry (Chart 51). The figure has increased by 254% from coal supply in 2013, which was only 3 million tons. Its annual average growth is 6% where the shown number is considered huge enough for long-term calculations and is very potential for future economic development.

### 1.4.5.3 Coke making

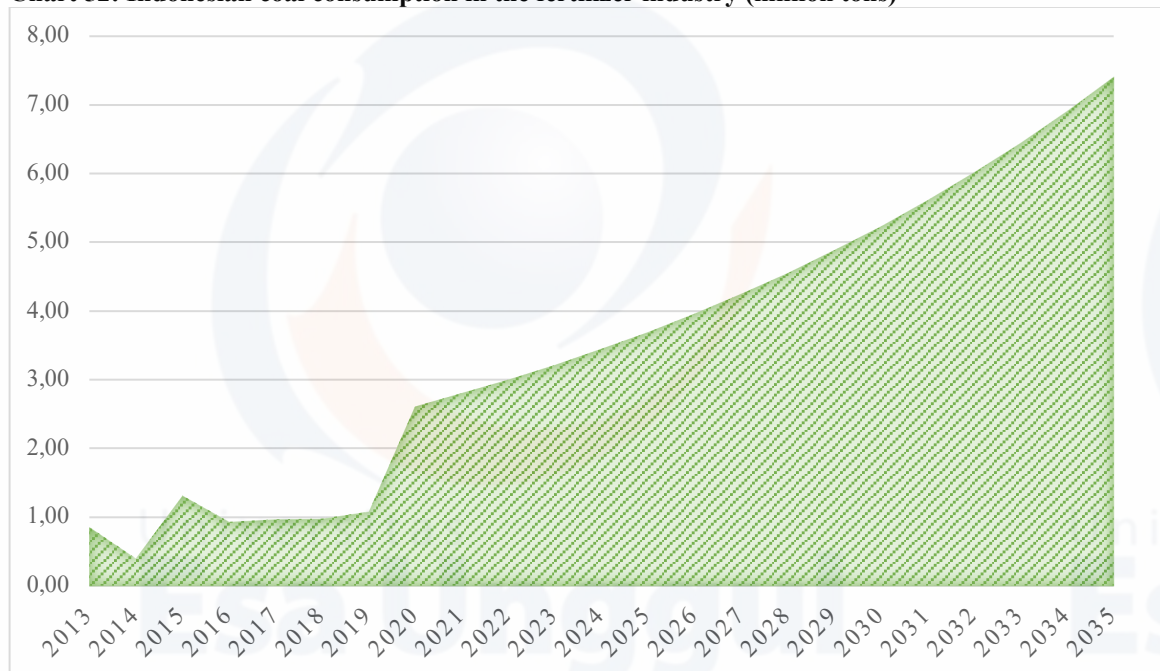
One of the spinoffs in the metallurgy industry is the coke making process. Newly mined iron still needs to be converted with the help of coking coal as one of the materials for its manufacture. The basic ingredients of coking coal which when heated will be in the form of soft and liquid are converted into coke which is harder yet porous lumps by removing undesirable substances to develop into pure carbon, with its low sulphur and phosphorus contents. In the cooking process, the heat is raised tremendously to reach the temperatures of 1,000-1,100 °C in the absence of oxygen to eliminate volatile compounds, i.e., pyrolysis, which produces hard porous material coke with 12-26 hours of processing time. When finished and removed, the material is doused with water or air to decrease the heat prior being put into storage or used for iron processing. In order to commence to the next procedure for iron ore, some small amounts of fluxes and coke need to be mixed and heated to 1,200 °C through hot air blown into the furnace. Coke will burn and produce carbon monoxide that reacts with iron ore, which has been in a liquid state due to its heat. Subsequently, the material needs to be removed and separated between molten iron and slag. Related to the previous topic, the development of coal demand in the metallurgical industry during

the 2010-2016 period fluctuated. It has consumed as much as 3.58 million tons in 2010 and in 2016 it has increased to 4.64 million tons (Haryadi and Suciyanti, 2018, p. 65). It was practiced by the Krakatau Steel group, PT Meratus Jaya Iron (MJI), PT Aneka Tambang (Antam) and PT Vale On the other hand, PT Prima Coal Chemical (PCC) also produce semi coking coal in Central Kalimantan (Tasrif, 2020). Coking coal needs for the metallurgical industry are expected to increase along with economic development and the increase in the metal industry, which will require a sizable metallurgical end product.

#### 1.4.5.4 Fertilizer

The development of coal consumption in the fertilizer industry is almost identical to the metallurgical industry with growing fluctuations. The increased use of coal in the fertilizer industry in Indonesia has been expected to continue over the next few decades.

**Chart 52: Indonesian coal consumption in the fertilizer industry (million tons)**



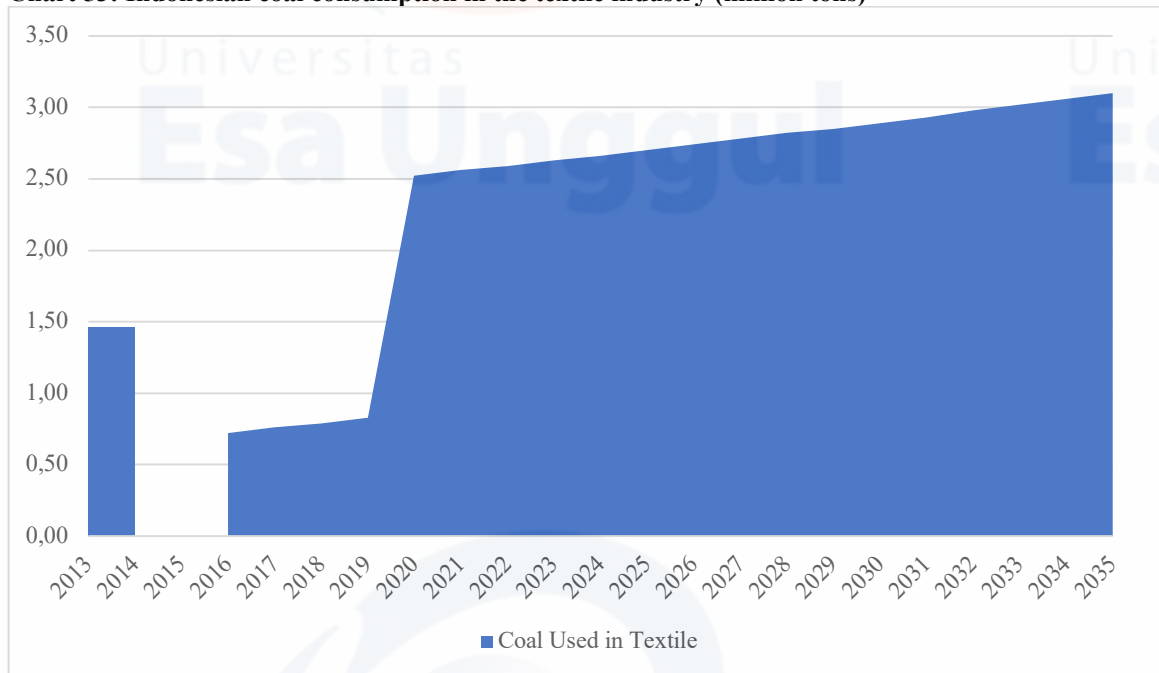
*Source: Ministry of National Development Planning (Bappenas) of Indonesia & Ministry of Energy and Mineral resources (ESDM) of Indonesia*

Coal consumption in the fertilizer industry had a sharp increase in 2015 and then went down and rebound in 2017, with a growth of 761% from 0.86 million tons in 2013 to 7.40 million tons in 2035 (Chart 52). The annual average growth was recorded at 10% based on the predictions and the result of conducted research. Furthermore, the demand for coal in the fertilizer industry is expected to increase, along with economic development and the increase in the agricultural, forestry as well as plantation sectors which require huge amounts of fertilizer for its activities.

#### 1.4.5.5 Textile

The textile industry has a high level of dependence on oil. Therefore, with soaring oil prices, many are turning to coal, although modifications are required for the current boiler or to replace it with a new and different coal-fired boiler to make it compatible.

**Chart 53: Indonesian coal consumption in the textile industry (million tons)**



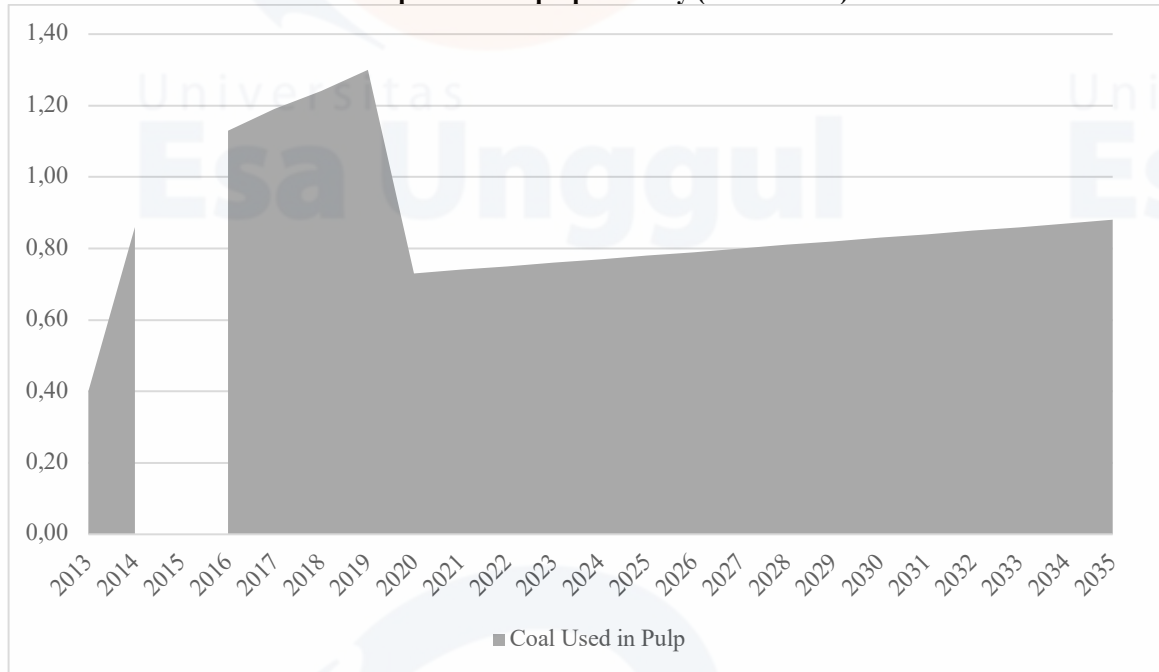
*Source: Ministry of National Development Planning (Bappenas) of Indonesia & Ministry of Energy and Mineral resources (ESDM) of Indonesia*

In 2013, coal consumption in the textile industry in Indonesia was only 1.46 million tons and will increase to 112% until 2035, as it is estimated that coal consumption would reach 3.1 million tons (Chart 53). The raise continues to occur in this industrial sector even though faced with a low increase rate where the annual average growth is only 3%. The number of textile businesses that use coal fuel have reached 224 companies that are spread across Java island, especially in the West Java province.

#### **1.4.5.6 Pulp**

Comparable to textile companies, coal in the paper industry is also needed for its processing activities. The produced heat energy is used to evaporate water in the boiler, thus producing the steam needed to cook the pulp which will then be dried and pressed to become paper.

**Chart 54: Indonesian coal consumption in the pulp industry (million tons)**



*Source: Ministry of National Development Planning (Bappenas) of Indonesia & Ministry of Energy and Mineral resources (ESDM) of Indonesia*

In 2013 until 2019, there was an increase in coal consumption in the Indonesian pulp industry followed by a sharp decline in 2020 of around 44% (Chart 54). In the continued period, there was an increase in coal consumption with fewer rate than the previous period prior 2019. If calculated from 2013, where coal consumption was around 0.4 million tons, there will be an increase of 120% with an estimated consumption of 0.88 million tons in 2035. Calculation of the average annual growth of consumption in this industry is 4%, where the figure is above the textile industry, yet below other coal-related industrial sectors.

#### 1.4.5.7 Briquettes

Coal briquette is a solid fuel of a certain shape and size, which are composed of fine grains of coal that have undergone a compressive process with certain compressive forces, in order to enable this product to be handled easier and produce added value. Briquette is a technology that uses a wet or dry process to compress raw materials into several forms. Dry briquette processes involve high pressure and require no binder, which is considered to be expensive and recommended only for high level production, while wet briquette processes only involve low pressure although requires a binder (Assureira, 2002). According to Kuncoro (2005), based on the manufacturing technique, coal briquettes are divided into two types. the first is carbonized coal briquettes, where most of the coal in Indonesia is subbituminous which contains high volatile matter, therefore it has the potential to cause smoke when burned if the combustion process is not perfectly executed. Consequently, a carbonization process is carried out, where volatile matter contained in coal is reduced to be as low as possible which makes the end product to not be able to produce scent and smoke. The process involves the stage of heating coal without or in limited air conditions in order to evaporate flying substances in the form of tar, oil and gas, where only a large portion of charcoal, i.e., fixed carbon, will remain. Produced coal is still fragile and of a non-uniform size, hence grinding and briquetting process is needed in order to obtain a



similar compact shape and strong physical properties. Through the carbonization process, the price of carbonized briquettes can reach twice of the non-carbonized one. However, another advantage is related to the higher calorie contained in briquettes per unit and considered to be quite safe for households. The second type is carbonized briquette where this type is developed to produce products that are cheaper yet still considered to be safe. To reduce or eliminate the flying substance that is still contained in coal briquettes, it is supposed to use the correct furnace to be able to produce perfect combustion where all the volatile matter that arises from the briquette will be burned by the flames of the furnace. The latest is recommended for small industries due to its cheaper price and easier to use compared to carbonized coal briquettes. However, it should be remembered that coal containing high volatile matter has the potential to cause smoke when burned. Therefore, it is necessary to design a special stove using carbonized coal briquettes, where the produced tar can be reused as a briquette binder and the rest can be processed to become Marine Fuel Oil (MFO) (Suprajemi, 2020).

**Chart 55: Indonesian coal consumption in briquettes industry (thousand tons)**

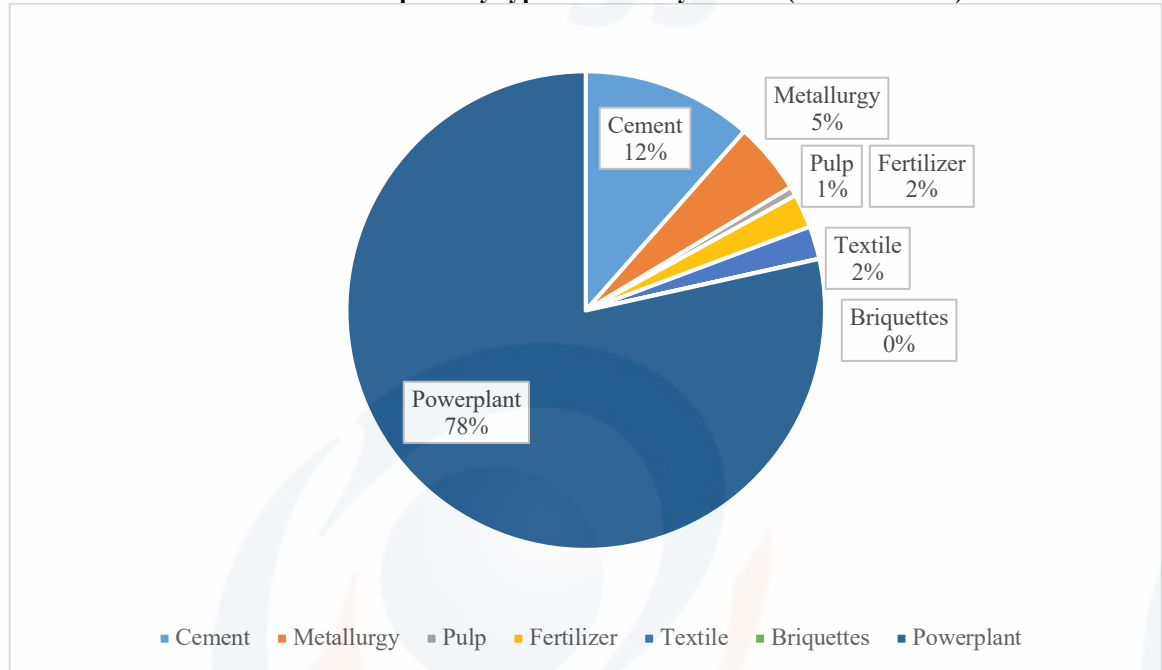


*Source: Ministry of National Development Planning (Bappenas) of Indonesia & Ministry of Energy and Mineral resources (ESDM) of Indonesia*

From 2013 to 2015, development in coal consumption for briquettes is changing, where in 2013 the consumption was 36.38 thousand tons and had dropped to 1.56 thousand tons in 2014 with further drop to 1.31 thousand tons in 2015 (Chart 55). From 2016 to 2035, the use of coal in the briquette industry had a stable need of 30 thousand tons based on the historical data and forecast. This amount remains the same due to its intended purpose for research materials as well as for pilot projects and not being used for the commercialization activities. It will always be similar except any changes happen in the economic situation which requires briquette as its fuel, that consequently makes the current analysis to be invalid and will cause updates on numbers and future reports. However, in its development, PT Bukit Asam (BA) plans to build a briquette factory in 2026 and 2028 with a production capacity of 20 thousand tons per year (Tasrif, 2020), where the existing ones are located in Tanjung Enim, South Sumatra and in Tarahan, Lampung. Other company such as PT ZJG Resource Technology also

produce coal briquette in North Kalimantan. In addition, PT Megah Energi Khatulistiwa (MEK) also plans to add to their briquette factories in 2026 and 2028 with a capacity of 1 million tons per year. On the other hand, the potential for oil consumption that can be substituted with coal briquettes for small and medium industries, as well as substitute for kerosene in the households sectors is immense.

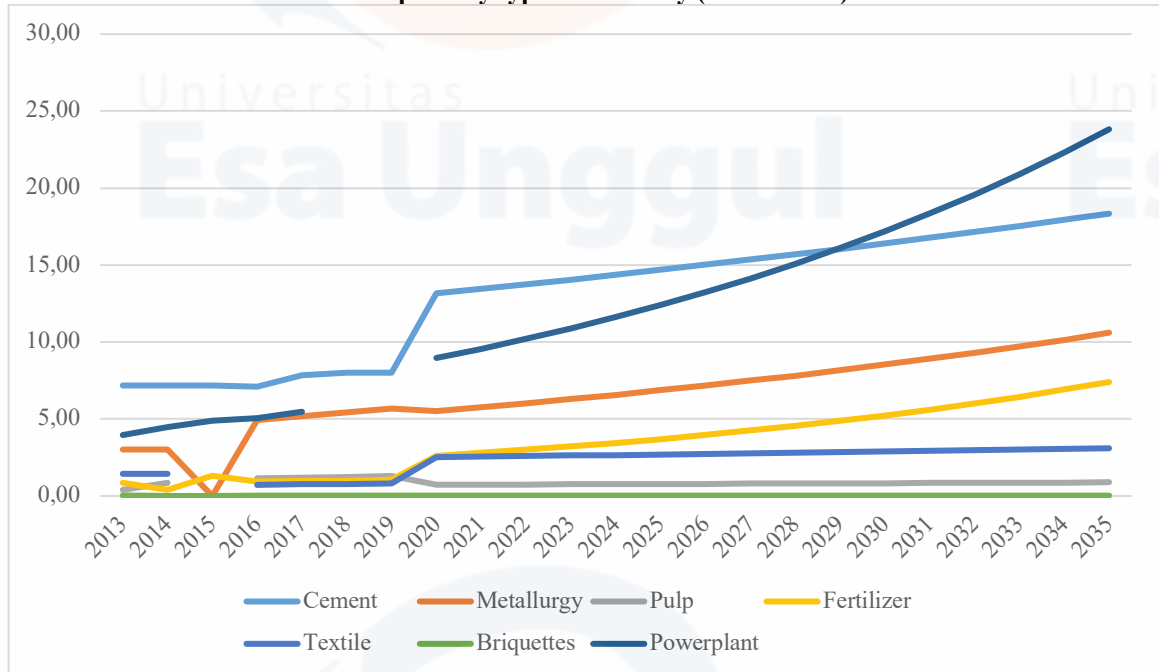
**Chart 56: Indonesian coal consumption by types of industry in 2020 (thousand tons)**



*Source: Ministry of Energy and Mineral Resources (ESDM) of Indonesia*

Based on existing data for coal consumption by its several types of industry in Indonesia in 2020, the largest consumption is expected to be owned by the power plant sector where there is a portion of 78% of the total consumption available or 89.5 million tons (Chart 56). The second largest consumption is owned by the cement industry with a 12% portion or 13 million tons followed by the metallurgical industry at 5% or 5 million tons, fertilizers and textiles which are both in the third largest of 2% or more than 2 million tons, pulp by 1% or 735 thousand tons and briquettes which have portions of less than 1% or 30 thousand tons.

**Chart 57: Indonesian coal consumption by types of industry (million tons)**



Source: Ministry of National Development Planning (Bappenas) of Indonesia & Ministry of Energy and Mineral resources (ESDM) of Indonesia

For this reason, it is safe to assume that the biggest influence on coal policies and mining comes from the power plant sector due to its significant difference of consumption with other industrial sectors which is only 22% or 24.5 million tons when combined. In general, the increase of coal consumption in all existing industries is expected to continue, in which the needs for power plants has jumped sharply, while the cement industry will proceed to rise and is expected to have a consumption that is identical to power plants in 2028 and 2029 (Chart 57). The lowest growth and consumption occur in the briquettes industry as previously explained while the second smallest growth and consumption is possessed by the pulp industry. A plan and application for coal mining programs are needed to adapt and contribute to the constant increase and needs of coal production to meet the demand of several related industries.

#### 1.4.6 Comparative study and additional information from Australia

In global mining activities, Australia as a country and continent located in the southern hemisphere and having borders that are close to Indonesia's southern territory needs to be reckoned with and has a great influence. It is one of the world largest countries and the 13<sup>th</sup> largest economy with the highest GDP growth among major advanced economies (Australian Trade and Investment Commission). The mining industry has a significant contribution to its economy, along with its historical backgrounds on mining activities that lead to the current economy with rapid and stable growth in numbers and knowledge. As one of the largest coal producers globally, research and analysis related to this commodity are continuing to support future production and prediction. Responding to the challenges that exist in the growing need for coal, The developed latest technology to extract coal could be done by using the fracking method to collect the coal seam gas, "a natural gas, i.e., methane, which is sourced from underground coal formations, sometimes known as coal bed methane," (John, 2011). In conventional gas fields, the item exists in permeable sandstone reservoirs, while on the other hand, gas can be found in coal seams, where

underground water pressure helps to keep it contained. The method of extraction was usually done utilizing the water that is pumped out of the coal seam in order to release the pressure, which allows the trapped gas to withdraw into the well. However, such a method draws controversy by reason of water resource competition that drain the coal seam from subterranean aquifers which will affect the limitation of the groundwater resources and disturb the agricultural activities. Land-use competition could also emerge due to the possibility of the deposit of coal seam gas that might be located on farms, residential areas, factories, commercial areas, etc., that will likely trigger conflict between communities and mining companies by cause of the refusal to leave their lands, high price for offered compensation and reduced number of products that were previously provided by local industries. It also raises community concerns that unsuitable industrial characteristics could disturb the area that have been formerly designed and not adaptive to such changes (e.g., such as touristic and religious places). There are also possible environmental effects of contamination that are always considered as the main concern for mining activities, especially by using new technologies that have not yet been tested on a wider scale, which could potentially risk the surroundings, such as damaging the water sources and wildlife habitat if the gas leaks unexpectedly from its coal seam. It is also worth noting that waste products of chemical salt used in the extraction process could also be harmful for the natural habitat.

Responding to this concern, the Commonwealth Scientific and Industrial Research Organization (CSIRO)'s Gas Industry Social and Environmental Research Alliance have carried out research regarding the possibility to re-inject coal seam gas-produced water through the aquifers, in which if it is observed and controlled carefully, will not affect the quality of water, especially for human consumption. The policy of Queensland State Government to manage the water produced by coal seam gas will confidently boost the beneficial use of it by further protection of the environment as well as to raise its awareness and productiveness as an valuable resources, by stating that the produced water shall bring benefit to the environment, water users and water-dependent industries. The water itself can be used, based on its quality, quantity, and level of treatment, such as to provide for the local communities, supplying irrigations, reducing dust, cooling, washing, drilling and replenishing water sources. During different circumstances, assuming that the water could not be consumed, it needs to be treated and disposed of without or as minimum as possible of its harmful effect to the environment. Similar methods and research may be used in Indonesia with adaptation and further development to better suit the geological and company's operational characteristics, as well as the sociological aspect of the local community.

## **1.5 Statement of problems**

Despite the tremendous effort, several problems arise in the recent coal mining activities such as the low price of coal that leads to uneconomical extraction processes while at the same time, coal energy is still needed for mid-term power plant energy resources and smelter facilities; bureaucracy which makes it difficult to obtain licenses from the Government Ministries and Departments, such as the Local Government of Environment and Forestry Services, that are not part of the current Capital Investment Coordinating Board/*Badan Koordinasi Penanaman Modal* (BKPM)'s one-stop service; problematic land acquisition process including local community objections; financing issues including uncertainty around the availability of Government guarantees; and the lack of transmission lines and, to a lesser extent, other supporting

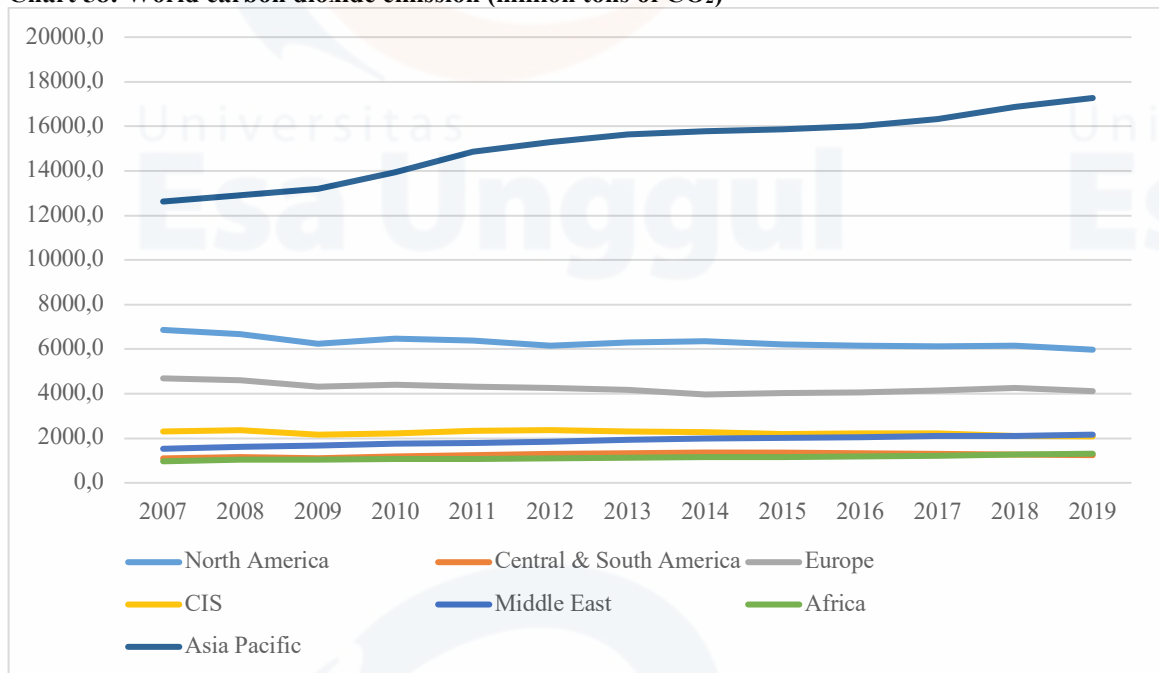
infrastructure. In addition, pollution and environmental issues also remain as big challenges to the mining business.

External factors that occur during mining activities are also necessary to be noticed. The proper definition is when the actions of one economic agent affect other agents indirectly, in either a positive or negative way (Nicholson, 2001), which means that the outcomes of this kind of activities may create external costs and/or provide external benefits to consumers or firms that are not involved in the relevant production or consumption decision. Several examples of negative externalities are pollution from the production process that adversely affects the health of people who live nearby and damages to the natural environment, which reduces the well-being of local residents. Positive externality might occur when locals work in the industry with a better salary compared to their previous work opportunities, which helps the improvement of their economy, building new infrastructures to support the operational activities in the mining site and related areas, that could also be used by neighboring people and homeowners where their properties could be used for rentals to other workers who previously live outside the worksite territory and reside temporarily in the local area. The World Trade Report from WTO offers a solution to the problem of negative externalities, by internalizing all costs and benefits into the price of the good. However, it is practically difficult to achieve without the intervention of external agents such as government and local institutions.

### 1.5.1 Emission

It is essential to realize that behind the needs of energy as explained earlier, negative impacts also exist and arise, where one of them is regarding the pollution from carbon dioxide (CO<sub>2</sub>) emissions released from the processing and combustion of fossil fuels.

**Chart 58: World carbon dioxide emission (million tons of CO<sub>2</sub>)**

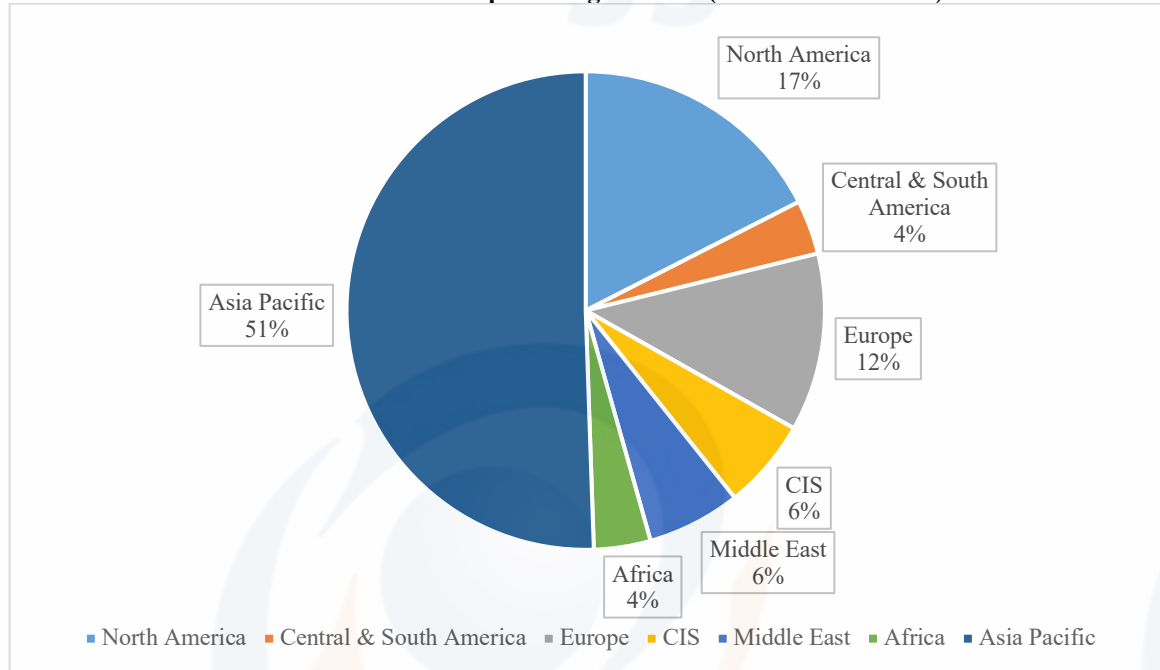


Source: BP Statistical Review of World Energy

Referring to the existing data, the total emissions generated from 2007 to 2019 is amounted to 418,716.7 million tons of CO<sub>2</sub>, where there has been a growth in the

amount of CO<sub>2</sub> emissions from 2007 amounting from 30,078.7 million tons to 34,169.0 million tons in 2019 where the occurred surge was 14% (Chart 58), with the average annual growth of emissions of 1.17%. Such information could serve as a warning that this number and increase considered to be significant and would affect many aspects in human life if not handled properly.

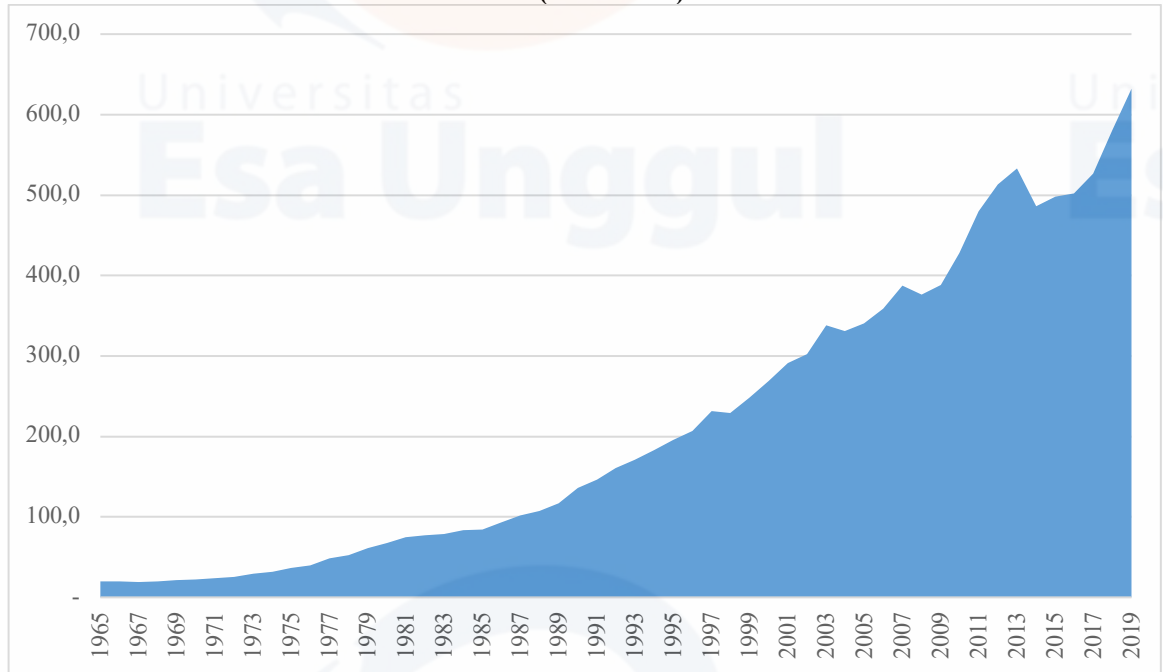
**Chart 59: World carbon dioxide emission percentage in 2019 (million tons of CO<sub>2</sub>)**



*Source: BP Statistical Review of World Energy*

Region with the largest CO<sub>2</sub> emissions in 2019 is the Asia Pacific, where it possesses a share of 51% of the world's total CO<sub>2</sub> emissions or equal to 17,269.5 million tons of CO<sub>2</sub> (Chart 59). North America is the second-largest emissions producers of 17% or 5,975.9 million tons, followed by Europe at 12% or 4,110.8 million tons, CIS at 6% or 2,085.3 million tons, the Middle East at 6% or 2,164.1 million tons as well as Central and South America along with Africa at 4% or 1,254.9 million tons and 1,308.5 million tons. This may be in line with the factor of a massive number of population and industries in the Asia Pacific region, which has an impact on enormous produced emissions. Increased economic activity, high lifestyles, and also public consumption plays significant roles in this regard.

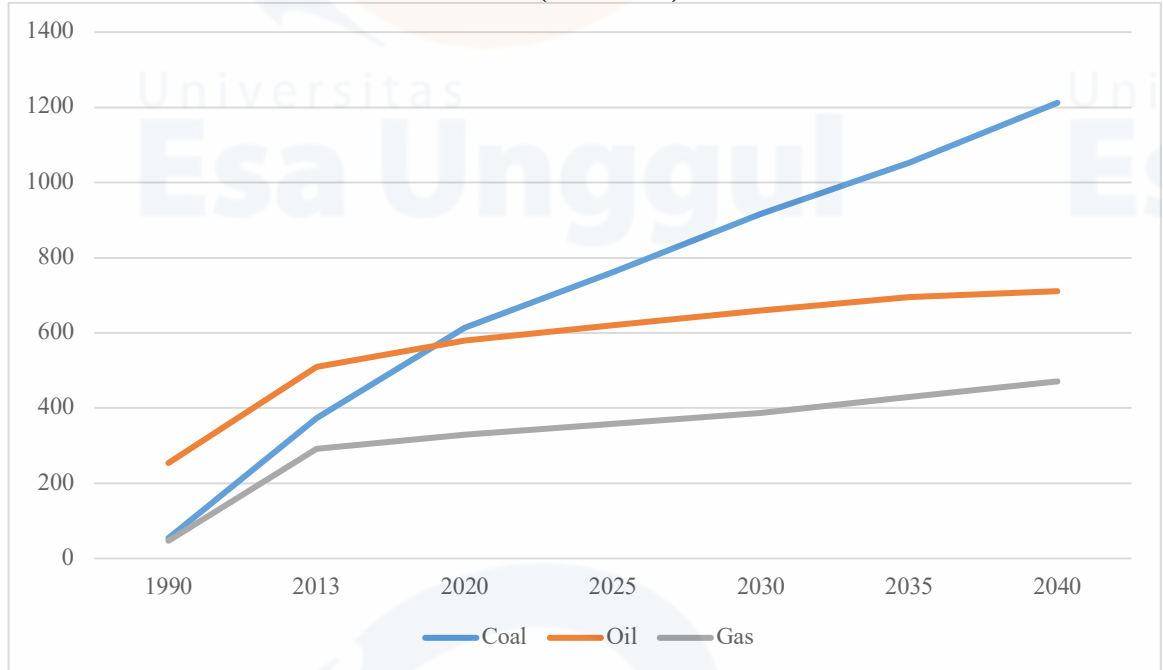
**Chart 60: Indonesian carbon dioxide emission (metric tons)**



*Source: BP Statistical Review of World Energy*

Meanwhile, Indonesia as part of the Asia Pacific region, has had an increasing amount of CO<sub>2</sub> emissions for years. Historically, the total emission in 1965 was only 20.1 million tons and however in 2009, the total emission has risen to 338.3 million tons and to 632.1 million tons in 2019 or up to 63% in 10 years (Chart 60). The average annual growth of these emissions is only 6.72% exclusively for the Indonesian territory. The largest growth in the number of emissions of 21% has occurred in 1977 and the second largest growth of 17% has occurred in the year of 1973 and 1975. After 2000, the largest growth has occurred in 2003 and 2011 with 12%. In contrast, the growth of the smallest amount of emissions occurred in the year of 2014 which was -9% and in the year of 1967 with -4%. Such changes are related to the global economic crisis in the 1960s, 1998 and 2008, causing a decline in all aspects of countries globally and causing stalled and hampered economy, industrial, tourism, transportation, etc.

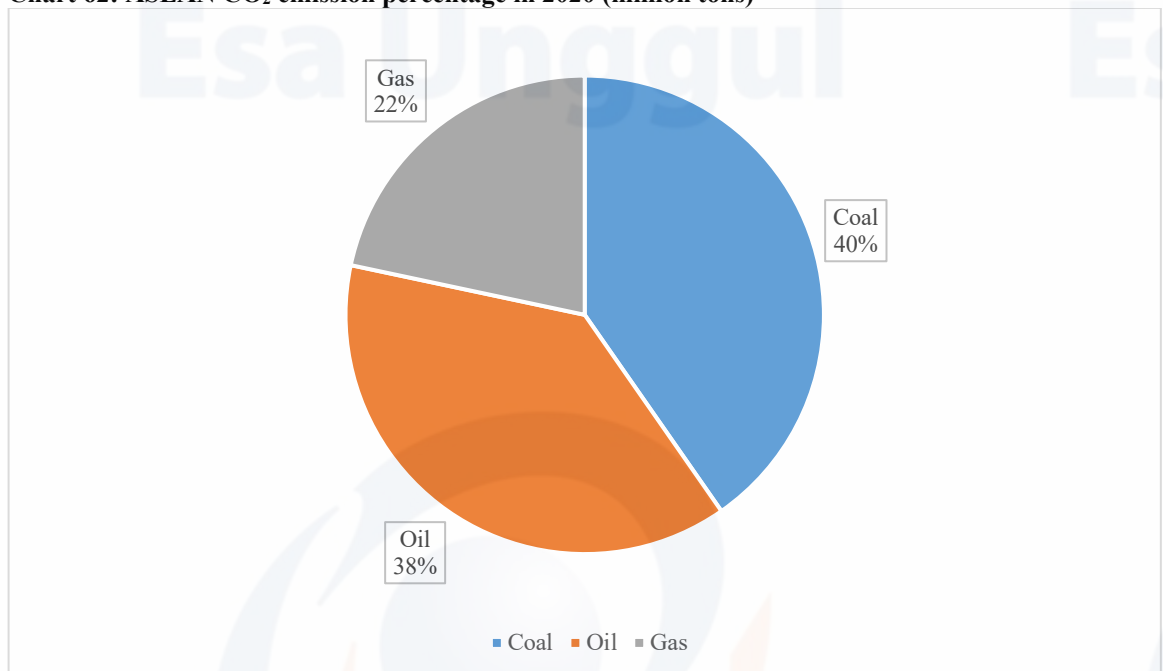
**Chart 61: ASEAN CO<sub>2</sub> emission based on fuel (million ton)**



*Source: International Energy Agency (IEA)*

As previously explained, Indonesia plays an important role in the ASEAN region where according to politics, economics, security, and other areas, country members have dependencies on each other, where they have to collaborate to overcome problems and challenges that are interrelated and influential. It also has an impact on the produced CO<sub>2</sub> emissions and has the obligation to consider it as a shared responsibility. Total emissions produced from 1990 to the estimated 2040 amounted to 11,329 million tons, wherein 1990 the emissions produced only amounted to 355 million tons, and in 2040 its predicted increase is up to 2,394 million tons — an increase of 574% with an annual average emission growth of 5.02% (Chart 61).

**Chart 62: ASEAN CO<sub>2</sub> emission percentage in 2020 (million tons)**

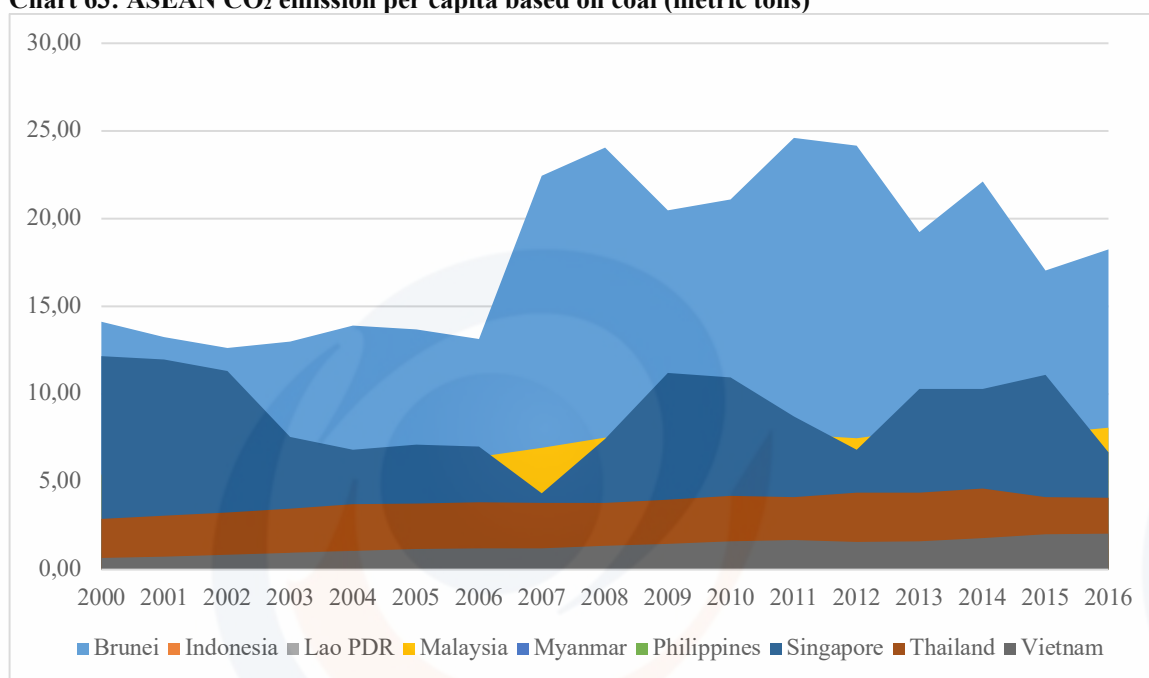




Source: International Energy Agency (IEA)

If such information is detailed, it shows that coal is estimated to be the biggest contributor to CO<sub>2</sub> emissions in 2020 by 40% of the total emission or equal to 614 million tons, where oil is the second largest contributor to emissions that differs slightly from coal by 38% or 579 million tons (Chart 62). Gas only produces emissions of 22% or 330 million tons, which is the smallest when compared to two previous fossil fuel sources.

**Chart 63: ASEAN CO<sub>2</sub> emission per capita based on coal (metric tons)**



Source: World Bank

Due to the important role of coal in industrial development and related to people's needs in ASEAN, including being the largest CO<sub>2</sub> emitter, it is necessary to calculate the amount of carbon dioxide emission per capita based on coal in ASEAN. In 2000, the largest number was possessed by Brunei Darussalam with the amount of 14.14 metric tons while the country with the second-largest per capita emission was Singapore with the amount of 12.17 metric tons due to its small population yet heavy consumption on energy (Chart 63). In contrast, countries with the smallest amount of emissions per capita was Lao PDR with a total of 0.18 metric tons and Myanmar with the second smallest emission amounting to 0.22 metric tons, since those two countries are considered as lower income developing countries. Hence, total per capita emissions in the ASEAN region in 2000 were 37.86 metric tons. However, in 2016, which was more than one and half decade later, the number of emissions per capita in the ASEAN region increased by 20%, from 37.86 metric tons to 45.57 metric tons. It is worth noting that the only country who experienced a decrease in the number of emissions per capita was Singapore by 45% from 12.17 metric tons to 6.69 metric tons in just 16 years, with an average annual decline of 3.91%. In 2016, the largest per capita emission was owned by Brunei Darussalam with total emissions per capita of 18.25 metric tons or increased by 29% for over 16 years, with an annual average growth of 1.72%. Its per capita emission is very much influenced due to a small population, yet with an enormous amount of per capita oil production and due to cheap oil prices that leads to

massive energy and petroleum consumption as the result. However, the biggest growth occurred in Lao PDR, where it was recorded at 1,370% or from 0.18 metric tons to 2.59 metric tons, with an annual average growth of 19.63%, followed by Vietnam at 207% from 0.67 metric tons to 2.05 metric tons, with an annual average growth of 7.76%. The latest two countries' considerable growth is influenced by the development of a fairly massive industry which leads to the boost of its pollution.

The energy needs also have an impact on the increase in air pollution where coal is one of the biggest contributors in this regard, along with the increase in the energy-mix as one of its big factors. Coal will be the biggest emitter in 2020 to replace oil, where in 2040, around 50% of emissions will come from coal, while oil will only be responsible for 30%, followed by natural gas for 20% of the world total emission. The energy sector contributes in the portion of two thirds in this case, followed by the industrial sector, which accounts for 20% contribution. With the development of compliance of the energy needs from coal which are increasingly large and environmental issues that are commonly widespread, the use of environmentally friendly technology for coal-fired power plants can be utilized to overcome and reduce its negativity.

#### **1.5.1.1 Pollution control and reduction**

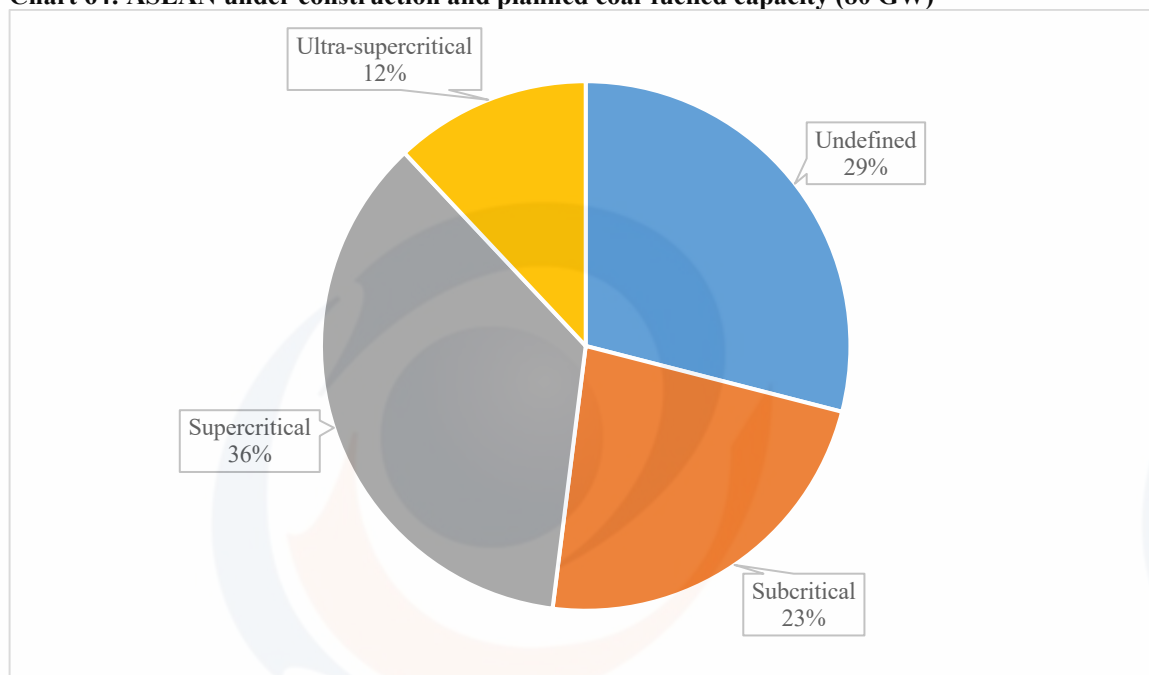
Coal combustion in the process of generating electricity causes pollution that affects air quality. However, the developed technologies can reduce these impacts with selective catalytic reduction systems, electrostatic precipitators, wet and dry scrubbers, fabric filters, sorbents, and activated carbon injection. The use of these technologies can reduce many harmful substances and generate negative impacts. One of its unfavorable effects is related to soot, a mass of carbon particles produced from the incomplete combustion of hydrocarbons, where its higher levels can reduce regional crop yields by more than 10% in each cycle of planting and harvesting. This substance can reduce the value of rice production in Asia by as much as US\$ 48.8 billion per year (Purvis et al., 2014, p. 4). Agreements regarding pollution standards in the ASEAN region are needed for harmonization of regulations and joint development systems to protect the environment. This initiative will force both existing and future power plants to modify and implement clean technology, including the use of co-firing coal-fired power plants with a mixture of solid biomass between 1%-5% (Siswanto, 2020) and with a mixture of ammonia (Iqbal, 2020). In addition, emission reducers in coal-fired power plants could utilize the Air Quality Control System (AQCS) Flow technology and methods; DeNO<sub>x</sub> (i.e., Nitrogen Oxide) by performing low NO<sub>x</sub> burner, Preventing Advanced Combustion Technology and Selective Catalytic Reduction (SCR); DeSO<sub>x</sub> (i.e., Sulphur Oxides) with spray tower absorber that uses oxidation water, agitator, absorber recycle pump and mist eliminator process; as well as Dry Flue Gas Cleaning Technology (Circulating Fluid Bed Reactor) that could decrease height of reactor and process filter along with selective separation of coarse particle by increasing sorbent concentration, sorbent residence time, fluid bed stability and less fly ash pre-separation upstream (ibid). However, several slagging and fouling may be occurred due to low ash fusion temperature.

#### **1.5.1.2 High-Efficiency Low Emission**

In order to achieve High-Efficiency Low Emission (HELE), high pressure and temperature are needed, where the system is already used in Supercritical (SC) and

Ultra-Supercritical (USC) power plants as well as Integrated Gasification Combined Cycle (IGCC) system, which are not possible for Subcritical power plants. The carbon released differs 40% less than the previous technology and 25-33% less compared to the average pollution from power plants globally. It can reduce carbon emissions while encouraging the potential use of coal-fired power plants to meet electricity needs. The 2014 study from IEA stated that there are more than 90% subcritical technologies used in coal-fired power plants all over the world. Fortunately, almost half of the existing and future planned coal-fired power plants that are being built and developed focused on the use of advance HELE technology, which is in line with the Paris agreement.

**Chart 64: ASEAN under construction and planned coal-fuelled capacity (80 GW)**



Source: International Energy Agency (IEA)

In ASEAN nations, for the construction and planning of 80 GW coal-fired power plants, there are 36% of which will use supercritical technology, 12% which will use ultra-supercritical technology, 23% which will use subcritical technology and 29% that are still undefined (Chart 64).

**Table 8: Comparison of HELE technologies and renewables**

Investment Option	Generation Mix for 800 TWh (%)		Required Capacity (GW)		Total CAPEX (\$billion)	% Increase in CAPEX to Baseline	Annual Emission (Bn. tCO <sub>2</sub> )
	Coal	Renewable	Coal	Renewable			
Subcritical Coal Only	100	0	122	0	180	Baseline	0,8
Ultra-supercritical Coal Only	100	0	122	0	253	40	0,6
Subcritical Coal &	83	17	101	58	253	40	0,7

Onshore Wind							
Subcritical Coal and Solar PV	88	12	107	63	253	40	0,7
Onshore Wind Only	0	100	0	338	598	232	0
Solar PV Only	0	100	0	522	773	329	0

Source: World Coal Association (WCA)

If further elaboration are made by comparing several technologies of power plants with HELE technologies and renewables, more information shows that low Capital Expenditure (CAPEX) can be obtained through a combination of renewable energy with coal or solely based on coal (Table 8). Zero emissions can only be achieved by using renewable energy such as Solar Photovoltaic (PV) and onshore wind, but the fulfilment of significant electricity needs and capacity can only be done with fossil energy in order to obtain the lowest emissions through available information by using ultra-supercritical coal technology. The total usage for renewable energy at the present moment will lead to hard impact that will result in the inhibition of economic growth and the cessation of some manufacturing activities due to energy deficits. However, there are challenges in the implementation of such technology, even though negative impacts have decreased due to the difficulty of obtaining funding related to the tightening policy on fossil energy sources, which makes the high initial cost for HELE technology to be unachievable. It makes the government and related parties who need additional energy prefer the use of old technology that is particularly inefficient and has higher pollution levels. From the conducted research, there are approximately 23% of the construction of coal-fired power plants that are using the subcritical technology, of which 29% of the projects have not yet been finalized for its implemented technology. It mainly depends on the price level, potentials, and conveniences that are taken into consideration. The use of HELE technology in ASEAN will significantly reduce carbon emissions, where both its capacity and use of coal using the current mix towards ultra-supercritical by 2035 will reduce the number of emissions by 1.3 billion tons.

On the other hand, many development and multinational banks, as well as other financial institutions, are beginning to follow existing political policies to limit pollution and global warming by implementing stricter policies for fossil energy. Nevertheless, this can be inversely proportional if it is not well disclosed due to the increase of energy demand in developing countries, especially with easier access and high dependence on coal, which will made up their preference to build and develop coal-fired power plants with cheaper, easier and faster in the construction process of its older generation type, where consequently there will be higher pollution levels and low efficiency in its operation. Such things happen due to the difficulties of accessing financial assistance for research, development, and construction of coal-fired power plants up to the latest technology, which is in fact, is more environmentally friendly, safer, and has a higher efficiency. The massive initial costs are bearable since, in the long term, operational activities will be relatively affordable. Private financial institutions generally cannot compensate for large projects such as power plants which makes the financing options to become strictly limited.

### 1.5.1.3 Carbon capture and storage

Carbon capture and storage (CCS) technology can help to reduce pollution by capturing CO<sub>2</sub> produced from coal-fired power generation processes, subsequently compacted, transported and injected into the earth permanently in areas that have been previously determined for long-term safety. This method is divided into two, namely Oxy Fuel Combustion with a direct capture system of highly concentrated CO<sub>2</sub> by combustion using the mixture gas with Oxygen (O<sub>2</sub>) and CO<sub>2</sub> instead of air as well as post combustion with a system of separation of CO<sub>2</sub> from the glue gas, using amine absorbent. Both were being tested in Australia, where the former is commercially ready (Iqbal, 2020). Another option is that CO<sub>2</sub> can be used for industrial purposes, for example, as enhanced oil recovery (EOR) to increase pressure in oil reservoirs. HELE is one of the cornerstones towards CCS, where it is vital for the use of technology following the agreement in facing climate change, due to the inevitable and irreplaceable needs of fossil fuels. Research from the Intergovernmental Panel on Climate Change (IPCC) shows that implementing decisions and plans to tackle climate change without using CCS will be 140% more expensive and incredibly difficult to limit global temperature increases to a maximum of 2° C. The current use of CCS still face problems toward access to the limitation and difficulties for financing coal and its technological developments, in which are not in the optimum level of implementation. There needs to be further evidence and broader awareness from the international community for the recognition of this technology, where ASEAN will become one of the regions that will gain its abundance benefits. This is also included with a large amount of potential land for CO<sub>2</sub> storage sites in several places scattered across the region, including the implementation of enhanced oil recovery that can have additional commercial benefits. Furthermore, 32.5 giga tons of captured CO<sub>2</sub> emissions create the potential for Indonesia to produce methanol, especially at the Jamali power plant (Tasrif, 2020).

The World Economic Forum meeting in 2016 emphasized the importance of efficiency towards achieving sustainability and affordability for countries with fast and robust economic and industrial growth, especially in the ASEAN region. It includes the use of HELE for coal-fired power plants, where an additional of 800 TWh is needed in between 2020-2035. The least expensive path is to use subcritical coal power plants at the cost of US\$ 180 billion, but with a high amount of emissions, where the most efficient use of ultra-supercritical technology can reduce emissions up to 200 million tons of CO<sub>2</sub> per year (WCO, 2017, p. 10). Renewable energy in the energy-mix is indeed required consideration and absolutely recommended. However, it entirely depends on ASEAN's energy needs and its implementation. A possible calculation of investment for the total use of renewable energy will cost around US\$ 500 billion (ibid, p. 11), which is considered to be quite massive and impossible due to limited financial capability and technological restriction. Thus, the combination of fossil energy such as coal and renewable energies are needed to receive a transition period to enlarge the portion of renewable energy in the future energy-mix. Recognition of HELE and its formalization will lead to access of broader and greater assistance in technological development for environmentally friendly power plants, which are in line with the fact that fossil energy needs are still enormous along with global concern to renewable energy carbon emission control.

Support from ASEAN as one of the most influential and most developed regions can have a significant impact, with a long-term planning, strategy and multilateral collaboration for the use of CCT, where coal is one of the main energy sources that

will become dominant in the future of energy-mix. The pathway of the transition from inefficient old technology to more efficient new technologies needs to be mapped in HELE for coal, especially in the commitment to end the use of subcritical power plant technology. It is in line with the Joint Ministerial Statement at the 32nd ASEAN Ministers on Energy Meeting in September 2014, in which ASEAN countries agreed to support the development of HELE coal-fired power plants, including the adoption of CCTs. It is possible to be backed by funding and cooperation for the value adding of coal by upgrading low-rank coal, cokes making, liquefaction, gasification, coal briquetting, coal slurry or water mixture as well as policies for CCT and HELE between ASEAN plus China, Japan and South Korea as its main partners. The use of HELE alone can reduce CO<sub>2</sub> pollution by 25-33% (ibid, p. 12) and diminish other kinds of pollutants, where generally approved standards for economic and technical issues are needed for this matter. In addition, WCO has made a potential model to be applied in accelerating coal efficiency.<sup>2</sup>

### 1.5.2 Depletion of natural resources

The lack of ownership rights over a common pool of resources, as stated in the theory of the tragedy of the commons (Hardin, 1968) will eventually lead to depletion of such resources, where coal and mineral natural resources are considered as a finite commodity. The concept of externalities on environmental issues happens due to calculation by stakeholders that does not include the affected cost and benefits which influence other people. As greed is human natural characteristic, the rush of every man to pursue their own best interest will result in over-excavation and in turn will devastating the environment even though they are part of the ecosystem and the society itself. Such trait is in favor of the forces of psychological denial called "individual benefits as an individual from his ability to deny the truth even though society as a whole, of which he is a part, suffers." (ibid, p. 1,244) This condition of over-exploitation and exhaustion is created with open access where the ownership and access to natural resources are owned by an individual or a group of people. Massive profit from mining activities makes many parties competing to extract existing natural resources as many as possible. They generally prioritizes resources that are easiest to access in the beginning where it makes the remaining fragmented resources become technically unreachable or deemed uneconomical, where 'resource sterilization' is a specific term for this. It serves as a result of poor quality of planning for mining permits particularly regarding its long-term interests and conditions, which need to be adjusted to technological developments and market conditions of coal prices. Such kind of negativity could be prevented by education that serves as a counteract to the natural tendency to execute wrongdoings, along with the intervention of local and central government which would cover the lack of awareness and power from individuals along with the aid of local institutions to halt negative and even encourage positive externalities in natural resources and pollution management, by imposing taxes, subsidies, etc. (Pigou, 1929). The government could create coercive laws by making tax regulations which will make it cheaper to deal with their own pollution or damages rather than to discharge them untreated. Other prevention could be done by a more persuasive approach by not giving prohibition but to offer a carefully biased option. Hence, the mutual agreement on coercion type of law does not always have to be enjoyable to most of the population, yet because it would favor the consciences. There

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<sup>2</sup> For more information, visit [www.worldcoal.org/pacc](http://www.worldcoal.org/pacc).

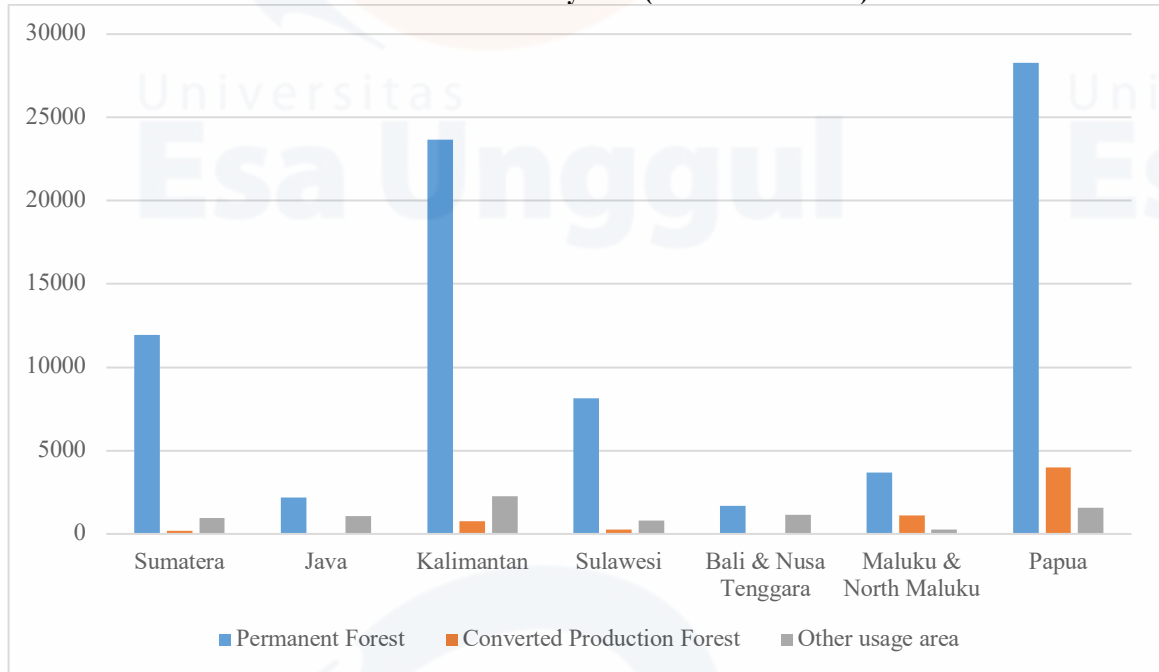
are questions on how to minimize and alter the uneconomical factors along with kinds of methods and innovation that could be used to create profitable mining activities.

In the case of mining companies in Indonesia, cost and benefit analysis does not exist, yet it rather has in consideration terms of economy that may bring multiplier effects, such as technical, environmental and social (e.g., community and local government permits) aspects. From the Presidential Regulation/*Peraturan Presiden* (PP) and the Law of the Republic of Indonesia Number 40 Year 2007 on Limited Liability Companies in Article 5 and Regulation of the Minister of Energy and Mineral Resources Number 25 Year 2018 on Mineral and Coal Mining Business Chapter 12 states that there must be a benefit to the community. There are programs that are agreed upon, such as the Corporate Social and Environmental Responsibility/*Tanggung Jawab Sosial dan Lingkungan Perusahaan* (TJSLP) which should be made by companies who enter and operate in related regions, for example, in the social, religious and economic fields. The program was agreed by the Regent/*Bupati* and the company's Director (e.g., through a signature), which is an obligation for active companies. However, it is not mandatory for corporation that have not yet operated. These regulations do not specify the numbers that must be issued for the community empowerment program and are an internal decision of the company itself. However, the Government is currently drafting a bill/*Rancangan Undang-undang* (RUU) on CSR, which includes a benchmark for the amount of CSR funds that companies must provide, namely 2%, 2.5%, or 3% of company yearly profits. This led to protests from businessmen since the figure is considered to be very large and burdensome.

### 1.5.3 Deforestation

Deforestation is an issue that cannot be separated from mining activities due to land clearing and conversion activities, from generally considered as forest or green area into open and cleared mining zone. Based on the definition of the Central Bureau of Statistics/*Badan Pusat Statistik* of Indonesia, "Forest areas are certain areas in the form of forests, which are designated and or determined by the government to maintain their existence as permanent forests. This is to ensure legal certainty regarding the status of forest areas, the location of boundaries, and the extent of a certain area that has been designated as a permanent forest area." The Indonesian forest area is determined by the Minister of Environment and Forestry of the Republic of Indonesia in a Ministerial Regulation Number P.44/Menhut-II/2012 concerning the Forest and Waters Area of Aceh Province and Number SK.103/Menlhk-II/2015 concerning the Appointment of Forest Areas. The designation of forest areas also includes water areas that are part of the Nature Reserve Area/*Kawasan Suaka Alam* (KSA) and Nature Conservation Area/*Kawasan Pelestarian Alam* (KPA).

**Chart 65: Closure of forested land in Indonesia by area (thousand hectares)**

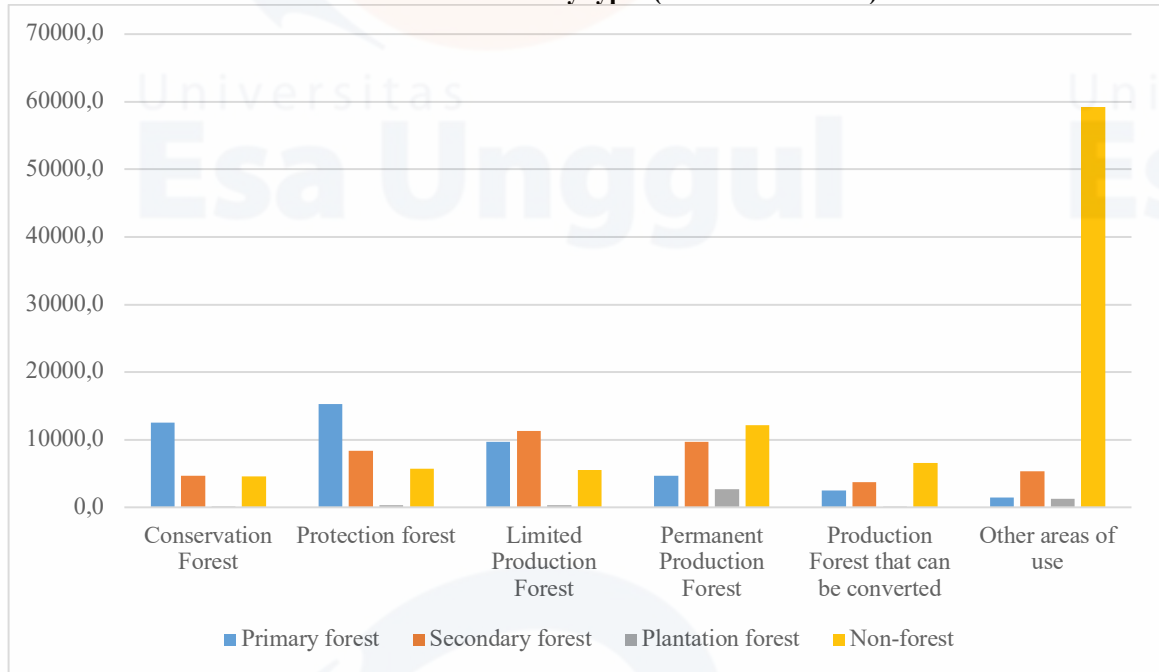


*Source: Ministry of Environment and Forestry of Indonesia*

The ministry of environment and forestry of Indonesia has stated that the country has a land area of 187.75 million hectares consisting of 93.95 hectares of forested land and 93.8 hectares of non-forested land, an almost 50:50 in percentage. If divided into three different area categories, the closure of forested land in Indonesia has a total of 79,553.7 thousand hectares or 92.67% of the total area for the forest category, 6,296.3 thousand hectares or 7.33% for converted production forest and 8,099.7 thousand hectares or 8.62% of the total territory for other usage areas (Chart 65). The largest forest area is located in Papua where permanent forest has the largest portion followed by converted production forest and other usage areas. Kalimantan is the second largest forest area where, similar to Papua and other regions, permanent forest has the largest portion, yet the converted production forest has only a smaller area compared to other usage areas. Bali and Nusa Tenggara are the areas with the fewest closure of forested land in Indonesia, with a total size of only 2,865.6 thousand hectares.



**Chart 66: Closure of forested land in Indonesia by types (thousand hectares)**



*Source: Ministry of Environment and Forestry of Indonesia*

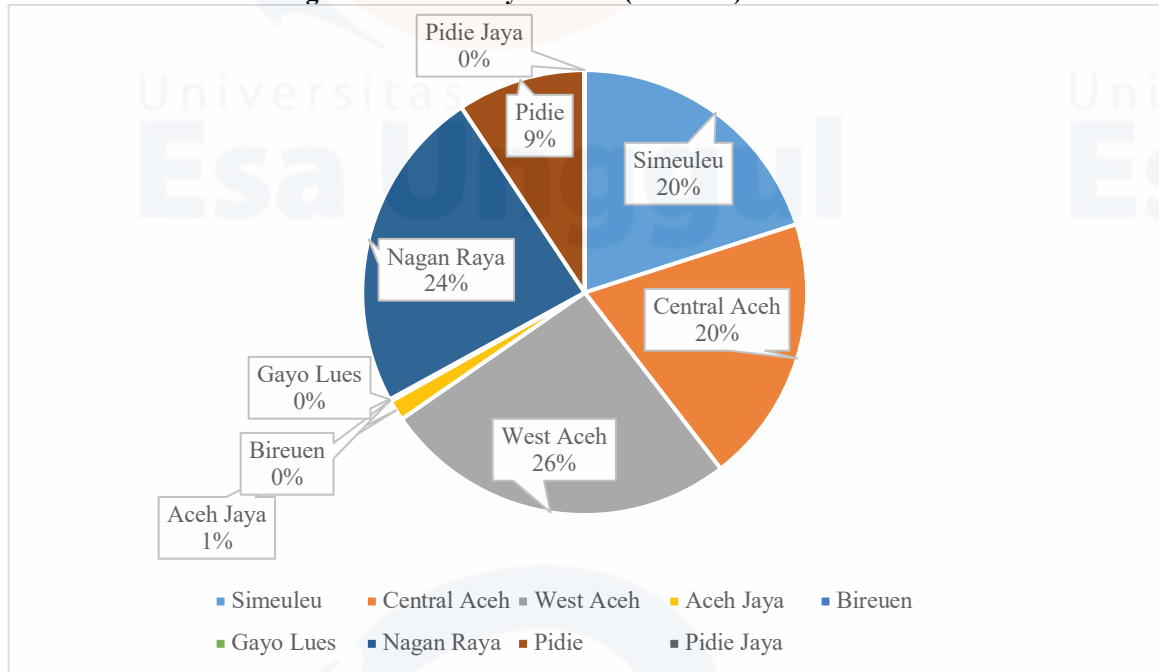
Based on basic information from Chart 66, Indonesia as one of the countries with the largest and most extensive forests, also called the world's lungs, has a closure of forested land that can also be divided by type, where there is a total area of 46,143.1 thousand hectares or 24.6% of primary forest that is defined as “naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed” (FAO, 2012, p. 7). 43,146.5 thousand hectares or 23% of secondary forest that is defined as “forest that regenerating largely through natural processes after significant removal or disturbance of the original forest vegetation by human or natural causes at a single point in time or over an extended period, and displaying a major difference in forest structure and/or canopy species composition with respect to pristine primary forests”(FAO). 4,660.2 thousand hectares or 2.5% of plantation forest as the smallest area all of which are included in the category of permanent forest land with a total amount of 85,849.9 thousand hectares or 92.67% of the total forest area. Meanwhile, there are 93,802.1 thousand hectares or 50% of non-forest area, which have the largest land territory. The term ‘other area of use’ is the location with the largest non-forest territory with 59,261.9 thousand hectares or 63.18% which deemed to be significant when compared to other types, including the largest total land area of 75,461.7 thousand hectares or 26.79% and the production forest that can be converted which has the smallest land area of 19,118.9 thousand hectares or 9.27% of the total forest area. Regarding forest management, the government will be more cautious in the process of issuing permits in mining. This accuracy is certainly related to environmental impact issues. The forestry service has joined the environmental agency in order to enable parallel processes through an environmental impact analysis for the procedure of permit creation in sequence to use the forest area, based on the Regulation of the Minister of Environment of the Republic of Indonesia Number 5 Year 2012 concerning the Types of Business Plans and/or Activities that Require an Environmental Impact Analysis. Data shows of only a few numbers of Production Operation Mining Permits/*Izin Usaha Pertambangan Operasi Produksi (IUP OP)*,

especially for minerals due to national policies related to smelters utilization obligation, resulting on numbers of mining investment enthusiasts that are concerning on their inadequate capabilities to build smelters since they have already obtained the OP IUP. Companies are required to have a lease-to-use forest area permit as stipulated in the law, if they have business activities in such area.

In principle, the Forestry Service is an institution that is mandated by law to carry out forest management as long as the activities are in accordance with applicable laws, where the service process will be provided. Thus far no new planning has been produced, hence the operations are still in accordance with existing rules (Hadi, 2019). Mining interest in Aceh's forest areas is considered to be minor, which may be in accordance with national general policies regarding smelters, including the implications of moratorium. The forestry service does not produce permits since it is centralized in the investment and licensing bodies in Jakarta. The forestry service only provides technical considerations or recommendations on the basis of the further process of the request. The forestry permit itself was issued by the Minister of Forestry and the Environment, including public complaints regarding environmental impacts where the Governor only played a role in providing recommendations (ibid). There are cases of mining permits issued by the government which used to be called a work contract and are now converted to Foreign Investment/*Penanaman Modal Asing* (PMA), where its permits can be directly received from the national level without regional approval. On the other hand, the Governor is able to forward the objections of the local community to the central government.

Nationally, the Forestry Plan at the National Level/*Rencana Kehutanan Tingkat Nasional* (RKTN), is deviated to become a Forestry Plan at the Provincial Level/*Rencana Kehutanan Tingkat Provinsi* (RKTP) which then detailed to the smaller level into a strategic plan/*Rencana Strategis* (Rensra). In forest management and supervision, especially related to the mining activities, the Indonesian government through the Ministry of Forestry and the Environment has prepared a Long-Term Forest Management Plan/*Rencana Pengelolaan Hutan Jangka Panjang* (RPHJP) in the Government Regulation of the Republic of Indonesia Number 6 Year 2007 concerning the Forest Management and Formulation of Forest Management Plans, as well as Forest Utilization. The government of Aceh made a division of work areas, where for the location of West Aceh is under the authority of region IV Forest Management Unit/*Kesatuan Pengelolaan Hutan* (KPH). The KPH has a RKTP, in which examples of forest areas that are projected to be managed with possible kind of scheme, feasible potentials and the effective management method, in which are not solely focused on mining issue but rather to production forests, including access to community management that is encouraged through social forestry and cooperation. To achieve the vision of efficient and sustainable forest management, in collaboration with plantation, aquaculture, real estate and mining industries, the KPH RPHJP management planning formulation was developed by referring to the Forest Management Technical Guidelines and Forest Management Plan Formulation in Protected Forest Management Units/*Kesatuan Pengelolaan Hutan Lindung* (KPHL) and Production Forest Management Units/*Kesatuan Pengelolaan Hutan Produksi* (KPHP), Directorate General of Forestry Planning of the Ministry of Forestry of the Republic of Indonesia, in which a strategy has been prepared for the long term plan of 2016-2025, i.e., 10+ years program, with directions, instructions and policies which may as well referred to various parties and stakeholders. Protected forest itself is intended to carry out environmental functions, specifically to maintain vegetation cover and soil stability on steep slopes and protect watersheds.

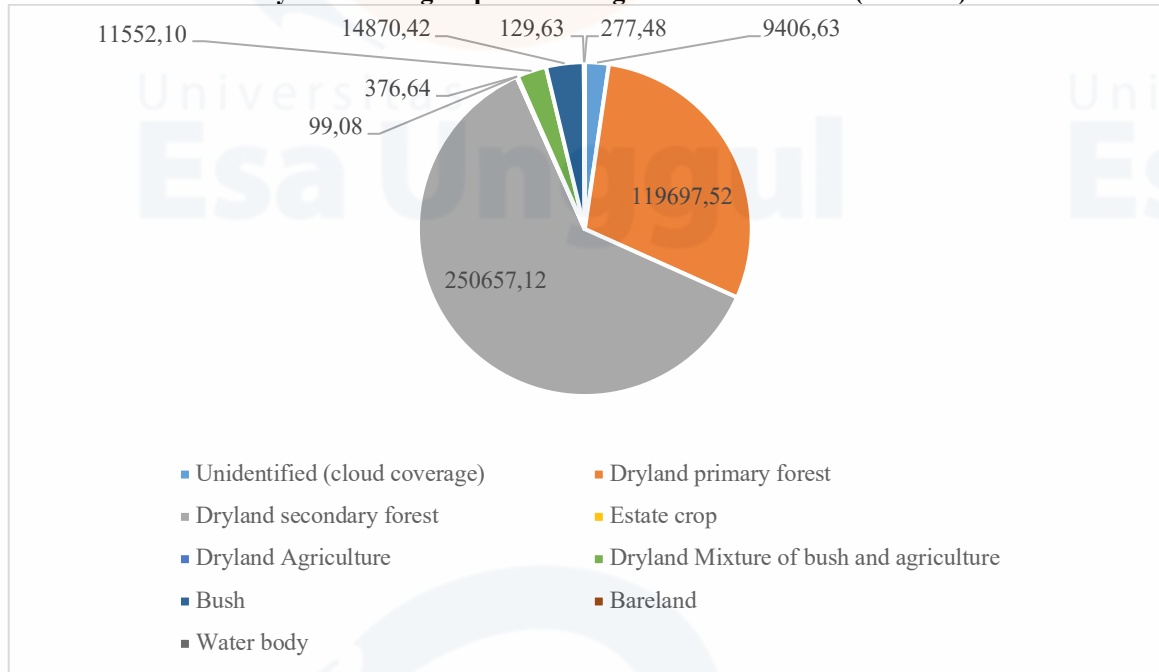
**Chart 67: Area of KPH region IV in Aceh by districts (Hectares)**



*Source: Forest Management Unit of Aceh*

Data from the Forestry Service of Aceh shown that the total area of West Aceh is 105,173.96 hectares which represents 26% of the total area of 407,066.61 hectares managed by KPH region IV, based on the Decree of the Minister of Environment and Forestry of the Republic of Indonesia Number 932/Menhut-II/2014 concerning the Area of Protected Forest Management Unit and Production Forest Management Unit of Aceh Province, which constitutes around 11.44% of the entire KPH designated area (Chart 67). The data are also generally used to help the improvement and also supported from the industry's survey results that require coordination and permit from such institution, by the reason of limited human resources and budget to carry out thorough checks and periodic updates with fairly short intervals. Land cover by watershed groups in KPH region IV area itself is distributed into some watersheds/*Daerah Aliran Sungai* (DAS), which are considered as short watershed types, indicating high sensitivity in terms of hydro-horological behavior and potential natural disaster. Rainfall coverage in this region is fairly high at around 3,500 - 4,000 millimeter (mm)/year with an area of 164,419.11 hectares or 40% of the total area of KPH region IV in Aceh.

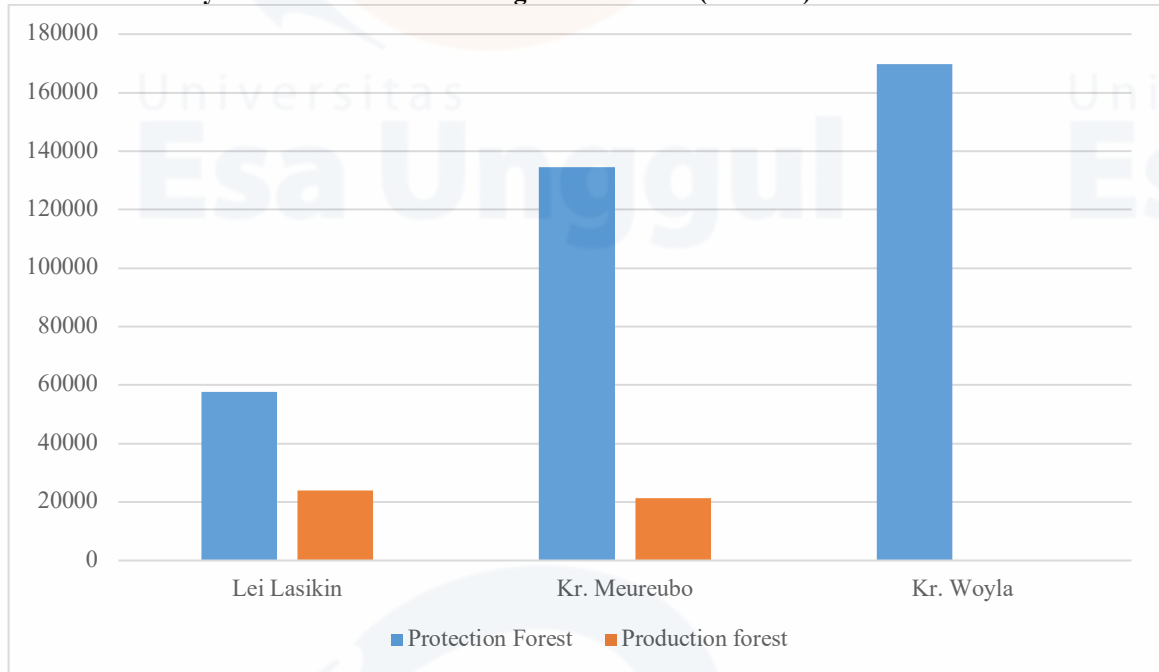
**Chart 68: Land cover by watershed group in KPH region IV area in Aceh (hectares)**



Source: Forest Management Unit of Aceh

Land cover in Aceh based on watershed group has the largest total area in the secondary forest dryland category at 62% of the total area or 250,657.12 hectares and followed by dryland primary forest which is the second largest of 29% of the total area or 119,697.52 hectares (chart 68). Other areas are consist of bush of 14,870.42 hectares, dryland mixture of bush and agriculture of 11,552.10 hectares, dryland agriculture of 376.64 hectares, water bath of 277.48 hectares along with the smallest land cover area of estate crop and bare land with coverage below 1% of the total area if unidentified area, i.e., cloud coverage, of 9,406.63 hectares is excluded. The division of areas and classification are needed to be able to carry out the planning and management of KPH implementation properly, in accordance with their respective characteristics in the area. Likewise, another classification was made by the government on the allocation of forest based on its functions. There was a Forestry Ministerial Decree/*Surat Keputusan* (SK) Number 932/Menhut-II/2014 on Designation of Aceh KPH Working Area, Covering Protection and Production Forest Functions.

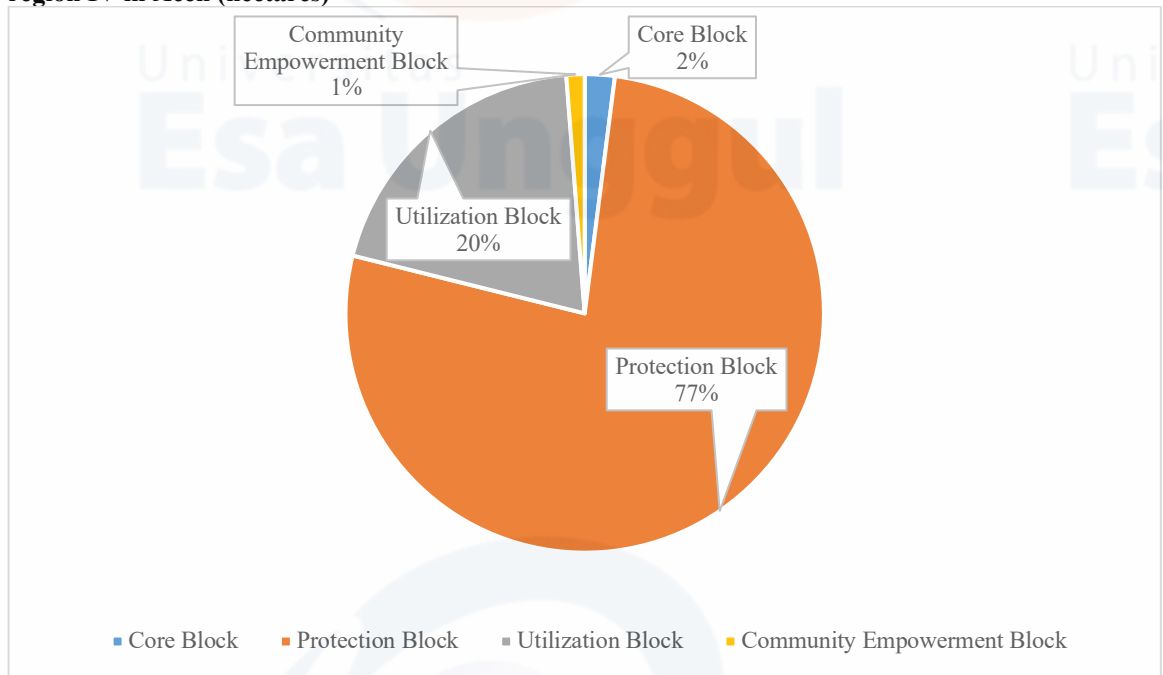
**Chart 69: Area by forest function in KPH region IV in Aceh (hectares)**



*Source: Forest Management Unit of Aceh*

The watershed group of Kr. Woyla has the largest area of 41.68% with protection forest that cover all of its area, while the Lei Lasikin has the smallest size of only 20.03% and consist of protection forest as the largest area and production forest which is almost half the size (Chart 69). In total, protection forest has the largest area in all of KPH IV region with 361,920.81 hectares while production forest has 457,066.61 hectares. In more details, Aceh KPH IV working area is configured into 3 sub-KPHs/*Bagian Kesatuan Pengelolaan Hutan* (BKPH), based on the layout of watershed groups. There are BPKH DAS Lei Lasikin, Kr. Meureubo and Kr. Woyla, where Sub-KPH is divided again into KPH Resort (RPH). Area organization is also undertaken to enable territory blocking based on biophysical profiles and potential utilization types.

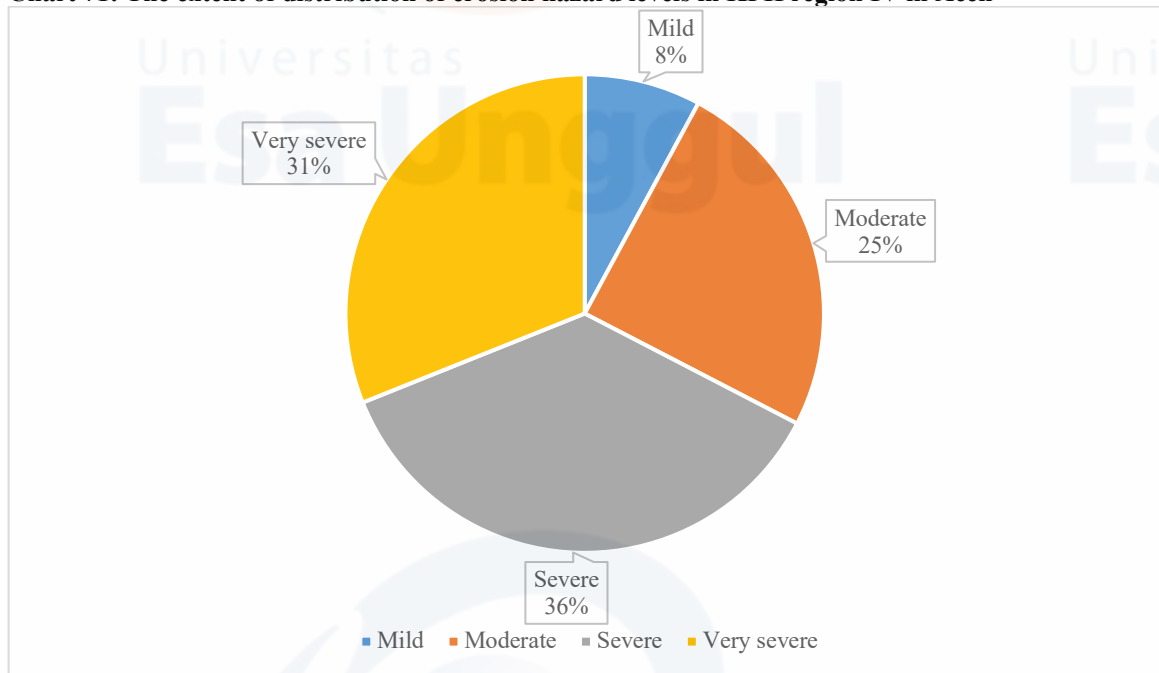
**Chart 70: Area blocking based on biophysical profiles and potential utilization types in KPH region IV in Aceh (hectares)**



Source: Forest Management Unit of Aceh

Brief of area is listed as Core Block of 2% of the total area or 8,233.51 hectares to accommodate high conservation values markedly by wildlife contact; Protection Block of 77% or 312,898.46 hectares to protect hydrological regimes defined by the National Forestry Plan; Utilization Block of 20% or 80,922.21 hectares, for various utilization types that potentially contained in the respective forest types; and Community Empowerment Block of 1% or 5,012.43 hectares, non-productive areas located adjacent to the settlement to be developed for community empowerment purposes (Chart 70). Inside the Aceh KPH IV, it is also noticeable as an area with diverse potentials marked by one of the richest species of forest, both in terms of flora and fauna. It has vast variety of non-timber forest products and indigenous species of wildlife Gibbons (*Symphalangus Syndactylus*), Malayan Sun Bear (*Helarctos Malayanus*), Small Indian civet (*Viverricula Indica*), Sumatran Tiger (*Panthera Tigris Sumatrae*), Hornbill (*Bucerotidae*), Sambar (*Cervus Unicolor*), Serow (*Capricornis Sumatraensis*), Sumatran Porcupine (*Hystrix Sumatrae*) and Sumatran elephant (*Elephas Maximus Sumatrae*).

**Chart 71: The extent of distribution of erosion hazard levels in KPH region IV in Aceh**

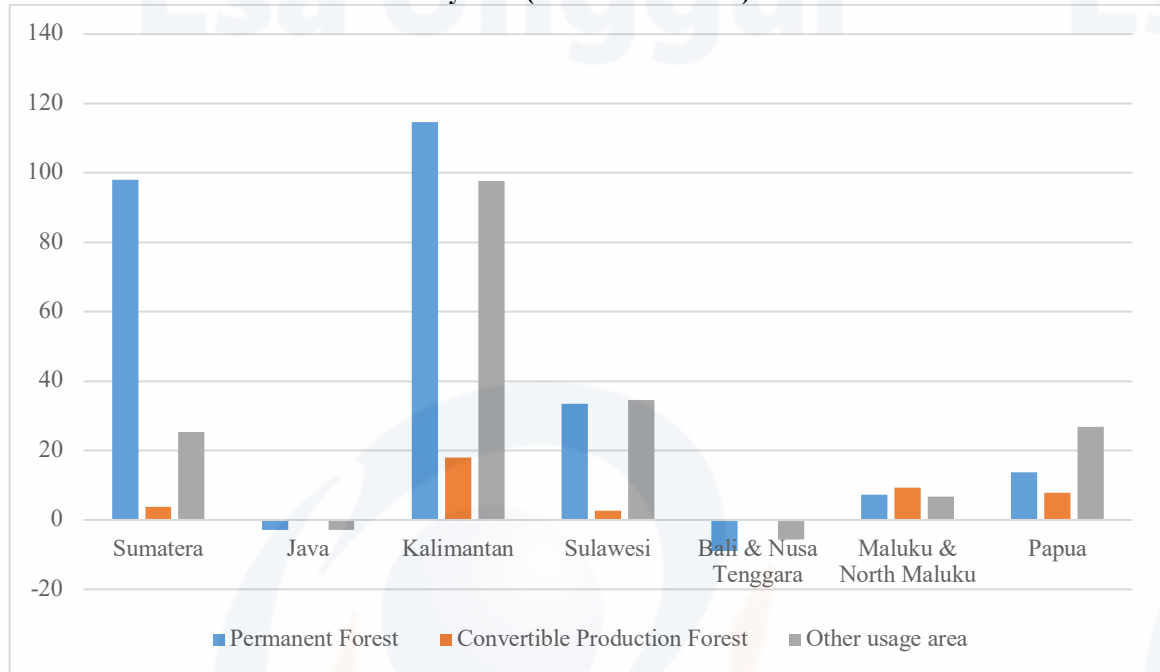


*Source: Forest Management Unit of Aceh*

However, environmental changes due to natural causes and also human activities have affected their ecosystem where 31% of land in KPH region IV has a very severe risk of erosion hazard and 36% has a severe risk, lower than the previous (Chart 71). Only 8% have mild risk while areas with moderate risk only possess 25%. This can affect the preservation of these animals as well as being a risk for the local community and workers. Furthermore, deforestation issue is related to the sensitivity of the community on environmental issues that are currently a hot topic worldwide, especially related to pollution and global warming. It is well known by the people that forests have become one of the 'cures' to deal with climate change. However, industrial and mining sectors require land clearing to begin their activities which are considered to be quite extensive in recent years and have an impact on the conversion of forest functions to a temporary 'barren' area which supposedly will be returned to become forest or used by local communities after the completion processes. As stated by the FAO, the definition of deforestation "is the conversion of forest to another land use or the long-term reduction of tree canopy cover below the 10% threshold. Deforestation can result from deliberate removal of forest cover for agriculture or urban development, or it can be an unintentional consequence of uncontrolled grazing (which can prevent the natural regeneration of young trees). The combined effect of grazing and fires can be a major cause of deforestation in dry areas. Deforestation implies the long-term, i.e., more than 10 years, or permanent loss of forest cover." Calculation of Indonesia's deforestation has been carried out periodically, starting from 1990 until the present. In each period, deforestation rates increase and also decrease, where it happens as a result of dynamic changes in land cover due to human activities in land utilization resulting in loss of forest cover. There are two terms being used for this topic, namely gross deforestation and net deforestation. Gross deforestation is defined as changing in land cover conditions from the category of forested land cover to become a category of non-forested land cover, while net deforestation is defined as gross deforestation reduced by the results of reforestation efforts. Deforestation rates

since the period of 2011-2017 are the results of net deforestation calculations that have considered reforestation activities. While the calculation in the previous period still uses gross deforestation, the 2014-2015 period shows that 30% of deforestation occurred in areas of forest and due to land fires.

**Chart 72: Deforestation in Indonesia by area (thousand hectares)**

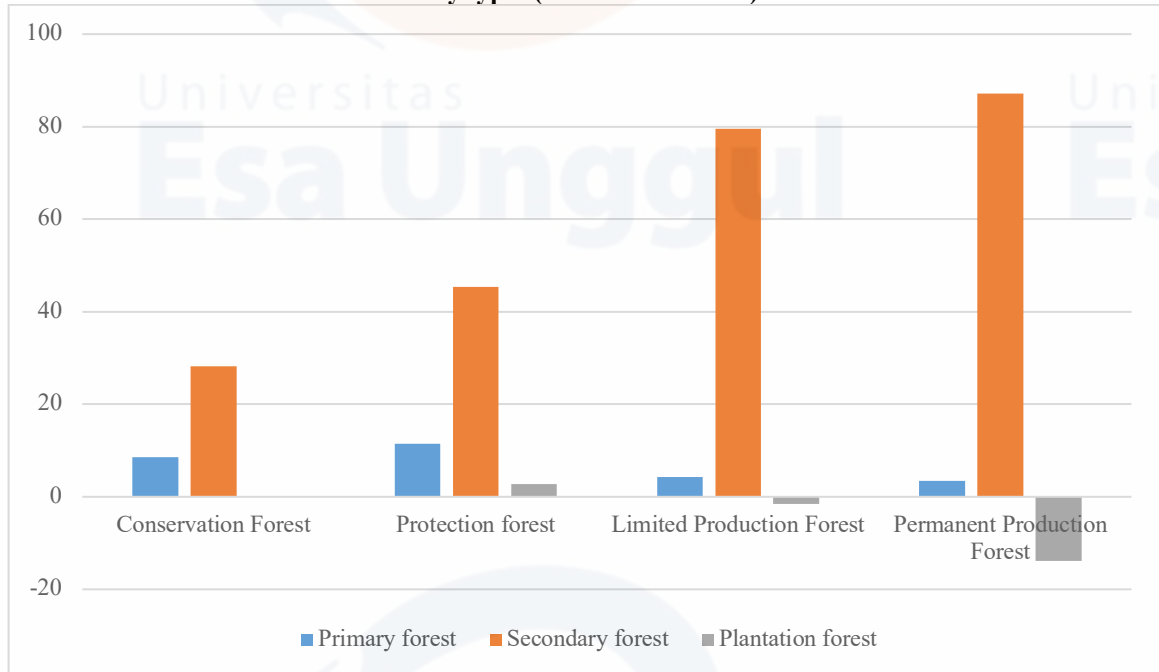


*Source: Ministry of Environment and Forestry of Indonesia*

The highest level of deforestation in Indonesia occurs on the island of Kalimantan, where permanent forest, a land that is officially part of the national forest zone and is under the authority of the Ministry of Forestry, is significantly reduced in the amount of 114,700 hectares due to the rise of land clearing activities for mining and plantations sectors (Chart 72). This term refers to land use, i.e., land of various forestry interests, in oppose to land cover. In addition, land cover for other usage areas on the island is also reduced by a considerable amount of 97,800 hectares, followed by a reduction in convertible production forest land area of 17,900 hectares, a type of forest located within the boundaries of a forest concession and managed to produce timber as well as reserved for development outside of the forest related activities. The island of Sumatra has the second largest rate of deforestation with a significant reduction in permanent forest of 98,000 hectares, although the amount of land reduction in other usage areas is small by ratio compared to permanent forest. The islands of Bali and Nusa Tenggara have the smallest rate of deforestation of negative 8,900 hectares for permanent forest and negative 5,600 hectares for other usage areas. Negative deforestation rate is also followed by the island of Java with negative 2,800 hectares of permanent forest area and negative 2,900 hectares for other usage areas. In total, there are 255.5 hectares of deforestation or 53.23% for permanent forest, 41.7 hectares or 8.69% for convertible production forest and 182.8 hectares or 38.08% for other usage areas.



**Chart 73: Deforestation in Indonesia by types (thousand hectares)**



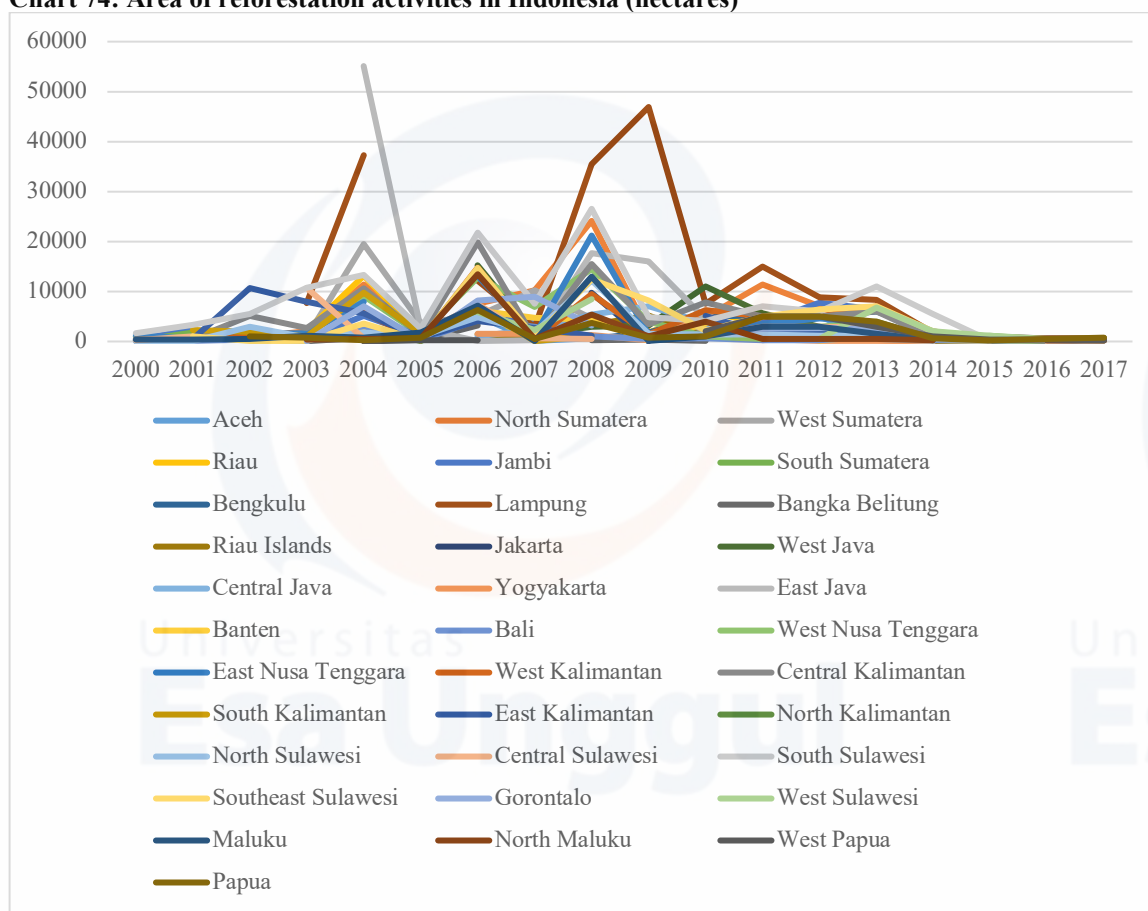
*Source: Ministry of Environment and Forestry of Indonesia*

For the level of deforestation by type, permanent production forest in the secondary forest category has the highest deforestation rate, which is 87,200 hectares followed by limited production forest with a secondary forest category of 79,500 hectares that is substantially a renewed forest as a result of human intervention, protection forest and conservation forest that is defined as “forest area designated primarily for conservation of biological diversity. Includes but is not limited to areas designated for biodiversity conservation within the protected areas” (ibid, p. 15) (Chart 73). The largest deforestation for the primary forest category was in the protection forest type of 11,500 hectares, a forest that has reached a later age and certain structural characteristics that are suitable for their maturity; and thus has unique ecological characteristics. In general, primary forests contain long-lived large trees, alternating with dead tree trunks that are still upright, stumps, and fallen wood. The numbers are followed by the conservation forest type of 8,600 hectares, which are designed for the protection of wildlife or their habitats and are usually located within national parks and other protected areas. However, the plantation forest category experienced a significant reduction in deforestation of minus 13,900 hectares for the permanent production forest type. The decline also occurred in plantation forests in the type of limited production forest. From this data, the further explanation of reforestation or forest rehabilitation that aims to restore critical forest areas in watershed areas that are carried out with the community in a participatory manner, while the determination of critical land refers to land that has been severely damaged due to loss of vegetation closure, resulting in loss or reduction of its function as water retention, erosion control, nutrient cycle, microclimate regulator, and carbon retention. Based on vegetation conditions, land conditions can be classified as very critical, critical, rather critical, critical potential, and normal conditions.

On the other hand, there are different perceptions regarding the definition of forests, according to the Green Peace as a Non-Governmental Organization (NGO) and the Indonesian government. The forest areas that can be transferred function more flexibly and easily by Forest Concession Company/*Perusahaan Hak Pengusahaan Hutan*

(HPH) as a business in the form of business entity or law that is engaged in the collection of forest products. The Forest Concession Rights itself is the right to cultivate forests within a forest area, which includes logging activities, regeneration, forest maintenance, processing and marketing of forest products in accordance with the work plan of forest exploitation according to applicable provisions and based on the principle of forest conservation and company principles (Central Bureau of Statistics of Indonesia). HPH can be given to State-Owned Enterprise (SOE)s/*Badan Usaha Milik Negara* (BUMN) and Private Owned Company, which meet certain requirements in accordance with the provisions stipulated by the Minister of Forestry. HPH is a forest concession right that focuses on logging as an industrial base material and for export purposes. The period of time to cultivate the forest is a maximum of 20 years but has the possibility to be extended.

**Chart 74: Area of reforestation activities in Indonesia (hectares)**



Source: Ministry of Environment and Forestry of Indonesia

In order to complete the efforts to improve governance of primary natural forests and peatlands to reduce emissions from deforestation and forest degradation, the government through Presidential Instruction Number 10 Year 2011 of Indonesia issued a policy to postpone the issuance of new licenses and to improve the governance of primary natural forests and peatlands. The Presidential Instruction is valid for two years and was last extended through Presidential Instruction Number 6 year 2017. However, there are several exceptions on the Indicative Map of Delay in Granting New Permits/*Peta Indikatif Penundaan Pemberian Ijin Baru* (PIPIB), such as the principle permit/*Ijin Prinsip* from the Minister of Forestry prior Presidential Instruction/*Instruksi Presiden* (Inpres) Number 10 Year 2011, vital national

development (e.g., geothermal, oil and gas, electricity and also land for food sovereignty programs that includes rice, sugar cane, corn, sago, and soybeans), extension of forest utilization permit and/or use of forest area that is still valid as well as ecosystem restoration. It is related to the decline in the number of reforestation activities in 2010 where previously there had been an increase in 2004 in Lampung of 37,250 hectares and East Java that has reached 55,106 hectares, while in 2009 the number of reforestation in Lampung has rose and reached 46,920 hectares. However, when calculated as a whole, the largest amount of reforestation occurred in 2004 with an area of 339,166 hectares and the smallest amount occurred in 2016 with an area of 7,067 hectares, with an average annual growth of 8.35%. Furthermore, one third of the land cleared by PKP2B and coal mining permit which is under the authority of the Minister has been reclaimed while the rest is active and supporting mining land (Tasrif, 2020).

#### **1.5.4 Complex, overlapping and unfair bureaucracy and regulations**

Several main problems and obstacles in business and economic activities in Indonesia, especially in the mining sector is the bureaucracy and regulations that are numerous and complex, along with poor inter-institutional coordination which makes the existing regulations become overlapping, as well as less comprehensive consideration that leads to unfair regulations for some parties. For this reason, the government adopted the Ease of Doing Business (EoDB) index to determine the response of businesses to, among other things, licensing, statutory regulations, government services, access to finance, and legal certainty. If described in detail, the problems that still cause the low rating of business ease are caused by several indicators such as the complexity of licensing in starting a business, rigid land acquisition, difficulty in getting access to finance, and the complexity of bankruptcy settlement. Not only do these indicators have low ratings, there has been a downgrade in 2020. Hence, serious efforts need to be made to improve the investment climate. Furthermore, the efficiency of bureaucracy in Indonesia is vital and needs an improvement, as illustrated in the Global Competitiveness Index (GCI) report of the World Economic Forum (2019) on the Institution's Pillars, regarding Burden of Government Regulation indicators in the Public Sector Performance sub-pillar that leads to inefficiency. This sub-pillar has decreased, both in terms of rank and score, where indicators show that regulations issued by the government are actually a burden. Whereas bureaucratic efficiency is the main capital to increase the confidence of foreign investors to invest in Indonesia.

The complexity and difficulty of investment in Indonesia has implications on the low competitiveness score compared to neighbouring countries, one of which can be seen from the licensing aspect. Furthermore, the complexity of investing and Indonesia's low competitiveness certainly underscore the need for corrective measures in various sectors to support the realization of ease of doing business in Indonesia. Another example of regulations that hamper or are unfair: e.g., the Domestic Market Obligation which does not follow prices sold to domestic but unilaterally determined by the government, i.e., not following the coal index. Problems arise with regulatory inconsistency, of both the regional and the central government different perceptions. The central government intends to clean up renters, therefore focusing only on remaining companies that are able and willing to carry out coal activities. Even though there are many problems of overlapping land and incomplete permits, yet the mining activities can continue by reason of insiders in the government and under-optimal

supervision. Such things happen due to differences of data from each different institution and sectoral ego that causes them to have conflicting policies and regulations due to minimal coordination activities that even collide with other existing regulations. In 2018, the government proposed the 6th Amendment Plan for the Government Regulation of the Republic of Indonesia Number 23 Year 2010 concerning the Implementation of Mineral and Coal Mining Business Activities with the aim of promoting a more hospitable investment climate by encouraging and creating fairness especially for companies holding the Coal Mining Concession Work Agreement/*Perjanjian Karya Pengusahaan Pertambangan Batubara (PKP2KB)* agreements. However, the proposed amendment has received many rejections due to its contrary to the Law Number 4 Year 2009 concerning concession areas of mineral and coal mining where the draft allows PKP2KB to expand concessions beyond the IUP provisions. In addition, it is indicated that the draft is prepared to facilitate contract extension and transition to IUPK. The amendment is also considered to prioritize coal businessmen over national interests. The law in its implementation is considered to cause many problems in coal management, where a number of regulations at the Ministry or Institution level are considered to collide with this law. Another thing that has led to many disputes is the authority of the Low-level Regional Government, i.e., Regent or Mayor, to grant mining permits. However, contrary to this, existing regulations at the regional level stipulate that mining permits can only be granted by the Provincial Government.

In addition, to further solve this issue, the government has also created a draft of Omnibus Law. It is a practice in the formulation of laws and regulations, which is mostly carried out in countries that adopt a Common Law or Anglo Saxon system such as in United States of America (USA), Canada, Britain, Philippines etc. The process is called Omnibus Legislating and the product is called Omnibus Bill. The word Omnibus derives from Latin which means everything. By using the Omnibus Law technique, problems in various laws can be resolved without having to revise various laws with substance related to licensing, and it is enough to only make a single new law amending articles in several existing laws. The Omnibus differs from most draft regulations in terms of the amount of material content covered, the number of articles regulated, i.e., size, and finally in terms of complexity, which covers almost all related material substances. It reflects an integration, codification of regulations whose ultimate goal is to make the application of these regulations effective. However, such legislation techniques in terms of theoretical and practical are still not common and well known in Indonesia, yet various techniques or methods of forming similar laws and regulations have been quite popular in Indonesia. Similar examples are the Regulatory Impact Assessment (RIA) and Rule, Opportunity, Capacity, Communication, Interest, Process, Ideology (ROCCIPI). Omnibus Law itself is a method for producing quality laws, not legal products and it is common in the formation of a law when there are norms in laws and regulations that are produced through legislation techniques that remove or change one norm and re-regulate it in a formed law. However, given the Omnibus Law's legislation technique is still rarely practiced in Indonesia, therefore in the drafting process of the Work Creation Bill to be formed, the existence of Academic Manuscript becomes highly important.

In recent updates, what has been passed is the mineral and coal mining Law Number 3 Year 2020, That is a different from the omnibus law, which is a change of Law Number 4 Year 2009, since it is considered to not support the current situation. Law number 3 itself was passed by the House of Representatives on 10 May 2020, wherein the government is then preparing implementing regulations through three draft

Government Regulations concerning the implementation of mining business activities, mining areas as well as guidance and supervision, including reclamation and mining operations in the implementation of mining business management. The Law still limits the maximum permit area for each mining commodity with an exploration period of 8 years for mineral mining and 7 years for coal mining. Furthermore, the Central Government can delegate the authority to grant licensing to the Provincial Governments with the provisions of statutory regulations through Article 35 Paragraph 4. On the other hand, the Omnibus Law concerns many other laws to simplify regulations due to massive amounts of 8,451 Central Government Regulations and 15,965 Local Regulations in Indonesia, which makes it exceptionally complex where the government finally takes the initiative. In details, related to coal mining, there are 1,238 permits, with 144 permits being the authority of the Central Government that consist of 67 Coal Mining Concession Work Agreement/*Perjanjian Karya Pengusahaan Pertambangan Batubara* (PKP2B) permits, 60 PMA permits, 7 IUP BUMN permits and 1,094 permits are the authority of the Provincial Government which is an IUP for Domestic Investment/*Penanaman Modal Dalam Negeri* (PMDN) (Tasrif, 2020).

As a related organization in this subject, PERHAPI has not yet discussed its general changes on Omnibus Law and prioritize focusing on the Mining Law foremost. The Omnibus Law Bill is divided into clusters, where only a few are related to mining which have been discussed and have been included in Law Number 3 Year 2020 in order to prevent conflict with the Omnibus law. There have been discussions several times with PERHAPI, but the members were surprised since a few days later the law was passed directly although previously discussion resulted on conclusion and had a further discussion in greater detail (Kasli, 2020). There have been no protests so far, however there are some people who oppose the law since it is considered to be more beneficial to the conglomerates, where contract of work or PKP2B is possible to be easily extended. Translations for this matter are divided into two different versions, whereas in the first version, it is allowed to be extended provided it does not violate existing provisions such as by paying royalty taxes, carrying out good mining practice, etc. The second version means that it cannot be extended, depending on the government's decision. If that happens, arbitration can be carried out in Singapore or the Hague, Netherlands, which will disturb the stability of the business and also reduce investor confidence (ibid). Although the development has received great support from business people, on the other hand, it has been responded negatively by the public, where workers have demonstrated to reject this agenda since it changes, removes and sets many new arrangements from previous related regulations. According to the Indonesian Forum for the Environment/*Wahana Lingkungan Hidup* (WALHI), in its development, the latest draft bill submitted by the President through the Coordinating Minister for the Economy, Minister of Finance, Minister of Manpower, Minister of Agrarian and Spatial Planning or Head of the National Land Agency, Minister of Law and Human Rights along with the Minister of Environment and Forestry to the House of Representatives were far worse than the previous draft. They assume that the bill was too capitalistic and did not defend the interest of people due to its neglected aspects of humanity and environmental protection. Specifically, WALHI's criticism (2020, p. 3-7) is aimed at things like the following:

1. The title of the bill does not represent the contents. Since technically, the naming in the title of this bill is not in accordance with the overall contents provided and considered to be potentially misleading the public opinion. Such issue is related to the protection and management of the environment which is not been regarded

as a priority compared to the Law Number 32 Year 2009, especially in Article 1 Paragraph 2 which puts forward systematic and integrated efforts in the prevention, use, control, maintenance, supervision and law enforcement in preserving functions the environment, before carrying out the operational activities.

2. The preparation of the bill does not involve all relevant parties, which disregarding environmental aspects can be seen in the absence of involvement of representatives from labor, environmental and other related organizations as well as youth and student groups in their preparation, contrary to the fairness expected by the community. This is based on the Press Release of the Coordinating Ministry for Economic Affairs regarding the academic draft drafting team and the Draft Bill conducted by the Joint Task Force led by the Chairperson of Chamber of Commerce and Industry/*Kamar Dagang dan Industri* (KADIN), with members coming from elements of Ministries/Institutions, Local Governments, Academics, as well as from KADIN itself, which is considered to be highly beneficial for business groups. Such fact is reinforced by the removal of several provisions of the Protection and Management of the Environment/*Perlindungan dan Pengelolaan Lingkungan Hidup* (PPLH) Law related to legal liability for forest and land that have been tested by the Indonesian Forest Concession Association/*Asosiasi Pengusahaan Hutan Indonesia* (APHI) and the Association of Indonesian Palm Oil Entrepreneurs/*Gabungan Pengusaha Kelapa Sawit Indonesia* (GAPKI) in the Constitutional Court in 2017. Furthermore, efforts to involve civil society organizations in the formation of this bill was only done after the Academic Paper and the Bill were submitted to the House of Representatives.
3. Secrecy and inaccessibility to the public, considering prior submitted to the House of Representatives, this document was circulated to the public without providing any clarity from the ministries regarding the validity of this draft. Afterward, the Coordinating Ministry for Politics, Law and Human Rights issued a letter stating that this draft was a classified information, which contradicts Article 5 Letter g of Law Number 12 Year 2011 concerning the Establishment of Legislative Regulations concerning the principle of openness which states that in the formation of legislation starting from planning, drafting, discussion, ratification or stipulation, and legislation are required to be transparent and open to public in order to accommodate the aspirations.
4. Elimination of some Environmental Permits, where the bill still emphasizes environmental protection by prohibiting mining using open mining patterns in protected forest areas including categorizing unauthorized use of forest areas as organized activities carried out in forest areas for plantations and/or mining without permission from the Central Government. However, simplification of regulations and obligations undertaken, particularly environmental impact analysis or Environmental Management Efforts - Environmental Monitoring Efforts (UKL-UPL) is to replace the Environmental Permit/*Izin Lingkungan* with an Environmental Agreement/*Persetujuan Lingkungan*, which has the definition of an Environmental Feasibility Decision or Statement of Environmental Management Capability. Such things deemed to be different from the protection and management of the environment Law where environmental impact analysis is not clearly regulated and detailed including no provision for pre-activity information, community engagement criteria and the objection process. Business actors who fulfil the business permit can carry out

part or all of the mineral and coal mining business activities, with the business licensing service using an electronically integrated licensing system managed by the Government. Nevertheless, the measure is dependent on the Government Regulations which are the full authority of the Central Government. As for activities that are not mandatory for environmental impact analysis, is carried out through a statement of the ability to manage the environment.

5. Blurring the norms of strict liability, that in principle, the regulation of absolute liability in the Bill remains regulated. However, when compared to article 88 of the protection and management of the environment Law, it appears that the company is not required to prove the element of error, where it is the plaintiff who becomes obligated to prove it, whether intentionally or negligently towards business actors whose actions, businesses and/or activities use, produce and/or manage the waste of hazardous and toxic materials/*bahan berbahaya dan beracun* (B3), and/or which pose serious threats to the environment. In addition, related to forest and land fires, based on Article 49 of the Forestry Law concerning the obligations of permit holders to be responsible for forest fires in their work areas, has been changed to the formulation of prevention and controlled effort of forest fires in their work areas. This change implies that the permit holder has weaker obligation and is no longer responsible for the fire accident, compared to the Law of the Republic of Indonesia Number 41 Year 1999 regarding Forestry.
6. Centralistic Control due to the attribution to environmental oversight as regulated by protection and management of the environment Law based on the Presidential Decree of the Republic of Indonesia Number 41 Year 2004 concerning the Licensing or Agreements in the Mining Sector Located in Forest Areas which separates the authority of the Central, Provincial, Regency or City Governments is removed. The provisions of Article 71 of the Protection And Management of the Environment Law give full oversight authority to the Central Government and can be delegated to local governments through the directive of Government Regulations. This type of centralistic supervision is considered to be ineffective due to the unknown characteristics of each different region as well as bureaucratic distance and oversight. Such issue is also related to the overlap between mining business activities and forest areas, spatial planning, business licensing or approvals, and/or land rights, where the settlement of this overlap according to Article 134 Paragraph 4 may be arranged by the Presidential Regulation.
7. Minimizing the Imposition of Administrative Sanctions, where the administrative sanctions variant in Article 76 Paragraph 2 of the protection and management of the environment Law is removed. Hence, the type of sanction will be administered by Government Regulations, by imposing administrative sanctions that only use the administrative fine schemes which replace the types of principal crimes that can be imposed on the corporation.
8. Eliminating Corporate Criminal Liability, in which this assumption occurs due to changes in all criminal provisions, where there is not a single crime that can be held liable without prior administrative sanction. This is contrary to Article 78 of the protection and management of the environment Law where the imposition of administrative sanctions does not exempt the person in charge of the business and/or activity from recovery and criminal responsibility. Hence, there should be no obligation to carry out administrative sanctions prior carrying out the criminal law enforcement process, in which criminal law enforcement

can only be done if the offender does not pay administrative fines. The Criminal Law regulates the imposition of additional crimes in Book One, Article 10, Point b of the Criminal Code/*Kitab Undang-undang Hukum Pidana* (KUHP) and Article 119 of the Number 32 Year 2009 concerning the Environmental Protection and Management, which can only be imposed if the basic criminal offense begins. The potential that occurs is criminal omission for corporations that damage the environment by only paying administrative fines and sacrificing their lower level staff and middle level management.

9. Removing the Environmental Administration Lawsuit Scheme, where the bill is also considered to minimize the space for public participation through justice. Article 93 of the protection and management of the environment Law granting the legal right to the public to correct or test the environmental permits and/or business permits through Administrative Judiciary/*Pengadilan Tata Usaha Negara* (PTUN) issued by the Government/Regional Government which is abolished.

Regarding the bureaucracy aspect, it cannot yet be proven that it is complicated, in relation to the law which regulates all licensing arrangements to be carried out by the central government. The main reasoning is to be more focused and controlled although further observation and analysis needs to be done in its implementation, since until recently its implementation instructions such as the Presidential Regulation, the Ministerial Decree and the Director General's Decree are not yet available. Generally, it will be available not earlier than 6-12 months, where the transition period is a confusing duration for all related parties and resulting in only a few activities related to permits to be issued while the rest eventually become pending or vacuum. PT Surya Makmur Indonesia (SMI) agrees more with such law because of their management's personal experiences in the past 10 years, the Local Government Laws (i.e., after 2009) give local government authority to issue licenses, especially at level two category (e.g., regency or city, in all fields), which result in confusion of licensing governance. In the mining sector, it is strongly felt that the leaders of level two are very generous in issuing permits with certain conditions, i.e., due to decentralization, in which they are evaluated and resulting in many produced permits, especially in the mining sector which is not in accordance with their designation and causes overlapping as well as companies that is not fulfilled the requirements in technical and financial capabilities. It is also very difficult for entrepreneurs since they have to follow the permit procedures from district to central level government. The development is still waiting for Presidential Decree and Ministerial Decree, which when referring to the previous licensing, require recommendations from the related Head of district, Regent, Governor and Minister. When the power of attorney is held by the Regent, only a letter of recommendation from the Head of district is needed, which unfortunately causes the management and supervision of mining activities to become chaotic. The highest IUP densities are located in Kalimantan, West Sumatra and Jambi, in the number of thousands. Afterward, the C&C regulation and requirements were made to resolve this problem, which was targeted to be completed within 5 years. At present, IUPs are automatically considered C&C due to the target having been accomplished. Qualification to require C&C status was made due to many inconsistencies from existing mining permits, especially related to taxation, royalties, reclamation, overlapping land and other obligations in mining. The district government is required to report all these matters to the provincial



government which carries out joint monitoring and evaluation with the central government.

Furthermore, in connection with the increasing number of negative issues in mining, President Joko Widodo announced a moratorium on mining permits in 2016 which complements the previous Circular Letter of the Minister of Energy and Mineral Resources Number 3.E/31/DJB/2009 concerning Licensing of Mineral and Coal Mining Prior to the Issuance of Government Regulations to Implement Law Number 4 Year 2009 concerning the Termination of Mining Permits Through the Director General of Mineral and Coal. It is seen as an effort to reduce land overlapping, small-scale mining which reduces the economic value of fragmented small parts of coal reserves and reduces land fires that generally occur due to land acquisition by burning methods that are considered to be fast and easy which unfortunately leads to haze disasters that also disturb neighboring countries. On the other hand, such a moratorium is considered to be effective to limit the amount of coal supply that can raise previously falling prices on global markets. Administratively, in 2014 the government created a One Map Policy to equalize all data and maps related to land use, one of which is utilized in the mining sector, due to land overlapping problems caused by unmatchable data on each institution that often occur. The environmental condition has already been considered to be worse since the responsibility of mining business permit holders to the environment was very minimal since in certain areas the number of permits was highly dense and overlapped. Another factor is the unbalanced number of supervisors compared to the volume that must be monitored, resulting in massive environmental damage in the region, where South Kalimantan is the most severely affected area (Setiawan, 2020a). Although a company has legally obtained the permit, in reality it cannot operate since the territory is also controlled by another party. Related to land use, synchronization between mines and plantations is needed. Mining companies that hold the permit are given mining priority in any area, yet the implementation is vastly different, especially when dealing with large plantation companies.

The new law was made to accommodate large mining companies that have expired permits, thus enabling them to extend for a maximum of 20 years for the first permit and an extension of two times where each duration is 10 years. Based on the results of discussions with legal experts from University of Indonesia, if there is a word written as "can be extended," it is assumed that there should be an obligation for its extension if there are no legal defects, such as in terms of security, environment, etc. (Kasli, 2020). If the government opens a mining business area and it will be auctioned, then the government will have to guarantee access to land, including issues of community approval, etc., to the buyers. Furthermore, if exploration has been carried out, it must guaranteed the continuation of the licensing process to the Production Operation/*Operasi Produksi* (OP) phase. BUMN must operate equal to private companies to get the maximum benefit, taking into account state revenues. To be fair, the contract period that runs out with a royalty of 13% for an extension to the next stage of the duration of the permit must have increased the percentage of royalty, since if in another scenario of being auctioned and resulting in a new owner, the amount of royalty will return to 13%. Moreover, if an auction is conducted, it will lead to higher costs and difficulties since in most cases, the owners are originated from foreign countries (Setiawan, 2020a). Foreign ownership as a percentage of its shares is reduce every five years, based on the 2009 Law. In

terms of revenue, the further the distance from the mining location to the location of the purchase, the smaller the royalty imposed, i.e., due to the percentage. The new law is quite responsive to the needs of employers and the certainty of licensing law although it will not satisfy all parties. There are still many technical and non-technical matters related to proposed regulations which sometimes lead to different interpretations at the level of implementers such as reclamation, where the provisions are 100% complete, yet the definition must be explained in more detail to avoid confusion. Reclamation and rehabilitation must be carried out by mining companies, at least two years prior to completion of mining activities based on the Mining Law Year 2009 on Plans and Budgets, that have been approved by the Provincial Mining Service. Reclamation guaranty funds must also be given to the government in the amount of IDR 60-70 million (2019US\$ 4.2-4.9 thousand)<sup>3</sup> per hectare based on Article 37 in the Government Regulation of the Republic of Indonesia Number 78 Year 2010 concerning the Reclamation and Post-Mining.

However, in its implementation, there are weaknesses in this related aspect of supervision and law enforcement. There are some IUP holders who do not put the reclamation guarantee fund (Apriando, 2017) and from the previous case, companies are able to delay and even stop mining activities when commodity prices fall. This causes IUP to remain active since it cannot be returned to the government if the requirements are not met. Moreover, it also happens since if the permit is revoked then the responsibility will shift to the government which will create additional work that takes up a lot of time and different procedures. Hence, it will be easier to wait until the permit expires by itself. On the other hand, companies can claim that reclamation is not necessary based on requests from the local community for water reservoirs or ponds. In practice, the benchmarks will differ from one location to another. Funds should be available for guidance programs, i.e., not only for supervision, to implement good mining practice. Such opinion arises due to past experience in which if guided and understood, the progress will be much better compared to being initially supervised and being left at the end, then usually everything will return to normal. Field supervision must still be carried out even with the utilization of an online system, where technology can be monitored using satellites, drones, etc., to avoid mistakes and to increase accuracy. Many great ideas have emerged and are being accommodated, yet there is always some lack of implementation in terms of both supporting facilities and personnel (Setiawan, 2020a). If it is fully centralized, the right capabilities of the central government is being questioned, where such problems are strongly related to the human resources factor (e.g., from the central to the lowest level of government) in terms of quality and quantity.

Furthermore, regarding the specified mineral and coal law, there are individuals or groups who contradict and submit a judicial review, since they feel that their interests or rights are legally disturbed, which does not officially represent PERHAPI. If the lawsuit is granted, intended regulation can be annulled or revised by the decision of the Constitutional Court/*Makhamah Konstitusi* (MK). Common practice shows that PERHAPI representatives are invited and present in these matters, although not officially. If the Constitutional Court desires to invite PERHAPI, the organization itself is ready and confident

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<sup>3</sup> Bank of Indonesia, Middle Transaction Rate/*Kurs Transaksi Tengah*, USD 1 = IDR 14,146.33, [www.bi.go.id](http://www.bi.go.id), (2019).

since they have expert members in mining operations and mining law (Kasli, 2020).

### 1.5.5 Tax and obligation evasion

Indonesia's tax revenue from mining is 7.2% of national GDP, where coal accounts for one-fourth of the amount (BPS, 2017). Tax revenue from the mining industry consists of corporate income tax, withholding tax, value-added tax and import duties for mining related equipment. For non-tax revenue, it consist of land rent and royalties, where the latest is the largest source of revenue from mining for the government (Lubis, 2017) with a calculation based on a percentage of gross sales or revenue of 2% - 7% based on the Government Regulation Number 9 Year 2012 concerning the Types and Rates of Non-Tax State Revenues Applicable to the Ministry of Energy and Mineral Resources that depends on its calorific value and types of mining (e.g., open pit or underground). Furthermore, around 80% of the Non-Tax National Income in the mineral and coal sub-sector comes from the coal mining industry (Tasrif, 2020).

**Table 9: Royalty Rates Based on Government Regulation Number 81 Year 2019**

No.	Commodity	Unit	Rates & Charges
1	Coal (open pit) with calorie level (kkal/kg, GAR)		
a	≤ 4.700	Per ton	3% of the sales price
b	> 4.700 - 5.700	Per ton	5% of the sales price
c	> 5.700	Per ton	7% of the sales price
2	Coal (underground) with calorie level (kkal/kg, GAR)		
a	≤ 4.700	Per ton	2% of the sales price
b	> 4.700 - 5.700	Per ton	4% of the sales price
c	> 5.700	Per ton	6% of the sales price
3	Peat	Per ton	3% of the sales price
4	Asphalt rock	Per ton	4% of the sales price

*Source: Ministry of Energy and Mineral Resources of Indonesia*

For royalty itself, there are proposed different rates for each grade, such as 7% for low grade, 9% for medium grade and 13.5% for high grade (Wulandari, 2015), for the reason that government want to increase revenues from royalty due to insignificant income based on the target for the mining category (Amelia, 2017). However, the latest Government Regulation Number 81 Year 2019 concerning the Types and Rates of Non-Tax State Revenues Applicable to the Ministry of Energy and Mineral Resources has a different percentage of royalty based on the number of calories, type of mining (e.g., open pit/underground) and type of commodity (e.g., common coal, peat or asphalt rock) (Table 9). In addition, Publish What You Pay (PWYP) Indonesia issued a report that the potential revenue loss from mining land rent as a whole, i.e., not just

for coal, was around IDR 931 billion (US\$ 98.8 million)<sup>4</sup> during 2010-2013. In addition, there were differences in the definition of non-payment of taxes from the ministry of energy and mineral resources which defines it as disputed and the ministry of finance which defines it as debt, since there is a plan to change the VAT rules for mining work contracts (Lingga, 2016). Whereas with regard to rents, Government Regulation Number 55 Year 2005 concerning the Balancing Fund confirms that the percentage of rents from production outputs is 13.5%, where there is a change in the government's perspective of coal which is considered to be a significant portion of state revenue. Arrangements related to land rents are also found in the Government Regulation Number 9 Year 2012 of US\$ 2 per hectare per year for the exploration phase and US\$ 4 per hectare per year for the production operation stage.

Revenues from these two different sources are divided between levels of government based on the Law Number 33 Year 2004 concerning the Financial Balance between the Central Government and Regional Government which is an amendment to the Law Number 25 Year 1999 and the Government Regulation Number 55 Year 2005 related to the income distribution from coal mining. The regional government receives an 80% revenue share, excluding oil and gas. Of this amount, the district government gets 64% and the provincial government gets 16%. As for land rents, the entire income is given to the district government, in contrast to the royalties which are also shared with other districts. Moreover, mineral and coal mining sector have only contribute 3.9% of the tax ratio in 2016, where the national tax ratio in the same year was 10.4% (Amalia, 2020). The low tax ratio cannot be separated from the problem of tax avoidance by coal industry players. Tax avoidance is a practice that utilizes legal loopholes and weaknesses of the existing taxation system. However, although it does not violate the law, it is deemed to be morally unjustified. It is worth to be noted that the number of taxpayers/*Wajib Pajak* (WP) which have mineral mining and coal mining business permits have a higher percentage of unreported annual tax return than those who declare to the Ministry of Finance of Indonesia. For example, in 2015, from 8,003 taxpayers of the coal industry there were more than half or 4,532 people who prefer to not report their tax returns (ibid). Moreover, such figures also exclude small-scale coal mining owners who do not officially registered as taxpayers. It should be noted that among taxpayers who report their Annual Notification Letter/*Surat Pemberitahuan Tahunan* (SPT) there is the potential of altering reports that differs from the realities. Many also report their tax returns with the intent to do tax avoidance and tax savings such as aggressive tax planning, corporate inversion, profit shifting and transfer mispricing. Tax evasion conducted by mining companies such as by depositing money from mining profits in tax haven countries to avoid taxes can be regarded as legal due to loopholes in the existing rules.

The Ministry of Finance of Indonesia defines the tax ratio as a comparison or percentage of tax revenue to GDP, which is also one indicator to assess the performance of tax revenue. The tax ratio measures the ability of the government to collect taxes from the total economy, in the sense of total GDP. Thus, the size of the tax ratio shows how capable the government is to finance needs that are the responsibility of the state. If the tax ratio is considered to be low, subsequently a nation will not be able plan and execute many programs. On the contrary, with high tax ratio, it opens the possibility to implement various matters through the National Revenue and Expenditure Budget/*Anggaran Pendapatan dan Belanja Negara* (APBN). In narrow definition, it is purely considered as tax such as income tax, value added tax,

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<sup>4</sup> Bank of Indonesia, Middle Transaction Rate/*Kurs Transaksi Tengah*, USD 1 = IDR 9,423.95, [www.bi.go.id](http://www.bi.go.id), (2010-2013).

import duty and excise. In a more comprehensive way recommended by the OECD, it also includes natural resource royalties. In Indonesian APBN, revenues from royalties are included in PNBPN where it consists of royalties from oil and gas as well as royalties from general mining as a component of the tax ratio.

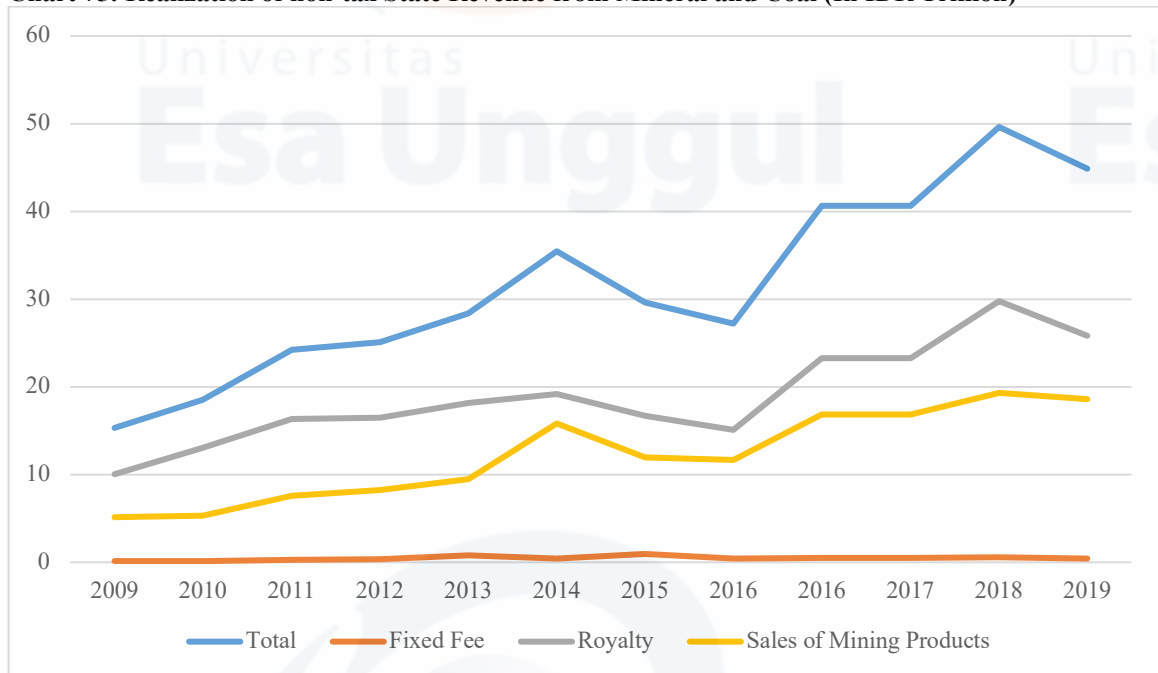
**Table 10: Percentage of General Mining's Profit Sharing Fund based on Government Regulation Number 55 Year 2005**

No.	Revenue	Central	Province	Producing District/City	Other Districts/Cities Within the Province	Total
<b>I</b>	<b>Mining Business Permit (IUP)</b>					
1	Producing District/City					
a	Fixed Fee	20%	16%	64%		100%
b	Production Fee	20%	16%	32%	32%	100%
2	Province as a producing region					
a	Fixed Fee	20%	80%			100%
b	Production Fee	20%	26%		54%	100%
<b>II</b>	<b>Contract of Work</b>					
a	Fixed Fee	20%	16%	64%		100%
b	Production Fee	20%	16%	32%	32%	100%
<b>III</b>	<b>Coal Mining Work Agreement</b>					
a	Fixed Fee	20%	16%	32%	32%	100%
b	Production Fee					
1	Royalty (3%-7%)	20%	16%	32%	32%	100%
2	Sales of Mining Products (3%-7%)	100%				100%

*Source: Ministry of Energy and Mineral Resources of Indonesia*

Revenue from general mining is also distributed to various regions and levels such as central, province, producing district/city and other districts/cities within province according to their respective portions that have been determined. Such formula was created to ensure the equality of income distribution and to ensure that there are no regions with poor natural resources and left far behind compared to other regions that are rich in these resources. In addition, the categories of revenue through IUP, contract of work and coal mining work agreements also affect and differentiate the received percentage (Table 10).

**Chart 75: Realization of non-tax State Revenue from Mineral and Coal (In IDR Trillion)**



Source: Ministry of Energy and Mineral Resources of Indonesia

Revenue for the state from mineral and coal mining in general continues to increase annually. The amount is divided into categories of non-tax, fixed fee, royalty and sales of mining products. The highest figure is in royalty revenue with a peak in 2018 of IDR 29.77 trillion (US\$ 2.09 trillion)<sup>5</sup>. On the other hand, fixed fee revenue has the lowest amount due to its inflexibility with adjustments to the amount of production (Chart 75). In relation to the state revenue, there is the potential for illicit finance originating from coal commodity export activities that are not in accordance with what was reported in which it can be considered an illicit financial outflow. Global Financial Integrity (GFI) in 2017 stated that illicit financial flows are a massive practice in the world economy, especially in developing countries such as Indonesia. This has contributed to weak economic growth and legal trade as well as the loss of potential government resources, one of which is natural resources, which can be invested in society (e.g., health, education and infrastructure). In total for the period between 2005 and 2014, illicit financial flows ranged from 14.1% to 24.0% of total trade in developing countries. From time to time, this value continues to increase with an average of ranging from 8.5% to 10.1% per year (Ningrum et al., 2019, p. 3). In Indonesia, the problem of illicit financial flows is very important to be resolved immediately since the nation is moving towards the stages of becoming a developed country. One of the prerequisites is the ability to carry out tax governance reforms and to significantly increase the ratio of taxes to GDP in line with the average OECD member countries. During the period 1989 to 2017, illicit financial flows into and out of the six leading export commodities (i.e., coal, palm oil, rubber, shrimps, copper and coffee) reached US\$ 142.03 billion, which means that each year the value reaches US\$ 5.07 billion. Palm oil was the commodity with the highest gross illicit financial flows, reaching US\$ 49.16 billion followed by coal commodities reaching US\$ 42.93 billion during the period 1989 to 2017 (ibid, p. 22). During this period, Indonesia lost US\$

<sup>5</sup> Bank of Indonesia, Middle Transaction Rate/*Kurs Transaksi Tengah*, USD 1 = IDR 14,246.43, [www.bi.go.id](http://www.bi.go.id), (2018).

19.65 billions or 23.4% of exports from only coal commodities, that leads to the average annual illicit financial outflow of more than US\$ 677 million (ibid, p. 23).

Such practice in the Indonesian coal mining industry shows tax avoidance as an effort to minimize tax obligations by utilizing opportunities or loopholes without violating tax laws and also a part of tax planning which is different from tax evasion, where such action is carried out by taxpayer to reduce the amount of owed tax or by not pay taxes at all through illegal means. Such a phenomenon raises a big question considering that there are already many regulations that supervise strictly starting from operating permits to the distribution of profits from coal sales. Low tax revenue from the coal sector is also caused by the weak capacity of the tax authorities in examining taxpayers which lead to various allegations of tax avoidance or tax disputes submitted by the tax authorities that leads to many losses in the tax court. Of the various taxation issues in Indonesia, fundamental reforms need to be immediately carried out both in terms of regulation, institutions and apparatus capacity building. As prevention from such negativity, mining companies are required to implement financial aspects in accordance with the approval of the Annual Work Plan and Budget/*Rancangan Kerja dan Anggaran Belanja* (RKAB) which consists of budget planning and realization, investment and financing sources, compensation of information data, payment of 10% of net profits for mining permit holders, guarantees of the seriousness of mining activities, and payment of PNBP which includes services for providing mineral and coal data information systems, fixed fees, production fees or royalties and coal proceeds. Afterwards, it is also required to prepare financial statements in accordance with the financial accounting standards, apply the principles of fairness and custom in financial transactions, apply risk management and internal control systems, and submit financial statements that have been audited by public accountants in accordance with statutory provisions. Specifically for production royalties or funds from the sale of coal, it is required to make a full deposit in advance prior to the sales of the mineral or coal mining commodity.

The Ministry of Energy and Mineral Resources encourages transparency in the management of natural resources through the Electronic Mineral and Coal Non-Tax National Income System/*Sistem Elektronik Pendapatan Nasional Bukan Pajak Mineral dan Batubara* (ePNBP Minerba), which was built to monitor mineral and coal production and sales activities that are integrated with PNBP and Minerba Online Monitoring System (MOMS) payment obligations as an application to record and facilitate supervision conducted by both the Central Government and the Provincial Governments in controlling and supervising mineral and coal mining activities, to encourage state revenues, especially related to royalties, which are more optimal if following the technological developments and conveniences in the digital system. Target of mineral and coal revenues in 2019 is IDR 43.2 trillion (2019US\$ 3.05 billion) with the possibility of realization of more than IDR 50 trillion (2019US\$ 3.5 billion) (Sulmaihati and Tobing, 2019). It is related to the principles of openness, accountability, responsibility and fairness to the extent of the people's prosperity for the governance of the mining of energy and mineral resources as mandated by Chapter 14, Article 33 of the Constitution of the Republic of Indonesia Year 1945/*Undang-undang Dasar* (UUD) *Republik Indonesia Tahun 1945*. Latest data shows that companies which have 100% licensing authority in the Central Government have utilized the MOMS and e-PNBP systems, while those whose authority is in the Regional Government have not reached 100%, i.e., only 40%, where revenue from mining is expected to return to the producing regions by 80% (Ministry of Energy and Mineral Resources of Indonesia, 2019). The government also asked mining inspectors

in the regions to proactively assist the Regional Government, namely the Governors and Regents to encourage companies to carry out their obligations. By implementing this system accordingly, the government is able to do online monitoring on companies' without having to physically visit them and capable on concentrating to produce a more accurate and verified calculation of company obligations in which will reduce the possibility of underpayment of PNBPN that are no longer based on physical reports from company submissions. It can be simplified into the term of 'controlling versus reporting' which is generally faster and more precise in accordance with existing regulations. Through this system, reporting, recapitulation and evaluation of mineral and coal production and sales achievements are no longer done manually with a monthly period and will be easier for companies to prepare data and report company performance to the government. Data on mining, coal processing, refining and sales of mineral and coal production are also integrated with reserves. Conversely, if they do not comply with the regulation, the company will not get a Verification Report/*Laporan Hasil Verifikasi* (LHV) from the conveyor that will result in the inability or prevention to export.

In addition, the Ministry of Energy and Mineral Resources through the Directorate General of Mineral and Coal has also released the Sales Verification Module/*Modul Verifikasi Penjualan* (MVP) application, which is intended to improve the supervision of mining activities, especially coal marketing, due to many companies that do not reporting their production and sales data regularly through the Minerba Online Monitoring System. In addition, there is still a risk of companies doing violations related to production and sales, where one example is a company whose produced commodity is unknown in origin, yet is able to sell their products without having a RKAB validated document. The application, which was completed in June 2019, will select companies that do not complete the requirements according to the rules in which they will not be able to conduct transactions. Production in the field may be possible although without the possibility to sell the resulting products. It was also made in response to assessments from the Indonesian Corruption Eradication Commission/*Komisi Pemberantasan Korupsi* (KPK), the Supreme Audit Board/*Badan Pemeriksa Keuangan* (BPK), and also the Indonesia Corruption Watch (ICW), which assessed that supervision of coal sales was still not optimal. There are coal sales activities that are not in accordance with regulations and lead to the potential loss of state revenue. This MVP will complement three other existing applications and integrate with each other, namely MOMS, Minerba One Data Indonesia (MODI) and e-PNBPN. On the other hand, regarding income related to the mining industry has been carried out by the forestry service concerning the lease-to-use forest area and to survey the area of the prospective mining area. The main task is to conduct field reviews and surveys to collect data related to bio-geophysical conditions in general, including to see the condition of land cover. Related to some trees that will be affected, there are obligations such as paying the intrinsic value of the tree that will be lost due to logging that must be deposited to the country through the Forest Resource Deposit/*Penyetoran Sumber Daya Hutan* (PSDH) and Reforestation Fund/*Dana Reboisasi* (DR) or PNBPN that exist where the forestry service conduct the research and makes inventories along with the appropriate amount of fund to be deposited and paid. The permit is issued by the Minister and when it is granted in an industrial forest, open pit operations can be carried out while for activities in protected forests, is possible to be done through closed-pit operations.



### 1.5.6 Corruption

There are interests from actors in the oil and gas industry that make Indonesia continue to depend on these energy sources. For example, processing for oil and gas can be done locally but is hampered due to the importance of profits from fossil fuel trade and import that has been done and investigated thus far (Kasli, 2019). Mafia in the mining industry has become the main concern of the KPK, where it has been a common knowledge that coal mining is also closely related to politics in Indonesia since the profits are also used for funding election campaigns. Such things happened due to the expensive cost of election processes in Indonesia which makes candidates for head of government at the regional and national levels require an abundance amount of money to meet those needs. Subsequently, this causes them to provide a lot of mining permits to increase regional income which could be one of their achievements in the campaign topics for debate as well as to receive assistance from mining companies as their sponsor (Faisal, 2015). On the other hand, many people assume that the distribution of profits from coal mining activities has a broad reach out to almost everyone in the society and every aspect of life. In order not to be trapped in administrative and regulatory difficulties by government officials or politicians, it is common for companies to participate in indirectly supporting politicians who are in the process of gaining power and when campaigning, especially for candidates who are politically strong and have the potential to win the election. Such act is also known as political investment, with analysis that is carried out to see the map of local political power where the company is located, to make sure that capital distribution and investment can be carried out effectively.

Furthermore, illegal coal mining is considered to commonly occur in Indonesia, although various policies have been done to overcome such problems. Areas that have a lot of illegal mining are spread in both Sumatra and Kalimantan, although there is no definite data regarding the number of illegal mines. However, based on a report from the Indonesian Coal Mining Association, it shows that there are around 20 to 70 million tons of illegal coal being produced per year, including 10,000 to 35,000 illegal workers on such activities. This can be rampant due to the lack of supervision along with corruption, collusion and nepotism that take place in which eventually omission happened and bring various negative impacts such as uncontrolled environmental pollution, deforestation, unpaid royalties and unhealthy price competition that affects coal trading at the local, national and international levels. Insufficient number of officers is also a major problem where the recruitment process, available budgets, and long bureaucratic processes are some of the main obstacles that hinder the eradication of illegal mining. Illegal mining areas are also difficult to reach since infrastructure is not in accordance with existing standards and workers choose to mine with poor facilities and with high risk of accidents that may endanger officers who are in the location for supervising purposes. However, there are significant efforts by the Indonesian government to address these matters, including tightening monitoring of port activities, procedures for documentation of freight forwarding that are more integrated and the construction of fourteen state-owned ports in Sumatra and Kalimantan. Action taken to reduce this can also be applied to other types of mining such as iron, copper, aluminium, gold, silver, etc.

The large profits from the mining industry encourage many parties to be able to carry out mining activities. Due to the complicated licensing, especially related to social, safety and health aspects, there are those who choose to do it illegally due to faster processes and greater profits without the need to pay taxes, royalties and other

costs in general. Mining activities are categorized as illegal if they are carried out outside the mining permit area or within expired, temporarily or permanently closed designated locations. Within a year there were estimated to be around 50-80 million tons of coal from the results of illegal mining (Coaltrans, 2014). In addition, there are also categories of semi-legal mining where miners who already obtain permits operate in areas that should not be designated for such activities, for instance protected forests and conservation forests. Other semi-legal activities are the transportation of coal via unauthorized roads, ports and waterways along with reporting of production results that are lower than what actually happened. Such acts result in reduced or loss of potential revenue and benefits for the government and the local community. Thus, weak supervision and differences in data have become a loophole for illegal mining actors to carry out their operations outside the applicable regulations. Corruption can occur due to difficulties in managing matters related to mining as well as opportunities to make it easier through under-the-table fees along with poor supervision. The KPK has focused its investigation and prevention of corrupt practices on mining licensing, hence corruption activities has shifted to supporting sectors such as transportation, where one indication shows that mining company may provide payments to inspection officers on trucks, barges or vessels to simplify and speed up the process which makes lead time to be shorter and more efficient. In addition, there are differences in spatial data from actual mining permits and operations, especially those conducted in protected and conservation forest areas. This is prohibited in accordance with the Law Number 41 Year 1999 on Forestry Affairs, except for underground mining with further provisions. In 2014, the KPK informed that 6.3 million hectares of mining permits were in those prohibited areas, of which 940,000 hectares or 15% were coal mining areas. (PWYP Indonesia, 2017, p. 15-16)

### **1.5.7 Price sensitivity**

Sensitivity to coal prices is one of the obstacles in the coal industry, which will affect the mining company's commitment to using ports built by the government, specifically for coal mining activities. The US Dollar exchange rate is not overly influential for coal with high calorific value. Selling value in the domestic market is in accordance with international coal prices, although there is a system that is not always effective immediately. Statistically, current fuel costs for mines with a high stripping ratio are considered to be expensive, yet as high as the price of coal itself and the profit that it could make. The coal index in Indonesia is still modest compared to the coal index in Australia or Japan. For exports from Indonesia to foreign countries, it is common to use the Newcastle Australia index with a difference of 3% depending on the conditions of each coal market. The dynamics of the global coal market also affect prices and mining activities at the national level, especially China and India as the main buyers of Indonesia's coal. In 2015 and 2016, the biggest decline in coal prices resulted in nearly 80% of mining companies in Indonesia to stop their production due to higher costs compared to selling prices (Indonesia Investments, 2015), according to the Indonesian Coal Mining Association. It is true, especially in the province of South Sumatra where many mining companies have long-term contracts and operational costs that tend to be higher than average. Low coal prices on the global market occur since China has reduced coal imports due to pollution issues and trade wars with the USA, which affected the production capacity of factories in China (Kasli, 2019). Hence, it caused a reduction in the demand of Indonesian coal and the ongoing production that is proven to be quite difficult to stop or reduce and simply caused

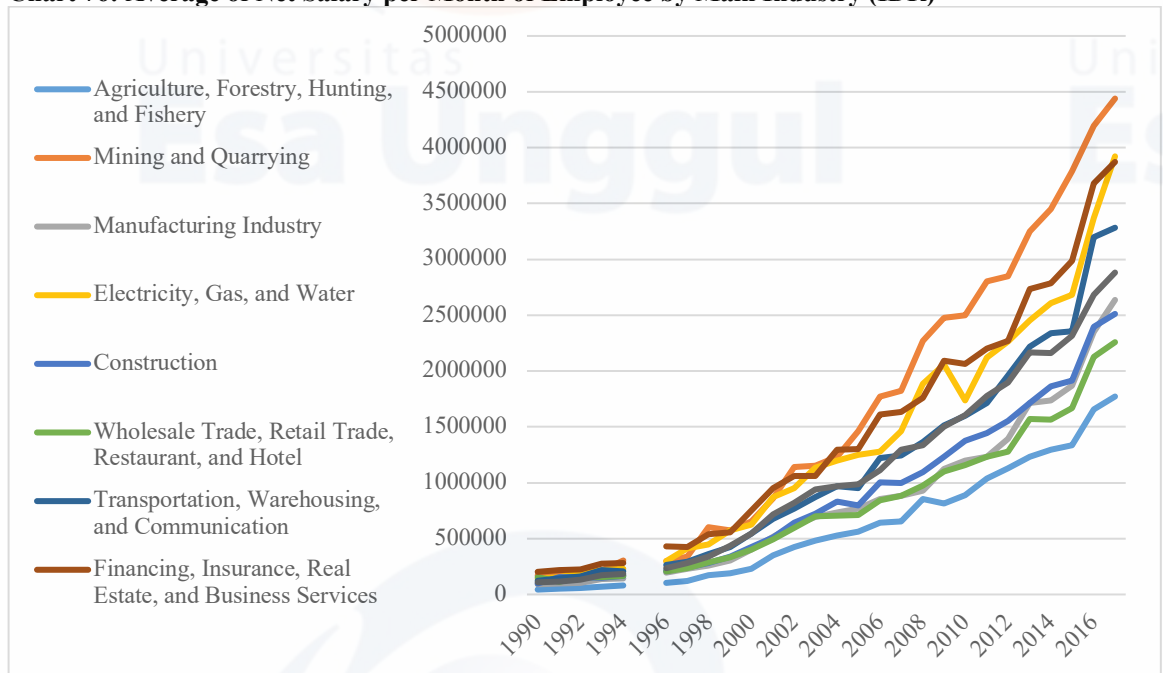
oversupply. In addition to that, India is an alternative market for Indonesian coal. However, due to the low coal prices, the demand has changed from low to high calories in which low-calorie coal production in Aceh was hit (ibid). Machine specifications for the power plant can be changed to receive higher calories by using the mix of low and high calorie with the coal blending process. The decline in coal prices have made mining companies' market capitalization to be decreased by around 75% from 2010 to 2015 that were listed on the stock exchange. Subsequently, a positive indication appeared in 2016 which is in line with the increase of coal prices in the percentage of 105% (Atteridge et al., 2018, p. 23). Generally, there are no clear signs that there will be a sustainable demand for coal in the future (PWC, 2017).

Domestically, coal prices are determined by Ministry Regulation Number 7 Year 2017 related to mineral and coal price benchmarks. However, even though domestic prices are considered to be low and have a large difference with overseas prices such as in 2018 where domestic prices are only US\$ 70/ton, companies cannot directly move to international markets at US\$ 100/ton prices since they are bound by contracts, especially for a long-term duration. Another factor which is quite significant in influencing costs is land acquisition and diesel. The latest is a vital requirement for mining operations with routine and greater purchases in accordance with the increasing amount of production, including changes in global and domestic oil prices. This has led to alteration in the mining system from diesel to direct electricity supply from PLN or batteries for the operational vehicles. In addition, the price of electricity from coal is indeed considerably low compared to other energy sources, yet contradictory opinions state that such things happen due to excluded environmental and social costs. Alternative energy from other mining sources besides coal is natural gas, which in its development has been widely used for vehicles, besides electricity generation due to cheaper costs which makes it not easily affected by global price fluctuations. Pollution impact for this source of energy is extremely low compared to other fossil fuels. Other countries also have a higher acceptance with natural gas compared to oil and coal therefore it has enough potential for the export market. Hence, to reduce the risk of price volatility and costs, mining companies can carry out a systematic risk management process, while preparing a reserve fund of sufficient profits as a precaution. If presented risks cannot be handled, then a risk transfer strategy could be implemented until the risk that is predicted to occur is reduced to a minimum, in which could be controlled by the company (i.e., become a risk appetite).

### **1.5.8 Horizontal conflicts**

The possibility of conflicts arising from natural resources is elaborated with the looting and grievance mechanism (Collier and Hoeffler, 2004). The grievance model refers to the condition where the coal mining activities destroy the environment, create social disruptions by labour migration, especially worker on high-level technical aspect that comes from a more developed area which leads to inadequate job opportunities due to the lack of human resources quality in the local area and also insufficient compensation for the land expropriation.

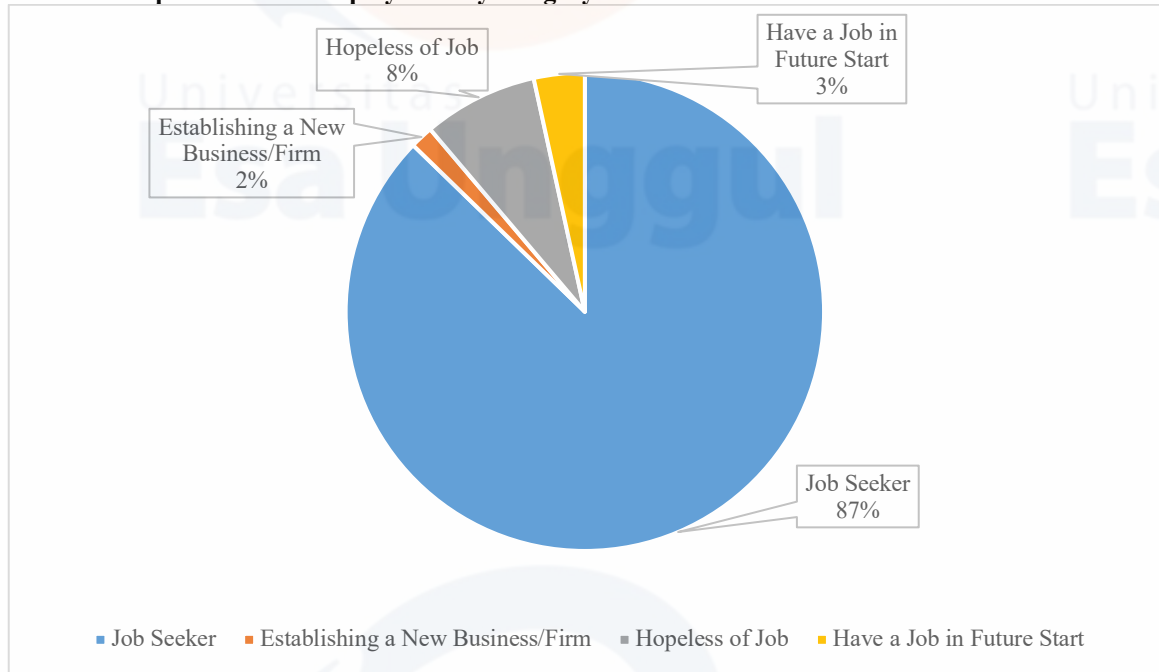
**Chart 76: Average of Net Salary per Month of Employee by Main Industry (IDR)**



Source: Central Bureau of Statistics of Indonesia

In addition, the difference in average net salary per month is also an initial factor of social jealousy which eventually triggers conflict. According to the presented data, the biggest salary is located in the mining and quarrying sector. However, the biggest growth was in the agriculture, forestry, hunting and fishery sectors of 3,990% with annual average growth of 15.34% from 1990 to 2017. It was due to the ease and abundance of these resources which led to community focus, especially in the regions with better utilization of such sectors. The mining and quarrying sector only had growth of 2,489% with average annual growth of 13.33% that was in the 6th largest position in its growth, in addition to the sectors mentioned earlier, after manufacturing Industry; electricity, gas, and water; transportation, warehousing, and communication as well as community, social, and personal services, but still above financing, insurance, real estate, and business services; construction and wholesale trade, retail trade, restaurant and hotel (Chart 76). In addition, Article 106 of Law Number 3 Year 2020 requires the priority of local labour, including domestic goods and services, to avoid friction between the community and workers, including suppliers and distributors.

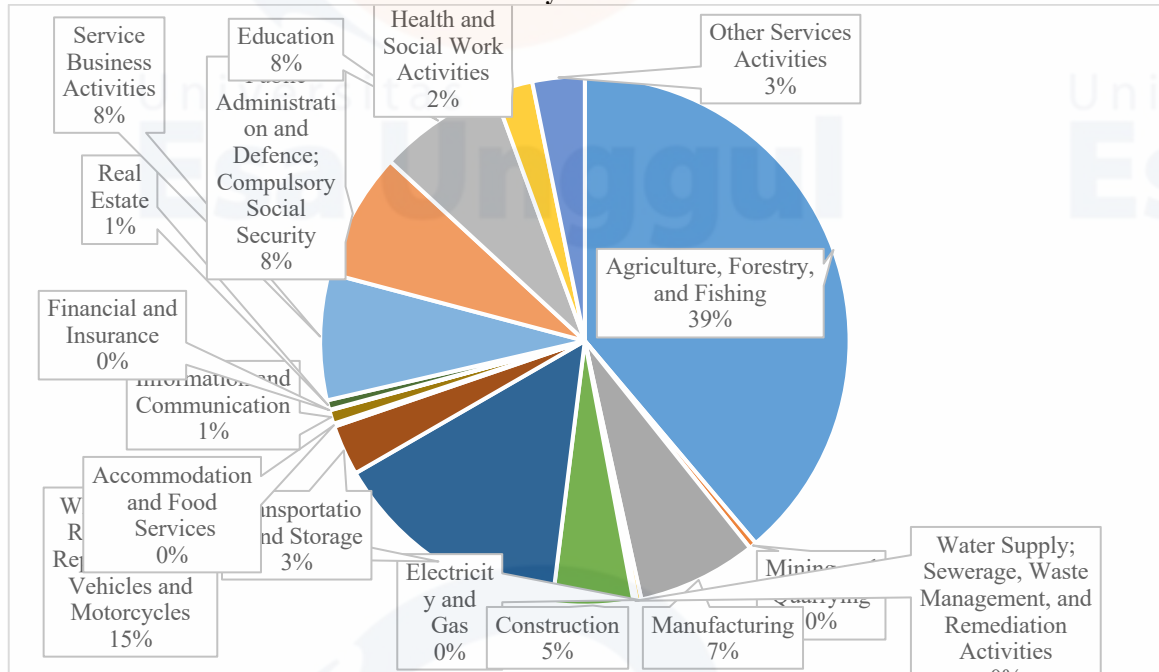
**Chart 77: Population of unemployment by category in Aceh in 2019**



*Source: Central Bureau of Statistics of Indonesia*

Another factor triggering horizontal conflict is the high unemployment rate in Aceh by 2% compared to other regions in Indonesia. In detail of unemployment statistics, 87% or 118,732 people of the unemployed are job seekers while 8% or 10,549 people are already hopeless of jobs. Other categories are employment because they have a job in the future starting at 3% or 4,678 people and because establishing a new business or firm at 2% or 2,117 people (Chart 77). In addition, conflicts can also occur between mine employees, where the unit leader must be skilled at carrying out the management role in the interpersonal role aspects, particularly as a figurehead, leader and liaison. Hence, neutrality is a must. Conflicted employees must be invited to dialogue to find the root of the problem and identify the best solution. Subsequently, a written agreement needs to be made to not prolong the current conflict as well as to prevent another one, since it will affect personal and company's performance in general.

**Chart 78: Number of workers based on industry in Aceh in 2019**



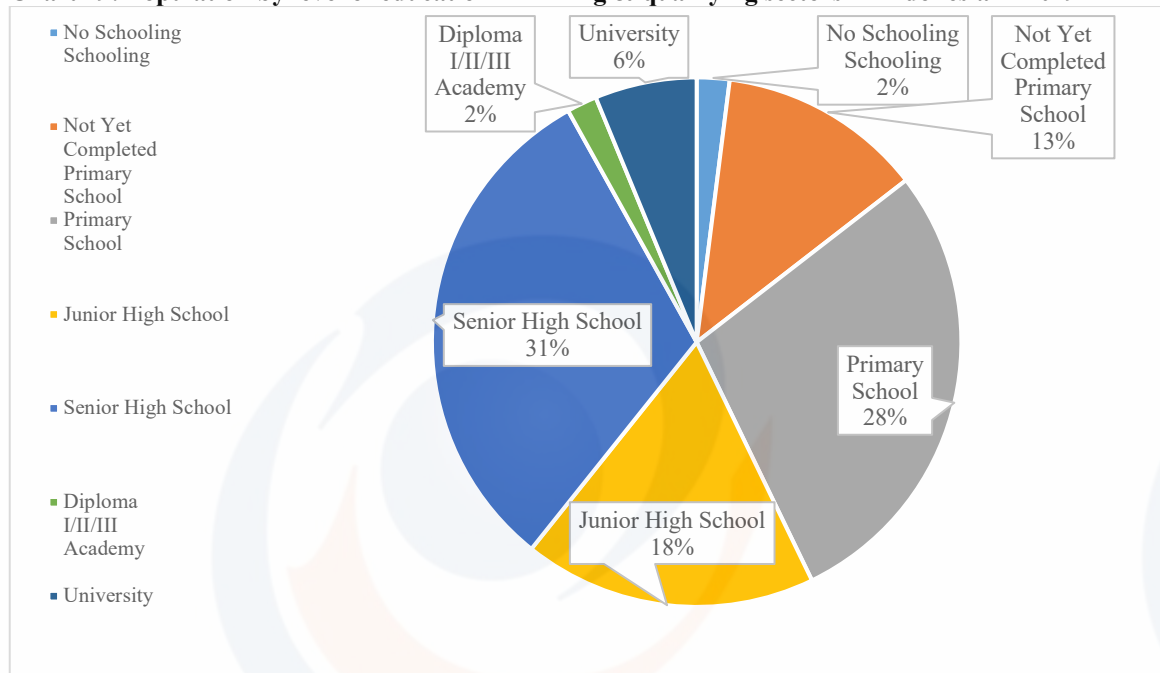
Source: Central Bureau of Statistics of Indonesia

On the other hand, Aceh has different types of workers. The largest number in this province is in the fields of Agriculture, Forestry, and Fishing by 39% or 937,014 people which is a traditional work for generations and is quite significant compared to other fields, where the second largest field is wholesale and retail trade; repair of motor vehicles and motorcycles which is only 15% or 354,593 people. Mining and quarrying alone only has a share of under 1% or 10,838 people. As mentioned previously, high salaries and small number of workers greatly affect the sensitivity of this field in the potential for conflict in society (Chart 78). Another opinion states that coal mining activities have significant effects on the society and environment where the negative impact is seen as greater than the positive impact. One of it is related to increased poverty, compared to other regions that do not have mining activities (Edwards, 2017, Bhattacharyya and Resosudarmo, 2015), especially since there is no benefit-sharing system with local communities related to the percentage of mining output. Mining areas cannot also be located in residential areas, i.e., in the radius of 500 meters, yet the granting of permits in such zones still occurs. An example of this happened with PT Kaltim Prima Coal (KPC) company in the province of East Kalimantan where they moved a whole Dayak village and community forest for mining purposes. Even though compensation were given, adaptation to a new uniquely different location proved to be difficult, in addition to discussions regarding the details of compensation was carried out after the transfer process. Thus, it has become an issue that emerged in the local community. Another social problem is community-based organizations (CSOs)/*Organisasi Masyarakat* (Ormas), some of which tried to take illegal profits from companies and local communities by intimidation, especially after the development of regional autonomy systems.

Related to the conflict, the forestry service gets a report from the community directly or finds it in the monitoring process of the forest area carried out by the management unit. At present there are six Forest Management Units who have the responsibility of managing the forest area in their territory in which complaints and findings process are carried out through regular procedures and does not rule out

possible follow-up based on community reports or when they have been exposed to the media (Hadi, 2019). In particular, the forestry service does not yet have complaint handling related to how the reporting process is carried out. It has become a bit complicated since on the other hand, permits are issued by the Minister while Aceh as a special autonomous region, should have the authority to issue permits represented by the Governor. The Ministry's Technical Implementation Unit/*Unit Pelaksana Teknis* (UPT) also still exists in provincial areas such as the Forest Area Utilization Centre/*Balai Pemanfaatan Kawasan Hutan* (BPKH).

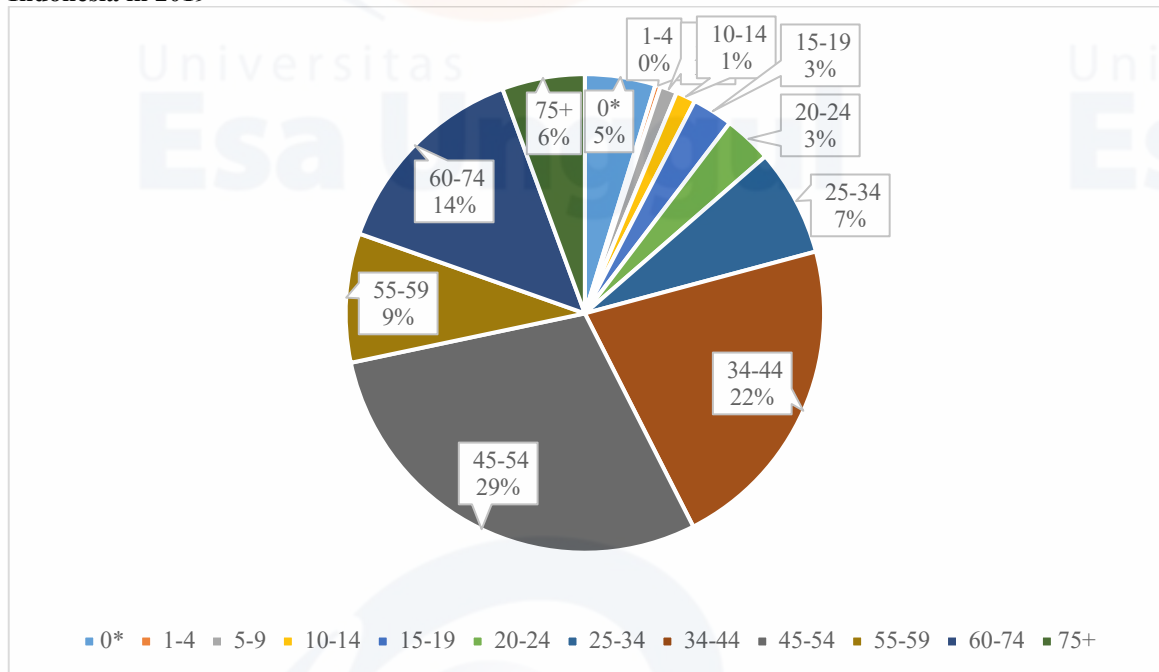
**Chart 79: Population by level of education in mining & quarrying sectors in Indonesia in 2019**



Source: Central Bureau of Statistics of Indonesia

The need for training and formal education is still a necessity in the mining sector, especially if companies aim for high technology systems. Although the official education level as senior high school student graduates has the highest percentage of 31% or 428,993 people, primary schools also have a very large number of 28% or 389,173 people followed by Junior High School by 18% or 246,245 people and not yet completed primary high school by 13% or 172,169 people (Chart 79). The final education level in diplomas and universities in total is only 8% or 110,938 people.

**Chart 80: Population of workers in mining and quarrying sectors by total working hours in Indonesia in 2019**



Source: Central Bureau of Statistics of Indonesia

Stress levels and high risks in the mining sector pose challenges to the work system. Although in general the working hours in this sector range from 34-54 hours per week, but a total of 29% or amounted to 389,280 people have working hours above the average of 55-75 hours per week (Chart 80). The number of working hours under 34 hours can occur if they work part-time or by project based where the income generated may not be in accordance with the standard of living. Another negative externality of horizontal conflict is regarding the over-exploration due to the early access of an individual on the natural resources and trying to maximize the benefits as quickly as possible solely for his own without considering other people. Thus, it reduces the number of available resources on every exploitation (Hotelling, 1931). Linked to this theory, the government could impose several rules and regulations to secure the future needs of the extracted commodity by establishing export quotas and enforcing mandatory environmental standards. Because of large domestic demand, in 2012 the government made a ban on coal exports with a low calorie category, i.e., below 5.700 kcal/kg, which took effect in 2014. However, the Indonesian Coal Mining Association contradicts the policy since it is considered to reduce profits that were already minuscule due to low prices, furthermore shut down middle to lower scale mining businesses. After going through various discussions, the agreed upon policy is to make new export licensing provisions where companies must have the status of Registered Coal Exporters/*Eksporir Terdaftar Batubara* (ETB) from the ministry of trade to be able to export, one of the requirements is to have a C&C certificate. However, the intervention from government might not be as effective if there is a high tolerance on corruption, which also related to the level of pollution based on the Environmental Kuznets Curve (EKC) that shows a positive correlation between corruption and environmental degradation that is heavily related to the natural resources' extraction activities (Lopez and Mitra, 2000).



### **1.5.9 The rationality of decision making**

Another problem is due to the rationality of decision making that is bound by one's cognitive capabilities. It is difficult to absorb large amounts of information effectively, and as a result, when someone makes a decision, they tend to fall back on certain rules of thumb or heuristics, that help them to make sense out of complex and uncertain aspects in mining. Unfortunately, sometimes these lead to severe and systematic errors in the decision-making process. Excessive approaches to stakeholders can also have a detrimental impact on the company's operations and growth. On the other hand, a highly tenuous relationship also has a negative effect on the business activities. Such issues must be properly addressed and carefully considered where each person and institution or group in the region and different levels have their respective characteristics. Systematic errors are becoming some issues that can appear time and time again which arise from a series of cognitive biases, a systematic error in human decision making that arise from the way people process information (Hill et al., 2014). Good strategic management could minimize this risk due to the selective and classification of information that simplifies the received information for users.

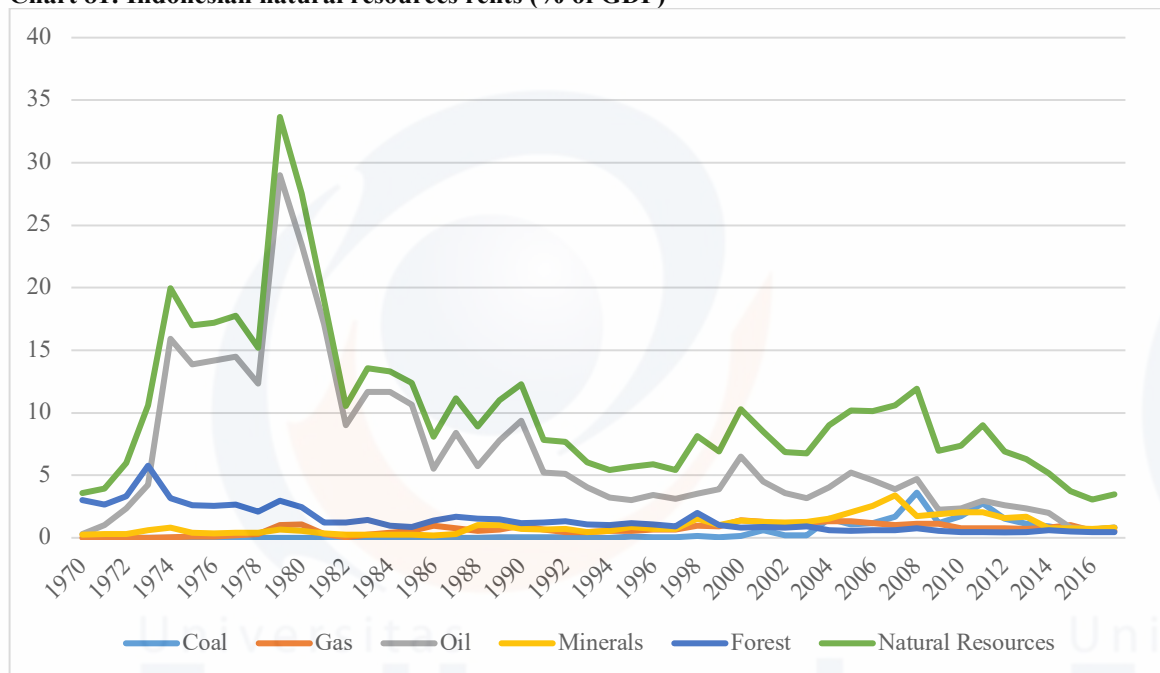
Moreover, sustainable mining management is needed to efficiently integrate economic, environmental and social issues into the mining operations while aiming to secure the support, cooperation, and trust of the local community in which a mine operates and other stakeholders. It covers the pre-production, production, and post-production phases for complete integration and analysis of several factors that could affect the mining activities, in parallel with new and improved technologies developed by recent researcher in collaboration with institutions, governments and also corporation that has been proven not only to raise efficiency and profit but also to reduce and limit the negative impact on the environment, by for example, lower the CO<sub>2</sub> generated by extraction and processing activities of natural resources (Grimaud et al., 2009). The essential factor for such technology is related to costs, and if it could match the minimum profit to be generated, optimal rate of resource extraction will increase as well as alleviate environmental constraints.

### **1.5.10 Geopolitical changes**

Geopolitical change needs to be considered as the result of combination from previous problems and challenges. It is important to understand in relation to vital factors in policy making as well as to anticipate the worst possibilities, especially for Indonesia as one of the countries with large fossil fuels resources. The magnitude of problems and demonstrations as well as the awareness of environmental issues and development of renewable energy will create possible threats to this nation that are largely dependent on fossil fuels, one of which is coal. Hence, it will trigger geopolitical changes where resource advantages that were previously controlled by fossil fuels producing or exporting countries where they generally have high advantages and bargaining against buyer or importer countries, are shifting to energy-producing countries from sufficient renewable power plants. Such changes are scattered and varied for each state. For this reason, countries that were previously comfortable in its position as buyers will lose their burden and pressure and shall have the possibility to benefit from renewable energy that they currently have and produce. Based on the geopolitical gains and losses index, a country's position can be grouped into six categories: power, security, vulnerability, energy security, other energy issues, and climate change (Overland et al., 2019, p. 1). From these factors, emphasis is given

to the knowledge of alteration from geopolitical power prior to transition to renewable energy and also related to access on energy sources, thus the geopolitical position of a country may not change much due to other related reasons although there are also minor variations in several of its energy resources. In general, the definition of geopolitical power is a combination of the security of energy supply of a country, power over energy supplies of other countries, and economic strength derived from energy exports (ibid, p. 4). However, it should also be noted that although not included in the geopolitical aspect, economic power can also affect military power, soft power, attractiveness for international alliances and to withstand international sanctions (ibid). Related to economic power, the high yield and sales of resources in Indonesia from natural resources through natural resources rent is one of the main considerations in making their mining, energy, trade and economic policies.

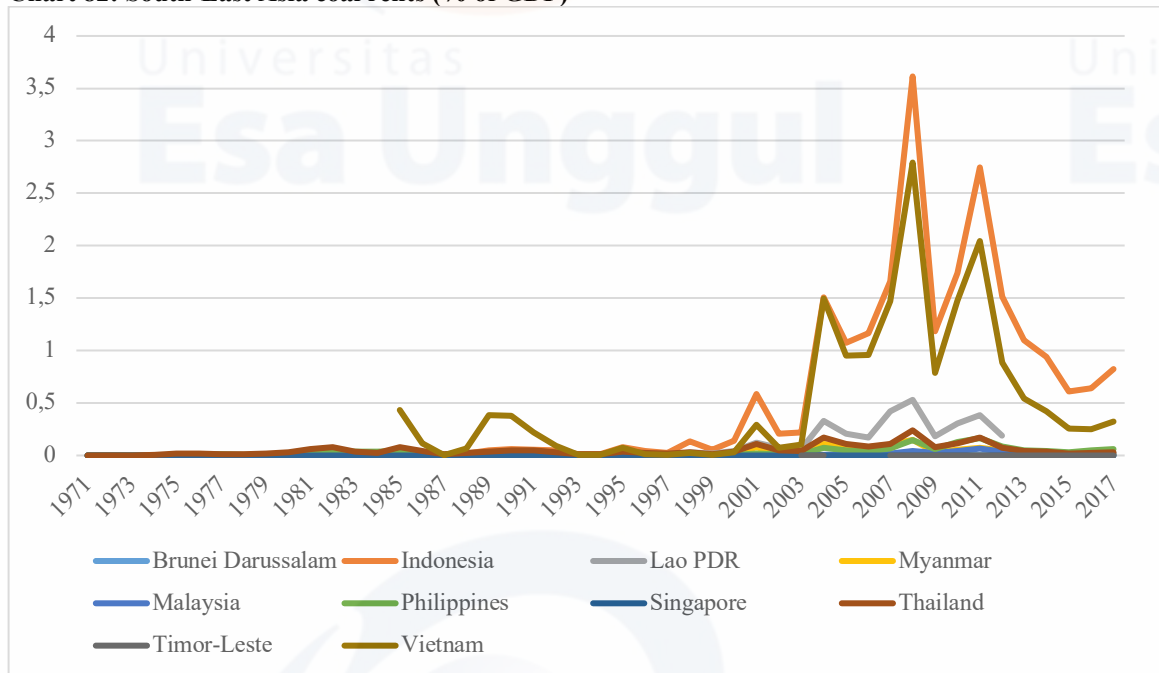
**Chart 81: Indonesian natural resources rents (% of GDP)**



Source: World Bank

Indonesia had the largest natural resource rent to GDP in 1980 and continued to decline until 2016. Oil is still the highest resource followed by coal and followed by gas, which is generally similar to the world natural resources rents (Chart 4). Data show that the smallest percentage is owned by the forest category (Chart 81). From this information, the mining sector has a large impact on the country's economy which makes geopolitical changes in the transformation of energy in the future will have a significant influence even though there are developments in the energy and industry diversification program.

**Chart 82: South-East Asia coal rents (% of GDP)**



Source: World Bank

As part of ASEAN, Indonesia's policies are also affected by regional influences and agreements. In South-east Asia, the country with high coal dependencies based on coal rents to the percentage of GDP is Indonesia, followed by Vietnam. The biggest surge occurred twice in 2008 and 2011 (Chart 82). Laos PDR came in third, yet with great distance from Vietnam. The smallest percentage is owned by Myanmar. However, contrary to the use of coal and other fossil fuels power, along with the development of research, trials and the increasingly massive use of renewable energy, there are things that influence geopolitical power that could create changes in the future planning and needs (IREA, 2019, p. 18) such as:

1. Declining cost

Cost reduction in component manufacturing, maintenance and production of renewable energy continues to occur along with technological developments, additional investment and an increasingly large scale of production. One of the reasons for fossil fuels such as coal is still widely used and developed is because the cost is still relatively low. If prices fall further and become competitive in the future, especially without subsidies, large-scale migration from old types of energy to new types of energy is expected to occur due to new competitive business models in this field for profit (Marteka et al., 2018).

2. Pollution and climate change

The influence of pollution from fossil fuels and climate change is accompanied by issues that are increasingly heating up in the public sphere causing various parties from governments, NGOs, investors and the public to find solutions related to such issues, including in terms of prevention. The World Health Organization (WHO) states that air pollution kills seven million people each year which makes it the fourth largest cause of death where the current ratio for people breathing unclean air is 9:10 (WHO, 2018), which encourage the Paris agreement which has been ratified by the Indonesian government in 2016 to make the air cleaner as well as to curb rising global temperatures below two degrees Celsius due to the

prevention of faster climate change that have domino effect on human life and damage the ecosystem.

### 3. Renewable energy target

Governments in various countries globally have stated plans for their renewable energy program of 179 countries and reduced carbon release from the energy sector in 57 countries (Ren21, 2018, p. 21). It is especially true for countries which lack fossil fuels and prefer to reduce their dependence on energy imports. In addition, fossil fuels producing countries also adopted policies to prioritize the development of renewable energies, including Indonesia with the Electricity Supply Business Plan which plans to reach 1,574 of additional renewable power plant units by 2028 (Chart 26). A large influence on the national energy policy is also owned by PLN as the sole player and has a monopoly on the electricity market in Indonesia. The state-owned company is quite reluctant to switch to distributed renewable energy sources from large centralized generation models, similar to Eskom, a state-owned company in South Africa. PLN states that the development of renewables is difficult as a result of its expensive operational costs which makes it unable to focus solely or at a higher portion on the renewable energy sources, which leads to higher costs from renewables that cannot be covered with the current budget without additional funding. Thus, it creates desynchronization between the central government policy and PLN whereby the Ministry of Energy and Mineral Resources in 2017 issued a regulation that PLN must be willing to buy electricity from the production of IPP on take or pay basis, making new feed-in-tariffs for renewables and limiting expenditures in order to not exceed the costs of local electricity producers (Susanto, 2017). There is an opinion that suggests that PLN can only focus on managing electricity transmission while IPP can move and develop its business in a more flexible way and compete with each other in electricity generation in Indonesia to trigger an increase in quality while, on the other hand, decrease electricity prices. In addition, it will also enhance the development of renewables. Furthermore, creation of a subsidiary or a specific BUMN to buy electricity from renewables is a possible scenario, referring to the case of PLN Batubara, a subsidiary company of PLN for coal trading and purchasing (Asmarini, 2016).

### 4. Technological innovation

Technological innovations have improved efficiencies for both coal-fired power plants and renewables. Such reduction of cost can facilitate the development of energy needs which are temporarily supplied by fossil fuels accompanied by the gradual fulfilment of energy requirements by renewables. From the patents that have been issued and their development, in the long run biofuels and hydrogen from electrolysis can make renewables enter the energy sector that was previously difficult to supply by this type of energy such as heavy industry, aviation and shipping (IREA, 2016). In addition, efficiency is rising with implementation and continuous research in the digital field for the internet of things (IoT), smart grids, artificial intelligence and big data. Energy storage with batteries is also conducted to support such development, where the remaining or unnecessary excess energy can be stored properly for future needs. Thus, it is in line with the interconnected ASEAN energy plans to utilize and maximize all existing energy potentials.

### 5. Corporate and investor action

Companies and investors receive pressure, both directly or indirectly from NGOs, academics and also various other parties related to business activities and their contribution to the issues of climate change and global warming, which affects

their branding and reputation among stakeholders. This causes changes in their long-term plans in order to adjust to the latest developments that are considered relevant and could have positive effects on their business activities. Such example happened in the agreement of 415 investors who had a combined asset of US\$ 32 trillion in December 2018 through COP24 to support the Paris Agreement and put pressure on governments to "accelerate private sector investment into the low carbon transition by incorporating corporate Paris-aligned climate scenarios into all relevant policy frameworks and energy transition pathways, put a meaningful price on carbon, phase out fossil fuel subsidies by set deadlines and Phase out thermal coal power worldwide by set deadlines" (COP24, 2018). However, the consideration of uneasiness and slow process to shift from fossil fuels to renewables and the increasing needs of industry and economy becomes some challenges and concerns for investors and heads of state as listed in Chart 64 and Table 8.

#### 6. Public opinion

Public opinion is one of the main factors in changing the views and policies of companies and countries, especially from the trends of people who are aware of the current climate change conditions in which they prefer to use products and services that have less carbon footprint. Such related movements also occur on social media as well as through street demonstrations aimed at putting pressure on relevant parties to ensure the realization of urgency on such issues and hopefully able to influence considerations in their policy making.

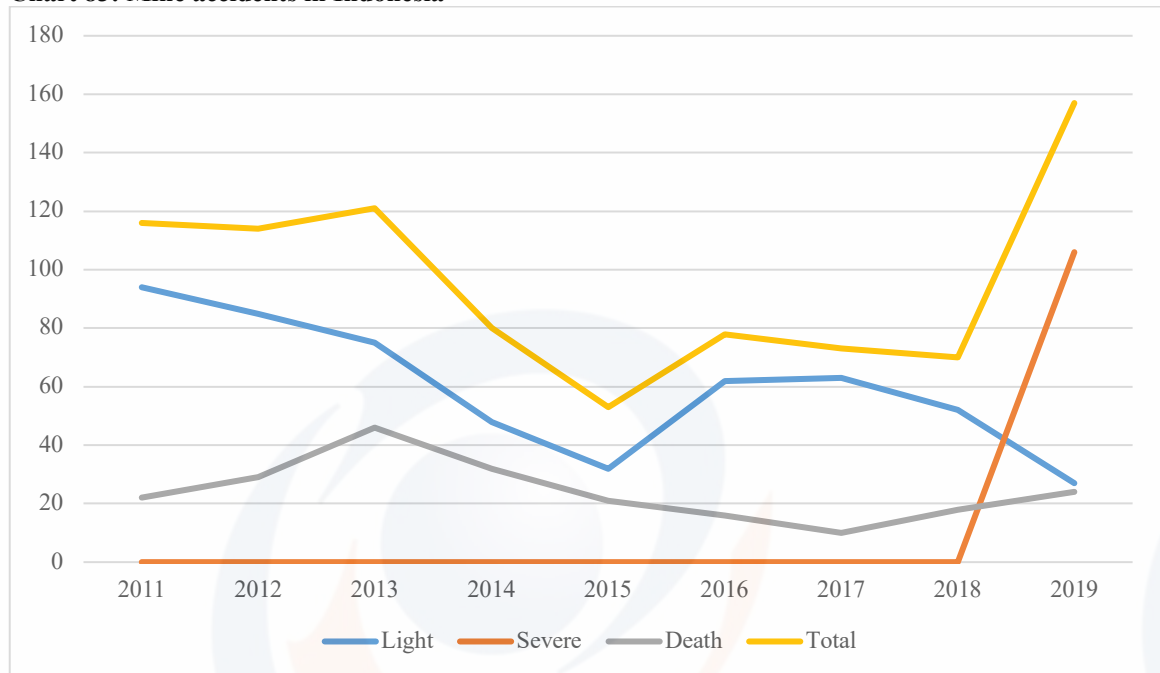
For several centuries, especially after the industrial revolution, the use of fossil fuels has increased sharply and massively with rising industrial activity and the need for such products. The use of steam engines that utilized coal occurred in the 19th century until the present period, especially for coal fired power plants. From that moment, fossil fuels have become one of the most important aspects of politics that affects many people's life. From above issues, transformation of energy use from fossil fuels to renewables is believed to have a major influence on changes in global geopolitics, where the two types of energy groups have their different unique characteristics with different consequences. Meanwhile, such transition is able to change the axis of world power as well as current and future geopolitical conditions. Such power is influenced by various factors, namely population, area, GDP, natural resources and military power. It is largely supported by access to energy that allow these factors to run effectively and protect national interests, which are able to increase their economic and political influence.

#### 1.5.11 Mining Accidents

In implementing good mining engineering principles, it is mandatory to appoint the Head of Mining Engineering/*Kepala Teknik Tambang* (KTT) as the highest chain of command in the mining site that obtain authorization from the Chief Mining Inspector/*Kepala Inspektur Tambang* (KaIT) and has competent mining technical personnel in accordance with statutory provisions. Furthermore, in activities using the underground mining method, it is mandatory to appoint the Head of the Underground Mine/*Kepala Tambang Bawah Tanah* (KTBT) to obtain approval from the KaIT. The KTBT is responsible to the KTT which has competence in the mining technical field determined by the Minister. It has become a concern due to existing regulations that allow for underground mining in protected forest areas, where there are numerous mineral deposits detected, yet with a greater risk of underground operation. These rules

are made to exploit existing potentials without disturbing and damaging protected forest areas. As prevention, permit holders are obliged to implement mining safety provisions by providing all basic equipment, personal protective equipment, facilities, personnel, and costs needed for the implementation of mining safety provisions, in addition to form and establish the organization of mining safety sections based on consideration of the number of workers, nature, or work area.

**Chart 83: Mine accidents in Indonesia**



*Source: Ministry of Energy and Mineral Resources*

Mining safety issues are vital and are also of particular concern in this industry. Supervision and cross-sector review from the central government, local governments, NGOs and the companies themselves are done on a frequent basis. However, every year there are always work accidents that cause minor injuries, serious injuries and also death. In 2018, there was a significant increase in the number of work accidents due to changes in the definition of work accidents so that a new category emerged, namely Severe, which turned out to be huge, in the amount of 106 people (Chart 83). There is a Focus Group Discussion (FGD) in collaboration with the World Bank, where one of it is related to safety. Government Regulations in energy and mineral resources are quite complex and always provide training, such as in the Ministerial Decree/*Keputusan Menteri* (Kepmen) Number 555.K/26/M.Pe/1995 concerning the Safety and Health at General Mining Work. The latest regulations are in the Minister of Energy and Mineral Resources Number 1827K/30/MEM/2018 concerning the Guidelines for Implementing Good Mining Engineering Principles and the Decree of the Directorate General/*Direktorat Jenderal* (Dirjen) Number 185.K/37.04/DJB/2019 concerning the Technical Guidelines for Mining Safety Implementation and Implementation, Assessment and Reporting of Mineral and Coal Mining Safety Management Systems regarding mining safety management systems. Some companies have Occupational Health and Safety Assessment Series (OHSAS), International Organization for Standardization (ISO), etc. Additional Ministerial Decrees are only formed by the report and related provisions (Kasli, 2020). In the past, if there were employees who died within a maximum of 24 hours, it could be considered as a

fatality. However, at present if someone dies as a result of a mining work accident over 24 hours, it will still be considered as a fatality (ibid). Mining companies must also have certain certificates, for example the KTT who must pass a competency test to ensure the quality of the safety and supervision standards, and must go through the competency test conducted by the Ministry. However, at the moment it can also be executed by PERHAPI at its Professional Training Institution/*Lembaga Diklat Profesi* (LDP) and Professional Certification Institute/*Lembaga Sertifikasi Profesi* (LSP). The development center of geo-mineral and human resources is owned by the government. Similar to KTT, there are also supervisors of the main/*pratama* and middle level operations.

In addition, a regulatory system exists that follows the K3 standard where there are no special modifications according to the characteristics of the mining area. For matters due to natural factors such as weather, earthquake, etc., a contingency plan or Standard Operational Procedure (SOP) has been made in accord to applicable international standards, as well as for unnatural causes such as fire, explosion, etc. It was also audited by the province and the central government with a one-time joint audit, where in its development will fully take over by the central government.

### 1.5.12 Business ethics

In the business activities, especially in the mining industry which is very vulnerable to negative issues and irregularities, business ethics plays a vital role on how it could operate well. Ethics itself could be considered as “the discipline that examines your moral standards or the moral standards of a society to evaluate their implications for one’s life” (Velasquez, 2012, p. 13) and is closely related to morality, as “the standards that an individual or a group has about what is right and wrong, or good and evil” (ibid, p. 8). To determine whether it is good or bad, moral standards are needed which “include the norms we have about the kinds of action we believe are morally right and wrong, as well as the values we place on what we believe is morally good or morally bad” (ibid). However, there are differences regarding moral standards in each region due to different perceptions and cultures. In practice, Java island that has been the most developed and richest region in Indonesia has a stricter ethics and regulation compared to Aceh that is considered as a developing area. In a more specific definition on business activities, it is believed to be “a specialized study of moral right and wrong that focuses on business institutions, organizations, and activities regarding our moral standards insofar as these apply to business, how reasonable or unreasonable these moral standards we have absorbed from society are and the implications our moral standards have for business activities” (ibid, p. 13). Corporate issues in the mining industry are very focused on environmental impacts where many environmental activists are demanding that the company's operations be stopped due to its massive negative effects in accordance with what they are considered as the morality of the whole company’s activities and policies. Based on the explanation from Velasquez (2012) regarding kinds of ethical issues, this research could be considered as systemic, corporate and individual. The mining activities in macro level consist of various degrees of regulations in social, political and legal both at national and provincial level that are considered as the systemic ethical issue. On the micro aspect, corporate actions and impact are based on its policies and culture that could be considered as its own issue.

Related to negative environmental issues, there are questions about ethical quality that are only allowed to be asked solely to respective individuals or may also include

everyone in the company in which all employees also share responsibility. Some people argue that individual ethics in a company are generally not considered since there are supposedly procedures and evaluation systems to prevent unwanted outcomes from workers. Other points of view assume that companies are machines or inanimate objects in which only humans are considered to have values and choices in ethics. Between these two opinions, exist a third perspective as a middle ground or a combination of the two previous opinions where individuals have responsibility due to the moral choices they made in executing company's assigned, since they also receive its benefits. The use of business ethics in arguing environmental issues can function positively where a company is not only concerned with the needs of shareholders, but also stakeholders. It is related to the current era of technology and globalization where issues can spread rapidly and change the public's view as well perception of a company's image. It is hoped that the best interest of shareholders can be set aside in the presence of disturbed interests from the majority of stakeholders. In this regard, the concern of stakeholders can be accomplished, one of which is through corporate social responsibility that is obliged for every company through law and regulation. In a clear definition, "corporate social responsibility encompasses the economic, legal, ethical, and discretionary (e.g., philanthropic) expectations that society has of organizations at a given point in time" (Carroll, 2016, p. 2). Those are in line with the stakeholder theory by Freeman (1984) that company's executives are required to consider and give a fair benefits to all of its stakeholders on its strategic decision and operational, an opposite of the shareholder view that consider managers to exclusively responsible to make the highest profit in term of money, for shareholders. The explanation refers to the relationship of a company with its external counterparts and behaviours toward the environment. However, there have been no single definitions of stakeholders that are commonly accepted. Hence, it depends on the researcher and related business actors do define it based on their local experience (Mainardes, et al., 2011).

Enforcing the business ethics in mining activities is believed to be able to have a significant impact in reducing the negative things that can occur through, despite differences in moral standards, which can be overcome by moral reasoning that is defined as "process by which human behaviours, institutions, or policies are judged to be in accordance with or in violation of moral standards" (Velasquez, 2012, p. 45). It is important to have the understanding of the requested requirements, restrictions, values, or criticism as well as information and evidence regarding what must be done from institutions, policies, and also individuals who do not meet or contradict, fair or unjust, along with good or bad, in business ethics within the local area. In general, a matter can be said as unethical if there is visible damage or loss and violates the existing moral standards. Challenges in measuring ethics according to Velasquez is "euphemistic labelling, justifying our actions, advantageous comparisons, displacement of responsibility, diffusion of responsibility, distorting the harm, and dehumanization, and attribution of blame" (ibid, p. 50). These things have the potential to distort ethical judgment due to the existence of biased assumptions and theories about oneself and others.

In reality, there are many grey areas in business where a shift in ethical values occurs due to moral seduction by reason of urgent interests of both the government and the community that causes compromise. However, what is feared is the accommodation that was initially regarded as temporary and continue to become permanent. This fact occurs in connection with patterns that take place in ethical culture theory where "the kind of behaviour in an organization encourages or



discourages by repeated use of examples of appropriate behaviour, incentives for ethical behaviour, clear rules and ethical policies, rewards for exemplary conduct, stories of notable ethical actions, etc” (ibid, p. 54). Communities and local governments assume that they have the right to be able to enjoy natural resources products originating from their area, both in terms of material, employment, constructed public facilities as well as territorial economic value. Statement that mining activities may damage the environment, must go through an objective assessment using the causality approach, where it occurs due to actions or failures in prevention; knowledge, where they know what is being done; and freedom, where the act is carried out based on his own awareness. Assessment of costs and benefits in the proclamation of business ethics that often arise is part of the concept of Utilitarianism that only relies on results, prior the limitations and principles of emergencies that must be met for the community, especially related to the economic factors. Maximum minimization of costs is possible to achieve by initially exercise the cost-benefit analysis by calculating as well as comparing between present and future economic costs in addition to benefits, continued with efficiency by using the smallest possible input to get the desired output.

The concept of business ethics and also utilitarian are the essence of rights and duties in society. Specifically in the legal system, that consist of legal right which is defined as “an entitlement that derives from a legal system that permits or empowers a person to act in a specified way or that requires others to act in certain ways toward that person” (ibid, p. 93). In this case, CSR is an extension of community rights to changes or adjustments in their lives due to activities carried out by mining companies. Legal rights are also owned by the company so that negotiations exist and cause contractual rights and duties to occur as a result of the agreement. The contract that takes place between the mining company, central government, provincial government and local communities assumes that each party knows the details of the agreement, the obligation that presented facts and information are true, without coercion and in accordance with mutually agreed norms. Generally, moral changes usually occur in this phase.

### **1.5.13 COVID-19 global pandemic**

Coronavirus diseases 2019 (Covid-19) or also called Severe Acute Respiratory Syndrome (SARS-CoV-2) first appeared in the city of Wuhan, China, in December 2019. Official statements from the Chinese government and the WHO stated that this virus originated from the food market in the city which in its development spread throughout the world. The genetic sequence data was published in January 2020 with sources from bats and is not an artificial virus. The effect that occurs when exposed to this virus is mild illness for most people, although more severe impacts can occur in people who have pre-existing medical conditions (e.g., chronic respiratory and cardiovascular disease, diabetes, etc.) and the elderly, which can be fatal (WHO, 2020). Sharing and collaboration at the global level has been carried out to overcome this issue, including in the treatment and manufacture of related vaccines. WHO as a world-class health organization under the United Nations has also provided updated guidance for handling and prevention in countries across the globe. In its continuation, many countries in the world have implemented a status of lockdown or social restrictions to prevent and reduce human-to-human transmission through social interactions. Indonesia is one of the countries that enforces national Large-Scale Social Restrictions/*Pembatasan Sosial Berskala Besar* (PSBB) on 31 March 2020 which in

its development, the regulation has been adapted based on the conditions of each province and city.

Technically, countries such as Mexico, Thailand, Singapore, Philippines, United Kingdom, France, Hong Kong, Japan and Germany have experienced a recession marked by negative growth for two consecutive quarters (Girianna, 2020). Subsequently, the impact on coal demand has fallen considerably, since activities in factories and offices have been reduced or even stopped. Regarding the energy sector, there has been an oversupply of its related commodities which makes prices fall along with the government plans to reduce energy supply. On the other hand, other mining products have not been majorly affected, especially for the type C of quarry mines used for construction, that has not greatly influenced since the changes of demands have only occurred in certain areas. One of the main problems in this pandemic is the number of work termination/*Pemutusan Hubungan Kerja* (PHK) which in turn reduce people's purchasing power and disturb the economic condition. Global market shows that gold is proved to be a good mining commodity, where its prices continue to rise, including based on the influence of the US Dollar As well as its characteristic as a highly valuable object in every country at all times and occasions (Kasli, 2020). Meanwhile, other mineral commodities have a decline of valuation but not significantly (ibid). The Energy Sector in Indonesia, including coal producers, has been severely affected and threatens around 8% of GDP and 2% of the national workforce (based on company operational data) (Amir, 2020).

In microeconomic level, the cost has become higher since people and businesses have to follow strict health protocol, for example roster or leave employees that must be quarantined for fourteen days in hotels which leads to additional expense. Furthermore, the company must also provide many tools and facilities to prevent the transmission of COVID-19 and it causes productivity to decline (Kasli, 2020). If there is an infected person, a lockdown must be carried out for 1-2 months along with rapid, Polymerase Chain Reaction (PCR) and swab test for all employees in the area. Hence, it causes mine to not be in a position to be well developed, even though companies can employ skilled workers at a more competitive cost. Nationally, only a very few new mines have been operated, including companies that are in the construction phase, in which their progress has been delayed due to the obligation to follow the health protocol. Such things cause the realization to be not in accordance with the initial timeline and schedule. Furthermore, logistics and supply chains are also hampered if goods are received and shipped from and to foreign countries. For example, the construction of a smelter could be hampered from their original target that should be completed in 2022, which has moved to 2024 (i.e., delayed for 1-2 years) for its completion (ibid). CAPEX will also increase because they still have to pay labour, logistics, etc., which has been increased during this pandemic. In addition, national coal production in 2020 has decreased due to low prices and falling coal consumption. Companies with coal quality less than 4,400 kcal and have no long-term contracts choose to reduce or stop production due to higher costs than the selling price. The benchmark coal price in September 2020 fell to US\$ 49.42 per ton or decreased by 25% compared to January at US\$ 65.93 per ton, which is the lowest value since 2009. This is indicated by the decrease in coal export volume in July 2020 by 11% and the export value which decreased by 22% compared to the same period last year. Restrictions on coal imports by India and China as well as reduced demand from South Korea, the Philippines and Japan led to an oversupply of coal globally, leading to lower prices on the international market (Tasrif, 2020). In addition, the planned DMO of 155

million tons of coal is only estimated to be realized by 125 million tons by December 2020 (Girianna, 2020).

The government through the Ministry of Finance responded by providing fiscal policy stimulus to mitigate the negative impact of the corona virus on the economy, where one of them is by providing relaxation of income tax/*Pajak Penghasilan* (PPh) articles 21, 22 and 25 of certain levels of employees (i.e., middle to low level) as well as accelerated Value Added Tax/*Pajak Pertambahan Nilai* (PPN) restitutions, who have been implemented for only a few months. The procedure for the licensing process is already online, therefore eliminating the needs to visit for submitting and completing the permit requirements, monitoring, paying taxes and production reports. This related matter also becomes easier since there are several licenses that are revoked, for example where mining contractors no longer need to have a certificate of registration in the Ministry of Energy and Mineral Resources, let alone the management of the permit that have already centralized in the BKPM, including the e-PNBP system, Minerba one map and MOMS. So far, the existing and implemented online system has not raised complaints from various related parties (Kasli, 2020). Moreover, there are some relaxation policies especially in corporate obligations to the state, in the sense of debt or tax relief, where it facilitates increased production if a better market potential is present without complicated licensing. In addition, revised RKAB is made simple to support faster production activities. DMO of 25% or more needs to be reviewed for a possible reduction or to be transferred in the form of goods (*natura*), in contrast to cash (Setiawan, 2020a). Since the figure is on average, it should be only applied for large companies that have advantages of good location and large areas while medium and small companies are mostly the opposite of it. Companies and related institutions have agreed that if exports are good, production can cover deficiencies during the crisis period. On the other hand, a question arises regarding the possibility of 25% DMO that could be absorbed or sold completely into the local market, especially for certain qualities that are not the main and common product in the country (ibid). With the National Recovery Program/*Program Pemulihan Nasional* (PEN) and the new normal status, economic activity began to increase. This is evidenced by a number of indicators that show positive signals of improvement in economic activity, such as the manufacturing Purchasing Managers Index (PMI), Consumer Confidence Index, retail sales and motor vehicle sales. However, exports in the mining sector continued to experience a deficit in July of 7.83% of month to month (mtm) and 31.10% of year over year (yoy). From January to July, the deficit was 22.14% of year to date (ytd) (ibid).

## 1.6 Hypothesis

### 1.6.1 Does the provincial government use the resource curse theory (Dutch disease) in their strategy and regulation planning in Aceh?

In theory, having abundant natural resources will make a country highly develop and grow rapidly. However, many nations have the opposite effect which is called the 'resource curse hypothesis' or the 'paradox of plenty.' Another phenomenon referred to as the 'Dutch Disease' is happening since a country with high revenue from its rich natural resources will de-industrialize the economy due to higher exchange rate, thus reducing the competitiveness of its manufacturing sectors. The commonly occurred trends are related to conflict and war, high levels of corruption, low human resources capabilities, unaccountable government and economic growth that is highly dependent

on commodities (Auty, 1993). The study of the natural resources curse at the regional level in Indonesia was carried out using the production sharing (i.e., rent) of natural resources as a measure of the abundance of natural resources, and found that in aggregate (i.e., total types of natural resources) the curse was not proven to exist in Indonesia (Komarulzaman and Alisjahbana, 2006) while Feryawan (2011) shows evidence of the existence of such curse. In general, they tested the hypothesis in the era of regional autonomy, which gave regions greater power to exploit their natural resources.

Aceh, as one of the provinces with the largest natural resources, has the potential for various types of economic activities, such as trade, agriculture, fisheries, livestock, mining, and manufacturing. One of its appealing factors is the capability to become an area that consist of basic industries whose processing raw materials into semi-finished goods for other industrial needs, therefore make other provinces to be dependent and raise the influence of Aceh. However, due to factors such as security issues in previous disputes between Free Aceh Movement/*Gerakan Aceh Merdeka* (GAM) and Indonesian government, underdeveloped infrastructure and other provinces that have already established their industries and economic ecosystems, along with low education levels, made the Aceh government prefer to sell raw materials to other places. Such decisions happen due to the ease of trading and doing business that are facilitated by the recipient provinces and as a result of smaller risks compared to collecting investment and building new industrial areas which may not be successful or well-developed. This might be included in the resource curse hypothesis theory where such mindset ultimately inhibits the growth potential of medium and high-tech processing industries, apart from the limited funds and low public trust. Such things make entrepreneurs from other business sectors reluctant to enter and develop in this area, where more emphasis must be placed on policies to receive better results from natural resource utilization activities.

Furthermore, focusing solely on natural resources and raw materials makes people have limited choices in existing types of jobs. Employment that has been filled and is smaller than the existing supply encourages them to switch to illegal mining activities, with numbers that continue to grow and are difficult to eradicate. This leads to negative externality where consideration gives rise to over-exploration in which local communities have already gained access since the natural resources are within their area. Thus, efforts to maximize the benefits resulting in excessive exploitation that tried to be prevented and controlled with Domestic Market Obligation policy by the government. However, on a macro and long-term basis, it is necessary to have policies and regulations that are perfectly adapted to the root of problems for optimum solutions.

The main principle of the Aceh government is to escape the stigma of a curse on natural resources. Many are hoping that the management of Aceh's resources can provide maximum benefits, including added value for the local community itself. The focus on poverty alleviation efforts is important since the figure is quite high, through natural resource management which is still based on the land area by avoiding potential damages. In general, Aceh is a province with the largest forest cover area in the island of Sumatra, which is the last bastion of natural forest on such region, where more than 3.5 million hectares or 62% of Aceh's area (e.g., including water conservation) are woodlands, which if only counted from for the land category only, 58% or 3 million hectares are considered as natural forests (Hadi, 2019). Threats arise since Aceh is within the Bukit Barisan cluster which has a sizable mine deposit, where it invites the interest of various parties for utilization of natural resources. Fortunately, the Forestry

Service is committed to implementing a sustainable process to counter negative issues. Furthermore, Aceh Provincial Government is also open on international cooperation and sharing of knowledge that have ended recently, namely support and grants from the German government through supporting Indonesia's climate change response in the technical assistance component, where climate change is an attractive issue and balancing emissions from the forestry sector in Indonesia require significant amount of effort which leads leading to mitigation, preventing the release of emissions as well as deforestation and land degradation (ibid). In addition, there is some support for the Leuser landscape, which focuses on three districts, namely: Aceh Singkil, Aceh Selatan and Subulussalam. The effort to save biodiversity is carried out due to its huge variation and richness in the Leuser landscape region, with financing that comes from international institutions such as Cambridge which focus on species issues. Those variety of partners to encourage improvements in governance may not be separated from its full commitment and political will of the provincial government, as evidenced by its broad coverage of forest in Sumatra island thus far.

Improvements in governance were carried out with a moratorium on logging, to provide a temporary respite for the use of timber forest products in natural forests while carrying out the Redesign, Reduction of deforestation and Reforestation (3R) program (ibid). Reducing deforestation is done through protecting safeguards, providing access to community management, etc. Reforestation carries out restoration activities of river areas and other related places. Redesign leads guidance to manage governance territory in forest areas in a more proportional manner, completed with a revised spatial plan in which it relates to forest spatial patterns from 2013. The priority of providing management access to the community has been given to the private sector and in line with national policies, whereas currently it has shifted to community based management which involves local people to be actively involved as key players in the management of Aceh's forests to secure its effectiveness. Moreover, optimizing the advantages of forests through non-timber forest products is one of the main focuses, where Aceh has a considerable amount of related commodities, for example from pine forests, rattan, etc.

Correlated to natural resources in mining, the holder of IUP must prioritize the needs of minerals and coal for domestic interests, where the Minister determines that such needs cover the processing industry and direct use in local and national levels. However, permit holders can export produced minerals or coal after domestic needs are met and must be guided by the benchmark price determined by the Ministry, based on market mechanisms and in accordance with prices generally applicable in international markets. Related to the use of domestic goods, equipment, raw materials, and/or supporting materials as well as imported products sold in Indonesia in mineral and coal mining business activities, there are provisions to meet quality standards and after sales services which require a guarantee of supply's continuity and on time delivery. The plan to purchase imported products must be submitted to the Minister and in accordance with the provisions of the legislation in the trade sector, where they control mineral and coal production operated by holders of IUPs at the provincial level to meet environmental aspects, conserves mineral and coal resources and controls prices.

### **1.6.2 Does the coal mining company have significant roles in the status of the special autonomy region in Aceh?**

Aceh is a provincial region which is given special authority to regulate and manage its own government affairs and the interests of the local community in accordance with the laws and regulations in the system and principles of the Unitary State of the Republic of Indonesia based on the Constitution of the Republic of Indonesia Year 1945, led by a Governor, as stated in the Chapter 6, Article 18, Paragraph 2. The Provincial and District or City Governments have the authority to regulate and administer government affairs in all public sectors except related to the national, foreign policy, defense, security, justice, monetary and national fiscal as well as certain functions in the religious field. In the area of special autonomy as stated in the Government Regulation Number 3 Year 2015, the relationship of authority between the central government and regional, provincial, regency, city, or between provinces and regencies and cities, is regulated by law by taking into account regional specificity and diversity, while financial relations, public services, utilization of natural resources and other resources between the central government and regional governments are regulated and implemented fairly and in accordance with the law. The government system recognizes and respects special regional government units, specifically for Aceh, bearing in mind the distinctive character of the history of the struggle of the Acehnese people who have high resilience, which honour the recognition as a special and special region, based on Law Number 44 Year 1999 concerning Aceh Privileges and the improved version in the Law Number 11 Year 2006.

In addition, compulsory affairs which become the authority of the Government of Aceh includes planning, utilization, and supervision of spatial planning; development planning and control; implementation of public order and peace; provision of public facilities and infrastructure; handling the health sector; providing education and allocating potential human resources; tackling cross-regency or city social problems; service in the field of providing cross-regency or city employment and manpower; facilitation of the development of cooperatives, small and medium enterprises, including cross-regency or city; environmental control; land services including cross regency or city; population and civil registration services; government general administration services; while investment administration services including cross-regency or city and other basic services that cannot be implemented by the district or city government. All of these are generally related to operations along with the positive and negative impacts of the mining industry which needs collaborations with related stakeholders. On specific natural resources management, it includes planning, implementing, utilizing and supervising business activities that may take the form of exploration, exploitation, and cultivation, including mining which consists of mining minerals, coal, geothermal, forestry, agriculture, fisheries and marine which are carried out by applying the principles of transparency and sustainable development, in accordance with Article 156. Such business activities can be carried out by State-Owned Enterprises, Regional-Owned Enterprises, cooperatives, local, national and foreign private business entities, which are guided by the standards, norms and procedures established by the Government, considering the specificity and privileges and without reducing authority of the Aceh Government, including the obligation to include local human resources and utilize other respective resources in Aceh. The Central Government itself is able to delegate to the Governor as a representative of the National Government and assign part of the affairs to the Provincial, District and

*Gampong*, i.e., Village level, Governments based on principle of co-administration, as stated in Article 8 of the Government Regulation Number 3 Year 2015.

There is an influence of special autonomy status in Aceh affecting the activities of the mining industry that is related to the policy of the authority to grant permits related to foreign investment, in accordance with the Law of the Government of Aceh (LoGA)/*Undang-undang Pemerintah Aceh* (UUPA) and its derivatives, where there is President Regulation Number 3 Year 2016 concerning Acceleration of National Strategic Projects which states that for foreign investment, a recommendation from the Governor of Aceh must be obtained in advance. Regarding the Law Number 11 Year 2006 concerning special autonomy in Aceh states that the management of natural resources is controlled by the Aceh provincial government along with district and city level governments in accordance with their respective authority. The law also regulates community empowerment funds which are not regulated by other provinces in Indonesia related to the existence of 1% of produced goods that have been sold and intended for previously mentioned funds in Aceh. Regarding mineral and coal, the authority in Aceh is regulated in the Regional Law/Qanun Number 15 Year 2013. In addition to mineral and coal, related to investment in the mining sector, the Aceh government also has Qanun Number 5 Year 2018 concerning Investment.

Generally on regional autonomy, the role of the central government is not as strong as in previous era prior the peace agreement and establishment of the special autonomy status. Such authority is based on Article 6 of the Government Regulation Number 23 Year 2010 for Mining Business Permits/*Izin Usaha Pertambangan* (IUP), where the authority for work contract is still possessed the central government, while the IUP is still under the regional government authority (e.g., province and districts). Regional autonomy has more disadvantages due to an unconcentrated and noncentralized system, which leads to many difficulties in monitoring the potentials along with its problems that have occurred regarding overlapping permits and land. Produced waste due to mining activities is proved to be problematic and difficult to monitor. Generally, since the local government feels that this is an area with their own respective authority, permission is easier to issue without more detailed consideration. Plus, there is a change of regional government every five years accompanied by a great deal of cash and assets that are related to politics involvement of some people. The Clean and Clear permit was only issued as many as 4,000 pieces out of the total 10,000 applications. Such issues clearly opens the discussion and alternative to return the authority from provincial to the central government.

Regarding the special autonomy in Aceh, there are separate Regional Regulations/*Peraturan Daerah* (Perda/Qanun), especially regarding some kind of additional royalties that use another term, namely the 'natural resource compensation.' It has similar contents, yet with double imposition from the same area. Problems occur due to the low calorie specifications and low prices of coal in Aceh. In opposite, it assumed that if price is fairly higher, miners will deliberately carry out mining activities as the result of prospective reasonable profit. However, it was cancelled by the central government due to being incompatible with decrees nor regulations under national law. Low prices and non-supportive rules make not only failure and losses for miners, but also will affect the provincial government due to the supposedly received income in the form of tax during normal and ideal conditions, i.e., as a result of the deficit status in company's finance. Moreover, if exports are still carried out, another loss will occur where the commodity of natural resources that have been sold cannot be returned to its location of origin and will be considered as a generous assistance to other countries for the supply of high-quality coal by sacrificing the interest of the

provenance. In comparison, although the province of Papua also has a special autonomy status as in the province of Aceh, it has rules that are still in accordance with most of the central government policies. On the other hand, Aceh has its own regulation due to the peace agreement between GAM and Indonesian government in Helsinki – Finland, that leads to the possibility to optimize the regional revenues by creating its own particular rules through the Qanun, specifically for natural resources. Great control and access to natural wealth as well as energy sources can be a bargaining point for local governments to negotiate with the central government. A study case in 2012 shows that if the central government rejected the request of the provincial government of East Kalimantan related to a larger allocation for fuel, coal shipments access from the province would be stopped. In the end, the central government accepted the signing of the MoU in June (BPH Migas, 2012). Hence, to ensure effective communications with the Aceh government, mining companies agreed to create an association that exclusively located and operated in Aceh, with Rizal Kasli, as its chairman from PT Agrabudi Jasa Bersama (AJB), although it is not considered to be quite active recently. Those who have joined are MIFA, Bell, AJB, PBM and SMI (e.g., not only in West Aceh but also in Banda Aceh and South Aceh areas). Companies with other kinds of mining activities such as C type mining are considered suitable for member's classification, yet keen to become active members due to its small production scale compared to other mining products.

Moreover, from 2016 to 2017 the Aceh Government has conducted a mining moratorium, especially for minerals and coal, which was then extended until 2018. In January to June 2019, the moratorium was re-conducted and until present day, the moratorium status is awaiting further government decision, whether it will be resumed in 2020 or halted. There are several motives for this moratorium, where it is not intending to oppose mining activities, but rather for restructuring mining licenses that have been previously issued (Hadi, 2019). This is in line with the KPK program related to the 'National Movement to Save Natural Resources' in which Aceh is one of the regions supervised by this institution. There are a number of permit statuses that have been revoked as a follow up to this licensing structuring process (ibid).

### **1.6.3 Is the Indonesian mining cooperative system (small scale mining) in Aceh effective to improve the welfare for Aceh's local residents/native people?**

In Indonesia, in addition to being permitted for mining business permit areas (large scale and cooperatives), it is also permissible to have a People's Mining Area/*Wilayah Pertambangan Rakyat* (WPR) where the people as an individual is able to have their permits directly. The regulation also explains in detail what conditions and management are allowed for obtaining WPR status, that will be needed to obtain the IPR. Coal mining cooperative systems exist to accommodate the interest of lower-to-mid level local communities, where they perform mining operations with the use of simpler methods through good mining practices. The Aceh Government has been using the cooperative system in their mining activities for the local or native people in the territory. Münkner (2015), divided cooperative based on the western and socialist concept, while the third countries using the mix of two concepts. Based on the western concept, cooperative is a private organization, formed voluntarily by people who have the same interests and intent to take care of the interests of their members and create mutual benefits for members of cooperatives and cooperative companies, as confirmed by the International Cooperative Alliance (ICA) in their statement. On the contrary, the socialist concept of cooperative means that it is planned and controlled by the



government, and formed with the aim of rationalizing production, to support the national plans. In Indonesia, cooperation as an institution can be created and supported by the government while maintaining its autonomous planning, decisions, and activities, as related to case study in Aceh.

Regarding direction on mechanical and heavy equipment, it has been regulated and allowed to use with a mine depth limit in accordance with the provisions through Law Number 4 Year 2009 and Presidential Regulation Number 23 Year 2010. IPR is given by Regents or Mayors based on applications submitted by local residents, both individuals and community groups and cooperatives, where one or several IPRs can be given within the same WPR. In general, the terms and conditions of the IPR are almost the same as the IUP related to administrative aspects, in the form of an application letter, tax identification number, certificate of incorporation that has been authorized by the authorized official, requested mining commodity, and a certificate from the government office of local village, technical aspects in the form of a statement containing the holes in IPR with at most 25 meters, the use of mechanical pumps, bogging or machining with a maximum amount of 25 horse power for one IPR along with proof of not using heavy equipment and explosives. In the financial aspects, it requires the form of financial statements for the past one year, which can be owned by individuals, community groups and local cooperatives.

Development of cooperatives as well as Small and Medium Enterprises (SME)s is a strategic step to enhance the level of national development, which makes such policy to be a concrete solution to improve people's welfare. It can be achieved by encouraging cooperatives and SMEs to increase their capacity and role, in which the development is also directed at strengthening their contribution to the economy, in terms of poverty alleviation, job creation along with raising economic value added that supports high economic growth and sustainable development. Within five years from 2015 to 2019, the development was carried out by the government through various policies to improve the competitiveness of Cooperatives and SMEs. These policies include efforts to increase the capacity and business performance, strengthen and expand the role of business support systems, and increase the assistance of the business climate. Those are in line with the three levels of development of Cooperatives and SMEs where at the macro level, development of policies cover the improvement of the required business environment to support advancement. Some business environment issues are related to regulations, business competition, transaction costs, business formalization, gender mainstreaming, and the combined role of government, private sector, in addition to society. The development at the medium level comprises improving business support systems that include institutions or arrangements that provide support for increasing access to productive resources in the context of expanding businesses and improving performance. Productive resources include raw materials, capital, skilled labour, information, and technology. The expansion of business includes improving institutional governance, capacity building, and expanding market reach. Meanwhile, the development policies at the micro level include improving the quality of institutional cooperatives and SMEs as well as improving the capacity and quality of human resources both in terms of entrepreneurship, as well as technical capabilities, management, and marketing.

Based on the Online Data System (ODS), the number of active cooperatives up to December 2016 was 150,223 units and those who had conducted Annual Member Meetings/*Rapat Anggota Tahunan* (RAT) were 80,008 units. Of the number of active cooperatives that have been awarded the Cooperative Registration Number/*Nomor Induk Koperasi* (NIK) certificate until the end of December 2016 were 8,459. The

ESDM Ministry itself does not focus on matters outside of their areas of authority. In the bureaucracy, there will be no effect where the ministry only focuses on matters that can be regulated by the authority of the central government alone, since cooperatives are the authority of the provincial government.

#### **1.6.4 Does the ‘Green Aceh’ policy affect the coal mining industry development in Aceh?**

Regarding environmental issues, Article 157 on Law Number 11 Year 2006 has covered that each business actor is responsible for carrying out the reclamation and rehabilitation of explored and exploited land, which before undertaking business activities, obliged to provide reclamation and rehabilitation guarantee fund in the amount of which will be calculated at the time of the exploration work contract is discussion and exploitation phase begin. Proceeds from mining activities are used to carry out balanced economic, social and health development of society as compensation for the exploitation of non-renewable natural resources, in accordance with Article 158. It was also added in Article 159 in which every mining business actors that carrying out their related activities in Aceh are obliged to prepare a community development fund determined based on an agreement between the Aceh government and district or city government as well as business entity which amounted to at least 1% of the total production price that are being sold every year. Plans for the use of community development funds to finance programs that have been prepared together are equalized to the needs of surrounding communities near mining sites as well as in other related places which include supporting businesses. The financing of community development programs with community development funds is managed solely by the concerned companies. As for supervision, the Government of Aceh in its activities related to the Aceh development program, management of natural resources and other economic resources, as well as investment and international cooperation, is overseen by the Aceh House of Representatives/*Dewan Perwakilan Rakyat Aceh* (DPRA) as listed in Article 2.

The government itself already has a vision to implement ‘Green Aceh’ policy. Its focus is to improve the welfare of the community by considering the capacity of the environment associated with these processes (Hadi, 2019). The province has only emerged from armed conflicts and tsunami disasters, where enormous resources are needed with land-based development and exploitation of natural resources, being one of the missions or instruments to consider the carrying capacity of the environment in natural resource exploitation activities. Therefore, the owner of a IUP is required to implement good mining practices, including rules in implementing technical aspects of mining; mineral and coal conservation; mining work safety and health; safety of mining operations; mining, reclamation, and post-mining environmental management, along with post-operation; and the use of technology, engineering capabilities, design, development and application of mining technology. As for the governance of mining businesses, it requires the implementation of several aspects in marketing; finance; data management; use of goods, services and technology; development of mining technical workforce; development and empowerment of local communities; other activities in the mining business sector that concern the public interest; implementation of activities in accordance with IUP; and the number, type, and quality of results of mining business. In addition, in the implementation of governance in the management of mining services, including prioritizing domestic products, prioritizing local

subcontractors according to their competencies, prioritizing local workers, and optimizing local spending on mining goods and services.

There could have been initiatives of analysis and exploration in the R&D, where it is related to many triple helix linkup space studies, which are associated with the economy, social, and environmental fields. However, for the Ministry of Energy and Mineral Resources of Indonesia, this has yet to be the main focus. Normally, mining activities are located in lands that could be considered as forest, which makes the permits to be quite complex, long, and costly. Forest areas that are able to directly carry out mining activities without forestry permission are those who have the Land-Use Area/*Area Pakai Lahan* (APL) status. Such things were created to support the reduction of deforestation, even though resistances still occur from local people, especially those who joined NGOs or *Lembaga Swadaya Masyarakat* (LSM). Negative response happens due to the facts shown on charts 69 and chart 70 regarding deforestation and in comparison with the data on Chart 71 related to reforestation, where it displays higher reduction on the forest area compared to replanting activities and the increasing number of forests. In addition, the utilization and application of post-mining lands depend on post-mining reports approved by the local government. After mining activities have been finished, the soil needs to be fertilized using required elements and chemicals. Post-mining guarantee funds placed in the local government can only be taken after the post-mining report is completed and accepted by the government with their own national and provincial standards. Furthermore, there is no limit on duration of completion of post-mining obligations for this matter. If there are disputes related to post-mining results that are different in definition and conclusions on both parties, a third party can be sought and asked for a second opinion, which is generally a consultant or educational institution. The last dismissed team was the one who does the reclamation and post-mining activities due to the needs to control and ensure the settlement process of mining affairs to the end to be completely finished. In addition, the Central Government is also encouraging the provincial Government for construction of solar powered power plants for former coal mines and reservoir areas (i.e., for former mining areas that have not been leveled and converted into water storage areas).

However, existing rules and precautions can be regarded as effective or worthless in ensuring the sustainability of mining operations where differences occur mainly in the respective culture and ethos of each region. For example, a culture that has stronger family systems such as in Sumatra, commonly happens due to a denser population in the region which creates diversification and heterogeneity in the community, in which they need to preserve the uniqueness of their own family. However, such matter is not directly related to or influences the mining operations in each location. Relatively there is some resistance from certain locations which are generally based on the economic interests of certain people who see the opportunity to obtain more profits in their own area. Community leaders who control or have sufficient influence feel that they have the right to get additional benefits from natural resources which are related to improving the economy in their territory, both for the society and for their own personal needs or wealth. Strong local economic individuals, i.e., usually called by other Indonesian as regional kings'/*raja-raja di daerah*, have strong ties in local communities throughout the grassroots level, where they have the ability to regulate their level of involvement in mining project which leads to extra income in the form of fees, facilities, etc. Despite that, it is generally become or considered as a little coercion to use existing and potential services or facilities from related mining companies.

Related to foreign investment, to guarantee great benefits for local people, foreign capital holders of IUP are required to divest their shares after five years of production, which makes the share to be at least 20% owned by Indonesian that are consisting of the central government, provincial government, district or city government, BUMN, Provincial Owned Enterprises/*Badan Usaha Milik Daerah* (BUMD), or national private business entity. If the provincial, district or city government is not willing to buy shares, the bidding is carried out by auction. In the event of an increase in the company's capital, Indonesian participants may not be able to dilute shares to less than 20%. In addition, regarding domestic specificities and priorities, Government Regulation Number 23 Year 2010 concerning the implementation of mineral and coal mining business activities states that those are intended to implement policies in prioritizing the use of minerals and/or coal for domestic interests as stated in Article 2. Companies can use goods, services, and technology from abroad, which in the utilization for processing and refining must meet the domestic content level in accordance with statutory provisions which are determined by the Minister.

#### **1.6.5 Is it possible for the mining company and local government to work together on solving the problem of corruption, collusion, and nepotism in Aceh?**

Related to prevention of corruption and improvement of anti-corruption act, are currently being implemented in the mining sector. In addition, part of the efforts of the Aceh government is to be open to institutions and organizations such as the KPK, NGOs, etc., where the Aceh Government is ready to be monitored on all matters both in the scope of management along with other aspects. Presentations and discussion regarding the mining company's work plan and budget also invite the director general of taxation, as well as the finance and revenue department, therefore everything related to mining companies in Aceh can be monitored by all sectors in Aceh, to minimize and prevent corruption in the mining sector (Dewi, 2019). As a form of supervision, companies must submit all data obtained from exploration and production activities to the Minister, Governor, Regent and/or Mayor in accordance with their authority and obliged to submit periodic written reports on work plans and budget for the implementation of mineral or coal mining business activities to Regents or Mayors with a copy to the Governor and Minister. In addition, from the government side, the Regent or Mayor must submit a written report regarding the management of mining business activities in accordance with his authority to the Governor, which is then followed by a written report on the management of mining business activities in accordance with his authority to the Minister on a regular basis in every six months. work progress in a period of time and in a certain stage of activity submitted by the mining company, within a period of no longer than 30 days after the end of each quarter or calendar year, except bi-weekly and monthly reports on the stages of production operation activities. The annual work plan and budget is submitted to the Minister, Governor, Regent and/or Mayor no later than 45 days prior the end of each calendar year, bi-weekly as well as monthly reports within five days after the end of every two weeks or calendar month. Afterward, they may respond to these reports and must be followed up by the IUP holder within a maximum period of 30 days from receipt of response. Companies that violate these provisions will be subjected to administrative sanctions, in the form of written warnings, temporary suspension or revocation of IUP.

### 1.6.5.1 Backbone infrastructure problems due to difficult bureaucracy related to corruption, collusion and nepotism

One of the areas in Indonesia that has lots of mining activities is in Pontianak, Kalimantan island, which has plans and development of direct railroad networks, gas pipelines, etc. However, the ESDM Ministry does not provide support for these things due to some circumstances and were usually built by private parties, BUMN or the Ministry of Public Works/*Kementerian Pekerjaan Umum* (PU). The ESDM Ministry only provides information and data to be processed by the company itself. Regarding the authority of the Ministry of Finance on the issue of financial support, the new regulation states that ministries may only provide regulations and issue permits. At present, there is a one-door system in the BKPM, which makes the 'additional' costs disappear. The infrastructure specifically built for mining activities, are almost non-existent and must be built by coal companies themselves. In several areas, transportation infrastructure for commodities is depending on the river due to its cheaper and easier construction. There must be some assistance in the development of backbone infrastructure from each potential area based on its own characteristic, where many mine infrastructures are not well coordinated and without the mining route backbone. There are plans to make a railroad funded by the Government to Government (G to G) scheme, originally from the New Order/*Orde Baru* Presidential era, yet without further implementation. Many initial plans were created to centralize ports for coal shipment, but in reality, it was made by large companies themselves. Medium level companies are only able to construct ports on the river due to the financial constraint, in which the government does not have a platform or network for such infrastructure. The current mining facilities is considered to be insufficient and in general, was built by the company itself unless it is owned by BUMN that collaborates with the Indonesian railway's company (Kasli, 2019). Usually, those companies have large scale operational activities and plenty of funding sources. Likewise, a company in South Sumatra province has built its own railway transportation network with substantial funds, where the locomotives and carriages were purchased from China, in opposite to railroad coal transportation plan in Kalimantan that has not been fully realized due to huge amount of required costs and several difficulties in executions and appointment of person in charge (ibid). As a solution, consortiums of mining companies are capable of carrying out infrastructure development, together with regional banks or national banks. However, it is necessary to calculate whether the project will be economical or not prior to committing and deciding to initiate such a program.

Port development is currently a major issue in order to encourage regional and national economic growth and equity. Port according to Law Number 17 Year 2008 concerning Shipping, is "a place consisting of land and/or waters with certain boundaries as the boundary of business activities that are used as a place for the vessel to lean, embark or disembark the passenger and loading and unloading goods, in the form of terminals equipped with shipping safety and security facilities and port support activities as well as intra-transitional places and between modes of transportation." Ports can also support the local and national economy, encourage industry development, provide employment, and generate income for the local government. All activities of landing, trading, and distribution of goods and commodities between regions are carried out through the port. In addition, the role of ports is getting bigger along with the importance of ports in logistics activities. Based on data from the Department of Transportation, Communication and Telematics/*Departemen*

*Transportasi, Komunikasi dan Telematika*, there are 11 ports in the province of Aceh that are included in the Sumatra Economic Corridor/*Koridor Ekonomi Sumatera* in the Master Plan for the Acceleration of Indonesian Development/*Masterplan Perencanaan Percepatan Pembangunan Indonesia* (MP3EI). However, the utilization of the port's potential has not been maximized. Most of the commodities of both for domestic and export from the province of Aceh are carried out through the port of Belawan in North Sumatra. This shows that ports in Aceh have not been able to compete with ports outside of its own province. The inter-port competition that occurs is actually a competition between the logistic chain of ports (Meersman et al., 1997). Based on data from the Information and Documentation Management Officer/*Pejabat Pengelolaan Informasi dan Dokumentasi* (PPID) of Aceh, in 2016, the port service contribution was only IDR 150 million (2016US\$ 11.27 thousand)<sup>6</sup> or 0.0012% of the total revenue of Aceh. Therefore the regional government of Aceh sees the need for the development of ports in this area.

One of the development plans for the Joint Port area specifically for coal mining is located in the Nagan Raya area, a district that has been formed since 2003 which is located between the districts of West Aceh and Southwest Aceh. It is one of the regions with the greatest potential for natural wealth among 23 other districts and cities throughout Aceh, which consists of gold, coal, silver, resin, and palm oil. In addition to the many unexplored lands, the location of this district is in a strategic position. In the current condition, transportation of commodity products from Nagan Raya is carried out through the seaport of Meulaboh (West Aceh district) and Susoh port (South-west Aceh district). The encountered difficulties are consist of remote locations of commodity-producing locations (e.g., palm oil, plantations, and mines), less integrated road access and lack of port facilities which results in many natural resources that are eventually transported by land to the port of Belawan, therefore create higher cost of shipping and longer arrival time estimation. Such problems burdened the businessmen in Aceh, thus encouraging them to initiate ideas and plans for port development in Nagan Raya where the coal mining industry, especially in the form of a consortium, is the only business that has the best capability and visibility to initiate and trigger the infrastructure development. At present, PLTU 1 and 2 have been built, while PLTU 3 and 4 are being constructed in this district. In addition, based on the Spatial and Regional Draft/*Rancangan Tata Ruang dan Wilayah* of Aceh, the Kuala coastal sub-district within Nagan Raya district is also being developed as an industrial area.

These matters raise several considerations in the construction of special integrated ports, with its five main criteria which based on the conducted research and need to have huge positive impacts such as to create hinterland connection which is an area behind the port, where the extent of relative and unknown administrative boundaries of a region, province or boundary of a country depends on the presence or absence of a port adjacent to the area, which borders the city and receives direct or indirect influence from the city itself. Specifically, hinterland itself is a supplier of natural and human resources. Thus, the Hinterland connection is defined as every facility that enables the implementation of linkage between ports with all industrial locations, agriculture, and trade in the broad sense that is located in the hinterland within the port location. Port and hinterland are having an interplay and an interdependence relationship, as if the hinterland does not have the potential to develop, subsequently the port will have less to none effect. Conversely, areas that are not supported by

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<sup>6</sup> Bank of Indonesia, Middle Transaction Rate/Kurs Transaksi Tengah, USD 1 = IDR 13,307.38, [www.bi.go.id](http://www.bi.go.id), (2016).

adequate ports with high levels of efficiency will hinder industrial development, agriculture, and trade in the hinterland. It leads to the connectivity of transportation, where ports act as interfaces between sea and land transportation modes, gateways for incoming and outgoing flows of trade goods from/or to the relevant hinterland and industrial estate development in export-oriented port areas. Besides in physical capacity, services are also need to be considered due to its operational for local, regional and international trade needs from hinterland; assist the running of the commerce activities and the development of surrounding industries; along with accommodating an increasing market share to serve local, regional and international trade both for transshipment and transit along with providing industrial development facilities in surrounding area. Economy is an important factor in which connecting and integrating ports in the use of shared roads can save transportation costs. Thus, with lower expenditures, existing industry development potential can lead to the construction of a warehouse for cement, fertilizer, integrated industries, and the construction of smelters for iron ore, lead, gold, and coal upgrading facilities. Social aspect is required due to the safety element for the local community that needs to be considered where port location is distant from residential areas thus it is protected from friction due to environmental impacts such as noise, air pollution (e.g., dust) and the possibility of other kinds of pollution. In this case, land territory in the development area is a customary land that has been owned and used for generations, with the basis of rights in the form of sporadic, seals, certificates of ownership and the rest of its legality requirements are considered clear and official. Approval from the surrounding community is also necessary to receive suggestions on how to effectively improve their economy, create jobs, and increase regional growth.

#### **1.6.5.2 Coordination between government institution as prevention of corruption, collusion and nepotism**

In compiling this Government Regulation, the determination of National Government affairs in Aceh is carried out based on the criteria of externality, efficiency and accountability. The externality criterion is based on the idea that the level of government that is authorized for a government affair is determined by the range of impacts caused by the administration of government affairs, while the use of accountability criteria is intended to provide an opportunity for the public or community representatives to oversee the running of government affairs in accordance with democratic principles to encourage accountability to the people. Lastly, the efficiency criterion is that the organizer of a government function should be determined based on a comparison of the highest levels of usability that is able to be obtained, meaning that if a government function is more efficient if handled by a certain level of government, then the specific governmental affairs are better carried out by the level of government that has the most economical factors. Implementation of the three criteria is based on the spirit of democracy that is applied through the criteria of externality and accountability, as well as an economic spirit that is realized through efficiency criteria in order to synergized as an effort to realize the welfare of society and democratization through the implementation of national government affairs in Aceh. To ensure this, consultations are carried out in the form of correspondence or meetings between the initiating Ministry or Institution of the Non-Ministerial Government or the House of Representatives with the Chairperson of the DPRA or the Governor of Aceh to achieve the same understanding of an International Approval Plan, Formation of Laws and policies administrative that will be created,

which is directly related to the Aceh Government. In addition, written consideration can be given from the Governor or the DPRA to the initiating DPR leadership of Ministries Government Institutions.

However, there is a problematic issue regarding the coordination system between institutions in Indonesia, especially for mining activities that are related to several different ministries. For comparison, another country such as Tunisia is more flexible regarding coordination and collaboration between institutions within their own countries, as well as in other countries (Hariwan, 2019). The root of the problem in Indonesia is that there are too many regulations that make it extremely difficult, time-consuming, and where some created contradictory rules leads to more challenges. The last point raised an issue and considerations for choosing which regulations must be sacrificed and strengthened, where the interests of the local and central government are sometimes different. Several coordination meetings were held, both internally and between different institutions such as the executive and the legislative. The length of the bureaucratic process that is being carried out and the budget spent has drawn protests from various parties. Not infrequently, many people accuse that this was done to spend the budget, where the indicator of budget absorption became a positive assessment in the Indonesian government system. Extra wages earned from each meeting may also refer to budget waste and 'legal form of corruption' if there is a deliberate factor by prolonging the settlement and excessive amount of meetings. In addition, the most flexible countries for coordination between institutions and permits exist in Europe, especially in Eastern Europe, where they have many natural resources and as well receive influence from the European Union system. Likewise Indonesia, countries such as China and India also have permit requirements with a considerable amount restriction and processes, to protect their massive coal reserves (ibid).

### **1.6.5.3 External organizations who supervise and control the clean government and corporate acts**

The relationship with NGOs is more in the form of discussions and seminars (Kasli, 2019). Raised issues including various illegal mines that actually need to be monitored and acted upon, in addition to legal mines are not even necessarily good and utilize good mining practice concepts. weakness exist since there are very few mining inspectors with the status and authority as ministry employees along with Civil Servant Supervisors/*Pengawas Pegawai Negeri Sipil* (PPNS) who focus more on cases of environmental damage and work safety. For corruption cases, the delegation was carried out to the Attorney General's Office, the Police and the KPK. Changes in the status of mine inspectors occur, and this causes a reduction in their budget. Furthermore, even though they have the status as ministry employees, nevertheless their operational budget comes from the provincial government, since the budget and financial conditions of the provincial government are limited, making it difficult to move freely to other related regions (e.g., exclude the capital city) to effectively conduct their work (ibid). In relation to the illegal activities and reports, PERHAPI that has a network to connect the needs of experts (e.g., consultants) related to the mining sector, is able to issue a certificate of expertise while overseeing the 'Competent Person.' In violation, the license can be revoked, and the report will also be recorded on the Indonesia stock exchange. If there is a falsification of the amount of mineral/coal reserves, then it can be subject to criminal law and the obligation to compensate the losers. This happens due to the same methods that tend to be used in which irregularity exists, where comparison and verification of methods and data can



be conducted to prove such issues. A database of people with expertise in this organization already exists and can be accessed as needed.

#### **1.6.5.4 Additional costs that arise due to poor governance system**

Unofficial additional costs have been reduced so far, especially since many regional government's leaders have been arrested due to crimes related to mining activities. However, it needs to be recognized that there is still miscommunication and miscoordination between the provincial governments and the central government. The problematic regional royalty issues have been informed and reported to the Director-General at the Ministry of Energy and Mineral Resources. Furthermore, mining companies were informed that if the name or used terms are different, it will not contradict the rule and is permitted. However, confusion arises among practitioners, and it needs to be brought to the legal route to be translated properly and legally since based on existing rules, an object, including mining goods, may not be taxed twice (Kasli, 2019).

#### **1.6.5.5 Problem of overlapping land and regulation between different institutions and business categories**

Other problems consist of overlapping land and regulations that have been controlled by other industries. Such things happen as the legacy of pre-existing provisions where there is an inconsistency and ego between institutions which makes it difficult for collaboration and data matching. Coal industry was booming in 2000, where at the same time, the palm oil industry was simultaneously expanding in which land use disagreements occurred. It is well known that every permit issued has a particular fee that must be paid and will be received as the local government revenue, where a higher number of issued permits will lead to the increase of regional income. Such problems generate additional duration, procedure and cost, which makes it ineffective and inefficient. Action has been taken to clarify the regulations. However, real-life implementation is uniquely different compared to existing provisions and gives rise to other challenges. Another example is regarding palm oil companies that are mostly in large groups which in fact control the industrial sector in Indonesia, while most coal companies are middle to lower class companies, which makes it difficult if land conflict arises. However, since palm oil plantations do not pay royalties, thus in comparison coal mining has a more significant contribution to local governments.

Policy improvements to simplify procedures and reduce overlapping including simplifying licensing requirements, accelerating time, and reducing costs to establish, operate, and develop businesses have been carried out by the government since 2015 through the One Stop Integrated Service/*Pelayanan Terpadu Satu Pintu* (PTSP) policy. PTSP is an activity of organizing a permit and non-licensing based on delegation or delegation of authority from an institution or agency that has licensing and non-licensing authority, whose management process starts from the application stage to the issuance stage of documents that are carried out in only one location. This system can reduce the processing time for several licenses, thus makes it more efficient and effective. Furthermore, the government is aggressively cutting down regulations that are seen as hampering investment through the Economic Policy Package/*Paket Kebijakan Ekonomi* (PKE). This is carried out with the pattern of bringing up new regulations that are formulated in the context of accelerating investment, which results in the revocation of several related regulations as outlined in Presidential Regulation

Number 91 Year 2017 concerning the Acceleration of Business Implementation. In this regulation, the Government is seeking simplification in terms of business licensing through:

1. Forms of service, escort, i.e., end to end, and active role in resolving barriers to business implementation through the establishment of task forces at the national level, ministries or institutions, provincial areas, and district or city areas, in order to support the acceleration of the establishment of a good investment climate;
2. Regulatory reforms are needed to carry out business activities, which further simplification needs to be regulated and re-established service standards in ministries or institutions, provincial areas, and district or city areas, with the aim of being harmonious and not overlapping;
3. Electronic Business Integrated Licensing System/*Perizinan Berusaha Terintegrasi Secara Elektronik (PBTSE)* as the implementation of information technology plan in order to speed up and simplify services for conducting business activities.

The Government's commitment above was carried out by the President through stipulating the President Regulation Number 24 Year 2018 concerning Integrated Electronic Business Licensing Services or known as the Online Single Submission (OSS), a business license issued by the OSS Institution for and on behalf of Ministers, Head of Institutions, Governors, Regents or Mayors to business actors with an integrated electronic system. Through this regulation, the government has reduced the number of permits, which originally amounted from 537 permits to only 237 permits and from 362 non-permits to become only 215 non-permits. The various descriptions, explanations and data above finally arrived at one point, namely the problem of complexity or difficulty in doing business in Indonesia due to massive number of regulations, i.e., over regulated, in the field of licensing whose substance is not harmonious, overlapping and even conflicting with one another. Such regulation creates a long and convoluted licensing system that results in an investment climate in Indonesia that is ineffective, inefficient and does not provide legal certainty. In the end, it has contributed to the decline of interest from foreign investors to Indonesia, especially for upstream industries such as mining and smelters. Efforts to improve the ease of doing business through the formation of Presidential Regulation Number 91 Year 2017 and Number 24 Year 2018 apparently cannot fix the entire licensing system since faced normative issues are more complex, which intersects with various laws, of more than 80 Laws that have less licensing dimensions.

One of the government's strategies to encourage economic growth through increased investment is to reform regulations in the field of business licensing. The reforms that need to be carried out are aimed at resolving investment barriers, viz the length of the bureaucratic chain, overlapping regulations, and the number of regulations that are not harmonious, especially in central and regional regulations, i.e., hyper-regulation. Therefore, it is necessary to deregulate the provisions regarding business licensing, investment requirements, employment, Micro, Small and Medium Enterprises (MSMEs) including cooperatives, land acquisition, development of economic zones, implementation of government projects, and provisions regarding government administration and the imposition of criminal sanctions that are regulated in various laws. In the case of the deregulation process carried out in a business-as-usual manner, particularly by amending one by one, will prove to be difficult for integration in a quick manner. Therefore, the application of the Omnibus Law method is required by forming a single thematic law that changes various provisions stipulated

in various other laws. In Indonesia, the law was created as an effort to produce enormous new jobs through easiness, protection, and empowerment efforts of micro, small and medium enterprises, enhancing investment ecosystems and ease of doing business, and Central Government investment as well as acceleration of national strategic projects by simplify existing regulations to overcome the previous problems and obstacles. This discourse was first presented on 20 October 2019 by President Joko Widodo in the inauguration of his second period of presidency and was later reinforced by the Press Release of the Coordinating Ministry of Economic Affairs Number HM.4.6/154/SET.M.EKON.2.3/12/2019 concerning the Omnibus Law Bill: Efforts to Strengthen the National Economy through Job Creation and Providing Tax Facilities, with the legislative body of the House of Representatives where they discuss and agree to consider this draft as a top priority in the 2020 National Legislation Program to accelerate the improvement of Indonesia's investment climate and competitiveness.

The objective of the work creation strategic policy is to create or expand employment through arrangements related to enhancing the investment ecosystem and business activities; increasing the protection and welfare of workers; facilities, empowerment, and protection of MSMEs and cooperatives; and increase government investment and accelerate national strategic projects by doing various simplifications in business licensing such as the investment requirements; research and innovation; land acquisition; and economic area. It also facilitate licensing for foreign workers who have certain expertise that is still needed for the production process of goods or services. The improvement of the investment ecosystem and business activities is performed by application of risk-based business licensing, simplification of the basic requirements for business licensing and land acquisition, simplification of business licensing sector, along with simplification of investment requirements. Risk-based business licensing is closely related to the mining industry where the risk is considered to be massive and require government support to further advance and accelerate the development of this industry. It is done by calculating the risk level determined based on the calculation of the value of both hazard level and potential of the hazard occurrence, taking into account the aspects of health, safety, environment and/or resource utilization. In addition, the type of business activity and its criteria, location of business operations as well as limited resources are also taken into account. Based on assessment of danger level and potential for the occurrence of hazards, the risk level of business activities should be categorized as low, medium and high risk business activities. Moreover, simplification of the basic requirements for business licensing and land acquisition include suitability of spatial use activities, environmental approval and building approval along with certificates of worthiness which encourage more effective land use regulations. Hence, Local Governments are required to prepare and provide Detailed Spatial Plan/*Rencana Detail Tata Ruang* (RDTR) in digital form that is in accordance with the actual standard and can be easily accessed by the public to obtain information regarding the suitability of the location plan of their activities and/or business with the RDTR, where the implementation of spatial planning is carried out by the Central Government in regard of environmental carrying capacity aspects as well as capacity compiled in a strategic environmental study including the suitability of the accuracy of the spatial plan map. Due to this centralized law, government officials receive a new status as the central government office team which however are still located and remain in Aceh. Currently, there are employees who are being paid at the central and local levels of government, where initially they were the regency's officials which subsequently represented the provincial government and still located in the Regency area. With the new law, every one of them will become the

central employees thus the new province's ESDM authority is only related to recommendations and not in technical aspects. Thus, *De facto* people already exist with such a transfer of supervision scenario. In addition, their salary does not change as the result of government standards for wages based on class or rank.

In the elucidation of this Bill, mining areas are included in the category of cultivation areas as listed in Article 5 Paragraph 2, That is related to the interests of development outside of forestry are activities for strategic purposes that cannot be avoided, including mining activities, construction of electricity networks, telephones, and water installations, religious interests, along with defence and security interests. In mining management for policy making and strategic plans related to the above regulations, the government has prepared a national-level mineral and coal resource balance sheet which describes the amount of mineral and coal resources, reserves, and production.

#### **1.6.6 Is it possible to apply the gasification and liquefaction processes in coal mining activities to reduce negative environmental impact and raise positive social impact in Aceh?**

In accordance with Government Regulation Number 23 Year 2010 in Article 93, mining companies are required to conduct processing and refining to increase the added value of commodities produced, either directly or through cooperation with other companies. Possibilities for adding value are gasification and liquefaction are often discussed in the planned downstream activities or coal production plans in Aceh. In analysis of the Regional Energy General Plan/*Rencana Umum Energi Daerah* (RUED) and the National Energy General Plan/*Rencana Umum Energi Nasional* (RUEN) which is a detailed elaboration of the KEN and is the basis for the preparation of the General Plan for National Electricity/*Rencana Umum Ketenaga Listrikan Nasional* (RUKLN) which subsequently becomes the basis for the preparation of the RUPTL, it was discussed that coal can also create downstream products through efforts to increase added value, which has been reviewed in Law Number 4 Year 2009 of efforts to raise its value and overall profit. Furthermore, Aceh's ESDM has also informed mining companies, especially coal related mining, to start the endeavor to increase coal added value based on the appropriate type of coal as well as social, economic and energy needs of the local community (Dewi, 2019). Likewise, related to the Omnibus Law on the Work Creation Bill in Article 102, there is an ease in the mining industry that is provided with the condition to increase added value through processing for non-metal minerals and rocks along with additional refining activities for metal minerals. If development and utilization is carried out, which can be done in collaboration with the development of coal utilization through operators for mining business activities, including special operations or with other parties that conduct business development and utilization of coal, it becomes possible to be excluded from the fulfilment of the domestic market obligations. Another special treatment is the imposition of 0% royalties as stated in Article 128A Paragraph 2, with the purpose to increase economic competitiveness, improve the current account deficit and equitable development as well as job creation in Indonesia. In addition, the export of the value added industrial sector has a higher resistance to global economic fluctuations compared to the primary sector (i.e., raw goods) (Pandjaitan, 2020).

Gasification technology itself has been used for a long time since the 1800s to produce transportation fuel due to the oil shortage during the World War 2. In addition, the development of this method is carried out due to the issue of sustainability which

can create no smog-causing particulates, concentrated and capture-ready CO<sub>2</sub> stream as well as sulphur removal that allows the use of high sulphur coal. Its low incremental operating cost would also be economically beneficial in a low oil price environment (Pramono, 2020). Currently, there are already several locations in Indonesia that carry out the gasification and liquefaction methods. However, it is not yet a common trend in Indonesia since the government still needs to carry out its vital role in this matter, due to the inadequate experience and insufficient desire of private companies, by the reason of the existing market that mainly used traditional methods. The ESDM Ministry already obtains knowledge on such technology and sale has been made from their R&D, except on raised problems due to higher cost for implementation on industrial scale and consideration of technology that will be absorbed or adapted. Regulation and procedure for this technology have already existed although need more improvement and support. Moreover, most currently utilized systems are adopted from China along with other adoption from Germany, Balkan region, etc. (Kasli, 2019). Decrepit Mining Areas (DMA) that was adopted from America was conducted in Riau province by BA with a massive investment of US\$ 2 billion, i.e., a large scale project, followed by PT Pertamina, a state-owned mining company (ibid). Obstacles exist due to many adoptions from different countries and large numbers of failures since not every aspect can be replicated. The method is carried out by firstly spraying the stored coal located beneath the earth with chemical liquid and then extracted. Other related natural resources are Coal Bed Methane (CBM), referred to as gases trapped in the coal basin. It is rarely used due to uneconomical factors, and further detailed feasibility studies are needed to ensure knowledge and information regarding the number of benefits that can be obtained as it will be considered profitable or the opposite. The newest technology to extract coal is by using the fracking method to collect the Coal Seam Gas (CSG), which is "a natural gas (e.g., methane) sourced from underground coal formations, sometimes known as coal bed methane" (John, 2011).

In Indonesia, the Director-General of the Chemical, Textile and Multifarious Industries/*Industri Kimia, Tekstil, dan Aneka* (IKTA) of the Ministry of Industry inform that low-calorie coal can be developed to produce dimethyl ether gas which can replace Liquefied Petroleum Gas (LPG) despite having a lower energy value, resulting in gas raw material imports that are no longer needed. An investment of IDR 13 trillion (more than 2019US\$ 900 million), is needed to produce in equal to 1,000 metric tons of coal gasification derivatives. If calculated, during testing phase carried out by the ministry, it is possible to convert 100,000 tons of coal into 3,600 Million Metric British Thermal Units (mmbtu) of gas per day (Ministry of Industry of the Republic of Indonesia, 2019). Furthermore, if the produced gas is not utilized, an alternative market can be applied to domestic industries. In addition to the potential, such investment will also generate large added value for the domestic industry since the end product is possible to be used, besides to the needs of supplementary infrastructure. Furthermore, the Minister of Industry of Indonesia, has met with the Zemag Clean Energy Technology GmbH from Germany in January 2019, where the cooperation between both countries will result in a pilot project for coal gasification facilities in Indonesia. Regarding the location of the factory, it is offered in the Kalimantan and South Sumatra regions. The development of this industry is actually quite attractive to foreign investors amid the global economic slowdown. Indonesia needs coal gasification derivative products for the manufacturing industry. At present, the government is still exploring methanol investment with low-calorific coal raw materials, since it has several uses for the production of adhesives, rubber, paper, textiles, paints, plastics, films, medicines, synthetic glass, solvents, coolants as well as

a mixture of diesel fuel with Fatty Acid Methyl Ester (FAME). Fortunately, there are no significant issues since the use of Business to Business (B to B) scheme does not require subsidies from the government. The company claims that its technology is currently being implemented by 180 coal processing plants globally, including the first coal processing plant that operates since 2000 in Germany. It has the technology to reduce the humidity level of low-calorie coal, process coal into briquettes and up to the coal gasification process. The treatment has enabled production of various types of derivative products such as methanol, ammonia, oil, olefin and synthetic gas.

Another cooperation has been made between BA, Pertamina as well as Air Products and Chemicals (APC), Inc., a company from the USA to establish a joint venture to produce Dimethyl Ether (DME) in the form of gas and synthetic natural gas (CNG), BA would become a supplier and investor while Pertamina act as an off-taker and investment while APC would become an investor and its source of technological ownership. A total investment of US\$ 3 billion for this cooperation is intended to enable Indonesia to produce LPG substitution products, which currently are still purchased from foreign countries (Juwono, 2020). Hence, the trade balance became negative, where the biggest import was from the energy sector, where around 70% of LPG is still imported. In 2017 Indonesia consumed no less than 7 million tons of LPG (Bukit Asam, 2019). Such collaboration led Indonesia to enter the stage of sustainable energy which could reduce dependence on imports by using domestic materials. The coal production will be done in the Peranap mine in Riau, Sumatera, which has not yet operated due to its exclusively low-calorie coal. This technology and investment will be used to produce a syngas (SNG) that will be processed into gas, with the Front End Engineering Design (FEED) stage in 2020 (Tasrif, 2020). The coal ingredient is under 3,600 kcal, which will be used in the amount of 5 million metric tons per year, from its total reserves of 600 million metric tons. The first phase will begin at producing around 1.4 million metric tons of gas from 5 million metric tons of coal (Pertamina, 2019). The plant proficiency will have a capacity of 400 thousand tons of DME per year and 50 million standard cubic feet per day (mmscfd) of SNG. Moreover, in 2024 BA plans to produce 500 kilo tons of Urea fertilizer per year, 400 kilo tons of DME per year and 450 kilo tons of polypropylene per year (Tasrif, 2020). BA's downstreaming is strengthened by its coal resources of 8.3 billion tons and coal reserves of 3.3 billion tons. The downstream process in the mining sector will also have a major impact on Indonesia, especially in anticipating the Current Account Deficit (CAD). It has been guaranteed by the CEO of Pertamina that this DME will later have a lower selling price than the current LPG price. On the other hand, the government is still deeply examining this matter since this product still requires subsidies due to price disparities with its substituted products, based on their assumption. Hence, a better energy subsidy management is needed to get maximum economic benefits especially as import substitution (Pandjaitan, 2020). The construction itself will take place for 18-24 months and the produced gas from this project is expected to be commercialized in the upcoming 2021. This gasification plant will have two locations, namely in Tanjung Enim and Peranap. For factories in Tanjung Enim, the investment is around US\$ 3 billion and for factories in Penarap is around US\$ 2 billion. The Dimethyl Ether project will later convert coal to gas; besides those products, it can also produce fertilizer. In addition, KPC also plans to do the gasification from coal into methanol in East Kalimantan Province with an estimated amount of 4 million tons (Tasrif, 2020).

Coordination and learning for this new project needs to be done with the Public Policy of IAGI, as a forum for experts which revealed that in order to build a gasification plant, there are certainly many aspects that must be considered. It is not

only regarding financial but also technical parameters such as reserves, coal quality, scale, off-taker, and water requirements when building gasification on site, where conducting a FGD is highly recommended prior to deciding and creating a final assumption. It is important to know that gasification, especially DME, is entering into industrial chemical areas. Even though the PKP2B is basically for the mining industry which is responsible to provide raw material need for upstream to downstream industries. In addition, to build gasification, the PKP2B parameter has become a special mining business permit for production and operation. Furthermore, the validity period of the IUPK, mine location, gas demand, infrastructure, amount of reserves, quality, and financial aspects must also be considered. Due to the complexity of this initial gasification process as well as the negative impacts and risks that are not yet fully known due to the lack of large-scale implementation, such conversion from coal to gas in Aceh mining site is still in waiting for the results of the pilot project from BA, which can be used as a basis for analysis and planning and through coordination and collaboration with the Ministry of Energy and Mineral Resources, IAGI, PERHAPI, the provincial government, buyers and contractors. Several mining companies in Aceh claimed to be interested in the potential for coal gasification in the future as long as there is supporting evidence, buyers and regulations. Consideration of regulatory support and proposed incentives from the coal side could be 0% Royalty, special coal price formula for gasification, IUP validity period that is in accordance with the economic life of the gasification project and ensuring the fair price of DME products from coal gasification.

As for the alternative, coal may be refined by a direct liquefaction process wherein the coal is liquefied by subjecting it to a hydrogen donor solvent in the presence of hydrogen-rich gas at elevated temperature and pressure, i.e., liquefaction. The use of low-rank coal for the liquefaction process is intended to strengthen its value and utilize its massive reserves and at a disadvantage due to its low quality and low economic value. The coal itself contains a lot of water, yet when in a dry state, it can have the autoignition properties that is similar to other types of coal. There are two kinds of processes for coal liquefaction, such as the direct and indirect process. The indirect process is performed to produce hydrocarbons from carbon monoxide and hydrogen in the presence of a Fischer-Tropsch (FT) catalyst (Lee, 1979). Direct coal liquefaction is the process of breaking down high molecular structures into lower structured molecular oils in the presence of hydrogen as solvents and catalysts under certain operating conditions. By mixing coal, as a hydrocarbon mixture such as petroleum, i.e., consisting of larger molecular weight and lower hydrogen to carbon ratio which makes it solid, with a catalyst and dissolving aid from hydrogen at very high temperatures and pressures, the coal polymer chain can be broken which changes its nature and therefore becomes liquid which can be referred as artificial oil. This process occurs in two phases, namely conversion to soluble forms (e.g., dissolution or depolymerization) and devaluation in molecular weight and transfer of heteroatoms, which is referred to as the up-grading process (Fernandez et al., 1995).

A case study can be found in USA where they have conducted research on Direct Coal Liquefaction (DCL) for decades. It was historically started from oil price disruptions in the early 1970s which ultimately led to the urgent needs and the rapid development of the DCL process regarding basic knowledge and understanding. The biggest challenge of DCL is the fairly expensive capital costs and need to be developed in a more efficient way with advance technology for catalysts, optimizing processes, separating ashes and optimizing the refinery process for separating liquids from coal, i.e., drying. Later in 1988, an economic feasibility study of the coal liquefaction plant

was carried out by Gray and Tomlinson. Their results show that the cost of hydrotreated product, i.e., oil from Illinois coal for Integrated Two-Stage Liquefaction (ITSL) process and H-coal, i.e., a trademark of Hydrocarbon Research Incorporated plants or Exxon Donor Solvent (EDS) plants were higher than US\$ 40 per barrel in 1986, where resulted prices were more expensive than the price of crude oil at that time which were between US\$ 16-18 per barrel. Thus, the production of liquefied coal became uneconomical and was unable to compete with crude oil production.

Afterwards, Research on the development of the advanced Brown Coal Liquefaction (BCL) began in 1993 as a development of the initial concept of a pilot project in MorweU, Victoria, Australia. BCL from Victoria was made to obtain the needed data in order to increase the results of such research and upscale it into industrial scale. Some changes and modifications are needed, such as reducing energy consumption needs, minimizing the development and construction costs, producing more oil, and further upgradeable products. Research on the coal liquefaction itself has been carried out in Indonesia since the early 1990s through the collaboration of the Bandung Mineral Technology Research and Development Centre (MTRDC) and the Bandung Institute of Technology/*Institut Teknologi Bandung* (ITB) using small-scale reactors, i.e., autoclave. In 1993, Indonesia, which was represented by the Agency for the Assessment and Application of Technology/*Badan Pengkajian dan Penerapan Teknologi* (BPPT) in collaboration with Japan, represented by the New Energy and Industrial Technology Development Organization (NEDO) that has begun their work for Indonesia's BCL research related to existing potential and profitability. The study team was formed to survey the potential and the liquefaction tests of low-rank coal in Indonesia since 1994. Effort to increase technical capacity of experts in Indonesia continues to be carried out through training and procurement of the required equipment. In 1999, there were three locations that were considered favourable for establishing a liquefaction plant, followed by the process of making a feasibility study and economic level assessment. Based on the price of petroleum in that year, the coal liquefaction process is considered economical and profitable. Japan has a great interest in the development of BCL technology that uses low-rank coal as its main raw material with the aim of providing abundant and stable energy supply to Japan by changing the coal nature which was previously difficult to use and deemed to be uneconomical into a new product that could be easily transported and beneficial for various matters, including as clean transportation fuels that has become the alternative of gasoline and diesel fuel. Another example comes from Shenhua in China that has brought and applied DCL technology commercially, where the estimated break-even cost is around US\$ 35-40 per barrel. Data on conceptual cost shows that various technologies related to DCL products vary from US\$ 25.54 per barrel to US\$ 140 per barrel. In comparison, the average cost for crude petroleum in 2008 was US\$ 93.05 per barrel, and the average selling price of West Texas Intermediate (WTI) crude oil in 2009 was US\$ 42 (Oster et al., 2009, p. 3), where these data show the potential benefits and competition of DCL prices with oil. Moreover, similar operations of coal-to-liquids are also take place in Lu'an (Syngas Cooler) and Jiutai (Bottom Quench Gasifiers) in China, as well in Bengalon, Indonesia (Bottom Quench Gasifiers) (Pramono, 2020).

Asian countries have an increasing and stable economic development which boosts their requirement of energy supply. Owners of large low-rank coal natural resource reserves countries such as Indonesia are capable of taking advantage of this opportunity for establishing and commercializing such potential by using current and developing future technology. Furthermore, the government through Law Number 30 Year 2007 in Article 11 and Article 17 made the National Energy Policy/*Kebijakan*



*Energi Nasional* (KEN) which includes energy availability for national needs, energy development priorities, utilization of national energy resources and national energy buffer reserves. Articles 8 and 9 of Government Regulation Number 79 Year 2014 provide details on the targets for the supply and utilization of primary energy, including the overall KEN target. One of the goals of as stated in the Presidential Regulation Number 5 Year 2006, is the achievement of the optimal energy-mix in 2025, which includes the reduction of oil consumption of only 20% and the application of coal to more than 33%. KEN also requires that as much as 2% of the national energy needs should be originated from coal liquefaction. Comparable to raw coal, emissions are also produced from the coal liquefaction processes, where conducted research stated that the Advanced BCL process has the lowest amount of emissions, even though it used low-quality coal compared to other processes such as ESD Direct Liquefaction and FT Synthetic Indirect Liquefaction.

In the long run, integration between the coal mining industry and coal liquefaction is needed to build the Coal Synthetic Oil (CSO) plants as an optimal way to achieve productivity and efficiency. The government might intervene to support the development of this industry, including to maintain quantity and price stability by carrying out low-rank coal price regulation procedures. Government could do the favour to secure potential investments and investors such as (Soelistijo, et al., 2013) by reducing Corporate Income Tax/*Pajak Penghasilan Perusahaan* (PPH Badan), creating exemption from import duty for imported capital goods, eliminating Value Added Tax (VAT) and subsidizing prices. CSO's role in the Economy Plans for its plant development in 2025 is expected to contribute to national economic output of IDR 65.033 trillion (2019US\$ 4.59 billion) in with economic growth of 6% and IDR 82.226 trillion (2019US\$ 5.81 billion), including economic growth of 7-8% (Soelistijo et al., 2013, p. 307).

In addition, due to the long period of time for development, trials and break-even points as a result of utilization of this new technology and procedure, supplementary regulations are also made regarding work contracts and work agreements in Article 169A of Work Creation Bill in spite of the fact that if coal mining operations have not yet received an extension, it is possible to be fulfilled by changing to the business licensing related to special mining activities for the first extension as a continuation of operations without going through an auction after the end of the work contract or work agreement coal mining concessions. For those who obtain the first extension, it is possible to extend on the same business licensing category for the second extension as a continuation of operations after the expiration of the first extension of the work contract or coal mining work agreement. Both of these regulations were made taking into account the increase in state revenue, where for business licensing related to mining special extension as a continuation of operations after the expiration of the contract of work and coal mining concession work agreements is carried out by rearranging taxation and non-tax state revenue, granting that the area in accordance with planned activities in all agreement areas have been approved by the Central Government prior Law has passed and become a valid obligations to increase the added value of minerals and coal, as written in Article 102. Furthermore, government support for the use of technology to encourage added value activities are related to imposition of coal royalty obligation, 20-year tax holiday for the main activities of the Special Economic Zones/*Kawasan Ekonomi Khusus* (KEK) based on the Minister of Finance Regulation Number 150 Year 2018, the tax allowance for activities outside the main KEK activities is based on Government Regulation Number 78 Year 2019, exemption from import taxes during construction and products with a Domestic

Component Rate/*Tingkat Komponen Dalam Negeri* (TKDN) of at least 40% in accordance with general provisions of the Minister of Finance Number 176/PMK.011/2009 as amended by Regulation Number 188/PMK.010/2015, exemption from the obligation to fulfil domestic needs/DMO and also additional subsidies, where the latest are still under review and discussion. The implementation of the Increased Value Added/*Peningkatan Nilai Tambah* (PNT) policy is also carried out for a maximum period of 3 years after this Law comes into effect. This is in line with the government's plan to add three coal upgrading facilities at PT ZJG Resources Technology Indonesia in 2024, 2026 and 2028 with a respective capacity of 1.5 million tons per year (Tasrif, 2020).

In general, the economic feasibility of coal gasification and liquefaction is highly dependent on three components, namely the high investment value since it uses new technology imported from abroad, the price of coal and the price of the final product. Business operators also consider that the most appropriate Internal Rate Return (IRR) is 12%. Based on further calculations, it can be projected that several incentive policies from the government could potentially boost the IRR up to 10.99%. Details of the incentive policy are mentioned, among others, through the provision of corporate income tax holidays for 20 years, reduction of VAT on processing services, reduction of VAT on EPC with local content, provision of special tariffs for coal raw materials and exemption of coal royalties (Juwono, 2020). In addition, the land area requirement for establishment of factories in each of these projects has not been fully fulfilled so that support from the government is needed to speed up clearance, including in the provision of a Terminal for Own Interest/*Terminal Untuk Kepentingan Sendiri* (TUKS) in the form of a special port. However, the coal to chemical processing process has the potential to release fly ash and bottom ash (FABA) and other excess products.

#### **1.6.7 Is it possible to combine open pit and underground coal mining with mineral mining, forestry products, plantation, poultry, and fishery in the coal mining concession area in Aceh to reduce the negative impact?**

The Ministerial Regulation Number 11 Year 2018 regulates the initial procedures for obtaining an IUP granted by Minister, Governor, Regent or Mayor in accordance with their authority based on applications submitted by business entities, cooperatives and individuals. Regarding SMI, it is possible to have several WIUPs in one area based on Article 9. Furthermore, in Article 10, prior to the auction of WIUP for mineral or coal, the Minister must obtain a recommendation from the Governor, and the Governor must obtain recommendation from the Regent or Mayor in advance and publicly announce WIUP to be auctioned to business entities, cooperatives, or individuals. Auction explanation is carried out to describe the technical data in the form of location; coordinate; types of minerals, including associated minerals, and coal; summary of research and investigation results; a summary of the results of preliminary exploration if any; and land status. In response, based on Government Regulation Number 23 Year 2010 in Article 44, if at the WIUP location there are other mining commodities which was found and are not associated in the IUP, its permit holder has the priority in commercializing existing other mining commodities in the same area, by forming new business entities or by giving it to other parties in a form of collaboration. In addition, government policies to encourage added value of minerals have created greater potential in the utilization and profitability of these resources. For example, the price of nickel ore, which was only US\$ 36 per ton, will increase 4.97 times to US\$ 1,700 per ton when processed into Ferro Nickel and will increase 3.15 times when processed

into stainless steel. In addition, the price of Bauxite which was previously US\$ 30 per ton when processed into Alumina will increase 3.95 times to US\$ 33 per ton and will increase 2.8 times to US\$ 1,700 when processed into Aluminum Ingots (Pandjaitan, 2020).

Article 106 also states that companies are required to develop community development and empowerment programs in the vicinity of the mining area which must first be consulted with the central government, provincial government, district or city government, and local communities. The local people can propose a program of community development and empowerment activities to the local Regents or Mayors to be informed to the company. Development and empowerment is prioritized to the surrounding communities that are directly affected by mining activities, regardless of administrative boundaries of the sub-district or district area, with funding derived from the allocation of development programs and community empowerment on the budget and costs of IUP holders each year. Such a program is related to the CSR based on the Law Number 40 Year 2007 on Limited Liability Companies, whose Article 74 obliges companies carrying out activities in the natural resources sector and in related sectors to participate in environmental social responsibility. In 2012 the provisions of Article 74 were implemented with the Government Regulation Number 47 Year 2012 on Social and Environmental Responsibility of Limited Liability Companies. The regulation also deals with incentives for companies that are complying with the law and sanctions for companies which do not fulfill the CSR obligations. CSR-related obligations are also included in Article 15 of the Investment Law, i.e., Law Number 25 Year 2007, and in the State-Owned Enterprises Law, i.e., Law Number 19 Year 2003. Factors such as different perceptions of CSR among various socio-economic players (e.g., business organizations, government, etc.), a certain degree of ambiguity in the law, and weak law enforcement are currently delaying the homogenous reception and implementation of social responsibility in Indonesia. CSR is still perceived as a cost that is likely to burden companies, instead of being perceived as an investment which could potentially lead to increased economic competitiveness and to a fairer and a more inclusive economic growth. Based on the Company Liability Law Number 40 Year 2007, there are two types of CSR implementation in Indonesia such as voluntary which is intended for companies whose business are not related to natural resources while the obligation is generally intended for companies whose business are related to natural resources. Complementary regulations related to CSR are based on the Law Number 13 Year 2011 on the Handling of Poor People while indirectly instructing companies to fund social acts based on its Article 36 Paragraph 1 Point c, that is also clarified in Paragraph 2. Companies are also responsible to provide community development funds as part of its social responsibility based in Article 41 on the participation of the community, Paragraph 2 Point j. Furthermore, the Minister of Social Affairs has regulated Law Number 13 Year 2020 for the implementation of social welfare based on the establishment of CSR forum at provincial level.

However, in its development to date, there are no specific directives and technical guidance for its mandatory CSR. Hence, each company implements its CSR program voluntarily with its own framework and technical implementation, with the division of categories as charity and philanthropy by its own standards. As stated on the Government Regulation Number 93 Year 2010 concerning the National Disaster Management Contribution, Research and Development Contribution, Educational Facility Contribution, Sports Development Contribution, and Social Infrastructure Development Costs Which can be Deducted From Gross Income, companies can disburse for charity for maximum of 5% from its net to revenue based on its previous

fiscal tax year. In addition, the tax reduction scheme has been issued by the government related to the CSR implementation. For SMI, it will be based on the company's plan contained in the Work Plan and Budget in terms of the environment that consist of community empowerment and environmental sustainability aspects, with its respective nominal cost figure. In detail, it will be done by selecting the type of activity that addresses matters relating to the environment and also what is appropriate to the environmental conditions and the local community. Meanwhile, AJB budgeted every year for such activity in Aceh, since if it was stopped, the local community would be voiceless even though there were demonstrations from external parties that opposed the local needs (Kasli, 2020). In addition, local youths often provide proposals regarding requests for assistance or funding for their activities. From PERHAPI's perspective, the appropriate amount for community empowerment is approximately 1% of gross income, yet it depends on the region and the program being made (ibid). In China, the government initially builds infrastructure where afterward companies will enter intended areas, whereas in Indonesia it is the opposite (ibid). An example of proposed solution in Indonesia is by building employee settlements (e.g., housing complexes) by related companies that can be bought by employees and local people which eventually will become a new city.

It is worth to be noted that there are differences between CSR and Community Development (Comdev). Comdev is related to the sustainable term, which could be considered as donations if considered to be incidental (e.g., making roads, renovating school buildings, etc.). Nowadays in Indonesia, the use of Comdev has been diminished since it is already included in the CSR category, which incorporates the whole aspect that involves community with the initiation and financing of related companies. Furthermore, there are regulations from the government where CSR must be sustainable, which is included in the Director General's Decree/*Surat Keputusan (SK) Direktorat Jenderal*. Generally, there is a mandatory requirement of a minimum percentage of income in which for a coal company, the calculated liability is worth per ton of product, i.e., nominal, with US\$ 0.25 per ton as the minimum amount for CSR obligations, that has become the common reference, since it is come from the actual selling price. Applied parameters to carry out these activities are sourced from the average coal company. Since the possessed quality is worth 6,000 calories, and if the calorific value is lower, it is regarded to be burdensome for the company due to its less profitable condition. To further explain, CSR is the commencement prior to starting large-scale operations, related to the need for a good relationship with the local community in order to secure effective operations. In large companies, it is common to have a specific division that takes care of CSR, an independent business entity that creates profit for themselves. The parent company helps in initial capital and gives direction to prepare themselves to enter the prospective market. Mining companies, for example, will create an easier way to provide trucks transporting coal to a certain point, truck facilities that are in line with road capacity, where truck drivers are also the vehicle owners who are members of village cooperatives. It also concerns logistical security and the ability to use local road access without establishing new roads. The management of CSR coordinates directly under the Person in Charge (PIC), at the manager's level. Thus, maximizing the potential of the converted land that could be used either by the company and the local people to supply their products and basic needs. This could change their point of view and reduce the negative impact based on the previous data because most of the lands are usually deserted after reforestation and neglected by the company and society.

### 1.6.7.1 Timber

Wood or timber is a forest product that is widely used in our daily lives ranging from building construction needs, furniture to papermaking. It is commonly known that wood is taken from trees that are mature enough and ready to be cut. Therefore to obtain timber, balance must be made with the reforestation process. After harvesting, it must be initially processed prior to being used as a final product. In terms of non-timber forest products, KPH IV have various resources of Rattan, Dragon Blood, Bamboo, Arenga Pinnata, Agar Wood, Jungle Honey, Swallow Nest, Gemstones, and Redwood, where those have been exploited by the local communities in low intensity. However, data and information on these utilization are still limited to date, and need to be completed by the KPH IV management. Timber potential production may be supplied by Meranti (*Shore asp.*), Keurueng (*Dipterocarpus Grandiflorus*), Meureubo (*Intsia cf Bijuga*), Jeumpa (*Cananga Odorata*), Seumantok (*Shorea spp.*), Medang (*Polyalthia sp 2*), Damar (*Santiria Oblongifolia*), Gaharu (*Aquilaria Malaccensis*), Bubon, Tampu (*Macaranga Triloba*), Resi, Balam, Jabon (*Neolamarckia Cadamba*), Kayu Hitam (*Rasak*), Kayu Lhon (*Arang*), Mahoni (*Swietenia Macrophylla*) and Sentang (*Azadirachta Excelsa*). However, utilization in commercial scale has not been initiated.

Furthermore, the use of felled timber need to obtain a permit for using the Forest Zone/*Izin Pinjam Pakai Kawasan Hutan* (IPPKH) based on the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number P.28/Menlhk/Setjen/Kum.1/7/2018 regarding the Procedures for Granting, Expansion of Work Areas and Extension of Business Permits for Utilization of Timber Forest Products in Forest Nature, Business Permit for Utilization of Timber Forest Products for Ecosystem Restoration or Business License for Utilization of Industrial Forest Timber Forest Products in Production Forests as well as the Minister of Forestry of the Republic of Indonesia concerning the Regulation of the Minister of Forestry of the Republic of Indonesia, Number P.50/Menlhk/Setjen/Kum.1/6/2016, Guidelines for Borrowing and Use of Forest Areas. It is required for the purpose of using timber in the mining concession area, by initially surveying the amount of existing trees. Collaboration can be established with local cooperatives, since those timbers have already been paid by the company and the produced results can be utilized for village development, construction of mining mess, etc., where those have already been included in the CSR category for corporate report. The land itself is intended for the local people where collaboration with local communities could be made to produce additional profits for related companies. One of the possible collaborations could be performed for cutting, processing, and selling activities of its timber products which was considered to be inevitable due to the land clearing process prior to the mining activities. Those processes could be conducted with several procedures to ensure its quality and added value to maximize the profits of local people and also to assure the easier can be utilized of selling processed products, by creating sawmills where wood bar which is still in the form of bark must be initially cut to create desirable shape and size according to the furniture design and concept. The next process is carried out with kiln dry by drying it by using a machine and a special room to reduce the water content into around 8-12%. Usually, the wood processing plant will measure the moisture content of this wood using a special moisture meter tool. Afterward, construction work could be done that includes the process of forming components, drilling for wood connecting construction using both machines and manuals, continued by assembling processes which is vital due to its effect on the beauty and strength of the finished

product. This process requires special expertise since if the connection is not sufficiently strong, the product will be easily separated or damaged. Finishing is the final step that affects the aesthetic value of wood which will change both the appearance and color of it, which is usually done in a repeated process. It aims to fulfill the interest of consumers and must be perfectly tailored to their tastes. In addition, there are various types of processed wood that can be produced to maximize profitability from its different parts, which can be utilized for processing purposes, where different results will be obtained on post production for subsequent selling activities.

#### **1.6.7.1.1 Medium-Density Fiberboard (MDF)**

The MDF is made of similar fine wood powder mixed with resin chemicals which are glued and compacted with the machine at high temperatures and pressures. The used product is usually taken from wood leftover from plantations or bamboo, making it more environmentally friendly. The final product processed by the MDF is a board or sheet that is ready to be cut according to needs. There are also High-Density Fiberboard (HDF), stronger and denser versions of the MDF. This type of wood is often mass-processed in factories into knocked-down furniture that can be easily and quickly disassembled with connecting elements such as bowels or non-permanent connecting bolts. The MDF is easy to process because it is made of fine wood powder. Due to its density, it has a consistent and even strength in all areas of holding loads. Making such material furniture is often an option. Smooth MDF wood surfaces are easy to be carried out on finishing applications such as paints and coatings, to veneer coatings, PVC, HPL, and other laminates, allowing for a colorful and varied appearance. However, MDF is quite susceptible to moisture and water since it is made of sawdust, and highly recommend to avoid areas that are close to water or outdoors.

#### **1.6.7.1.2 Particleboard**

This type of processed wood is made from the leftovers of woodwork such as sawdust, small pieces of wood, wood chips, which are mixed with resin chemicals and then glued together and compacted in a high-quality machine. The quality of solidified wood in particle boards tends to be coarser and not uniform, which is different from the type of processed wood from MDF. This causes particle boards to be most susceptible to water compared to other types of processed wood, therefore its use is fairly limited for home furniture, as it should not be utilized for kitchen sets or outdoor furniture that are vulnerable to weather changes. In addition, such types of processed wood are also unable to support heavy load since it might curve. The connection process also requires special screws or nails to prevent quick release and damage. Finishing phase for this type of wood needs to prevent the use of ordinary paint or coating due to its rough surface, where for this reason, veneers, PVC laminates, HPL, and other layers are needed. Pricing of particle boards is also fairly inexpensive, that includes it among the cheapest of other types of processed wood.

#### **1.6.7.1.3 Blockboard**

Small wood leftover from woodwork measuring 2,5 centimeter (cm) to 5 cm can be processed into a blockboard, through a process of compaction with a related machine and coated with a wooden layer veneer on both sides into a sheet-like board. The thickness of the blockboard is from 12 millimeter (mm), 15 mm and to 18 mm,

with an area resembling plywood. Blockboards are usually made from softwood which are not as strong and as sturdy as plywood. Its pricing is a little below plywood and its quality is acceptable to make shelves, cabinets, or kitchen sets since it is sufficiently strong and waterproof, yet for its maintenance, the use of water must be avoided. There are several types of blockboards such as teak-block, which is coated with teak wood veneers, to sungkai-block, which is coated with sungkai wood veneer. Hence, it depends on the veneer layer outside the blockboard.

Regarding the difficulty of Indonesian wood products in penetrating European markets, businessmen urged the European Union to immediately implement the Forest Law Enforcement Governance and Trade Voluntary Partnership Agreement (FLEGT-VPA). With these provisions, EU countries will only accept certified wood products from Indonesia. Unfortunately, VPA for Indonesia and the European Union have been postponed twice. Furthermore, Indonesia has prepared the Timber Legality Verification System/*Sistem Verifikasi Legalitas Kayu* (SVLK) to guarantee timber legality and carry out a shipment test. The test aims to recognize the suitability of the applicable system in Indonesia and the European Union, which has been properly completed. Processed wood products, including pulp and paper, can only be considered legal if the raw materials come from sustainably managed forests.<sup>7</sup> Despite that, the use of illegal wood in the wood processing industry in Indonesia is still rampant, where applied modes by employers also vary, from manipulating forest management rights to logging trees illegally and has been carried out systematically by large companies along with local communities. The use of non-systematic illegal timber is usually carried out by people who live around protected forests where they are used to chop down trees for generations and do not realize that such actions are considered to be illegal. Moreover, there are also illegal timber processing and trading that are carried out by corporations by utilizing the local community.

In the Lancong area, West Aceh, the impact will not be extremely large due to its small scale production of timber industry, where it mainly serves the purpose of a local community for personal needs, e.g., boards, furniture, etc., which does not belong to industrial activity. Another example is regarding land clearing in the size of three hectares, which makes timber yield insufficient and impractical in business due to its small quantity and small operational scale, where the usual processing activities and its result are only executed and owned by 2-3 people (Setiawan, 2019). Wood products are considered as fairly sensitive due to attention from environmentalists, even though they are actually used for the benefit of the local community. Nonetheless, there are still negative views and connotations from such people regarding this topic (ibid).

### 1.6.7.2 Underground Mining

Technically for underground mining in SMI, there are two related categories, such as geological and physical conditions. Geological conditions consist of the geometric position of coal where the slope of such a product at SMI mining area is relatively steep with 23 degrees (Setiawan, 2020b). Technically it is relatively difficult since many technical activities must be considered, e.g., water drainage, coal transportation, equipment transportation and personnel's transportation. As coal becomes farther from the surface, it turns out to be more difficult due to higher differences in height. Coal thickness varies widely, where there are nine seams of coal yet the average thickness is only below one meter. Only a single seam is indicated but it is still between 1-2

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<sup>7</sup> Ministry of Industry of Indonesia, "Timber Industry Has Difficulty Penetrating The European Market," [www.kemepnerin.go.id](http://www.kemepnerin.go.id), (Accessed: 29 June 2019).

meters of thickness, where the average is 1.5 meters. Thus, it is one of the underground mining categories that must be considered since mining activities of materials below or above must be done, in which there needs to be a proper height of work space for the equipment and personnel. With a coal thickness of 80 cm, it is not possible to extract the whole of it since it is relatively difficult to operate as planned. Ideally, the thickness of coal should be at least 2.5 meters since the average height of the tunnel is between 1.6-1.7 meters thus there is still a leftover of 80 cm for roof and pillars, which is the minimum height to obtain work efficiency (ibid). However, it can be made possible to have a thinner coal seam left with the use of a machine, where it also depends on the quality of coal in the location that is suitable for economic value.

The aspect of Lithology, a type of rock, including coal must be considered since the materials on top of the coal will affect roof stability. It must be calculated and analysed, to consider whether it has to be strengthened and whether it is sufficient with normal pillars or needs reinforcement, for example by injecting the roof with reinforcing fluids. Mining areas normally contain water and if it leaks, will affect mine stability that leads to, for example, small landslides. Geological structural considerations are based on faults and shears. Faults are cracks that move and it is necessary to determine the tectonic direction that works in the area which must be taken into account in order to make tunnels and the entire mining system. The mining operation area is based on the main tectonic forces, where structure affects the stability of the underground mining construction and the mining area, both from roof, wall and floor stability. Thus, it is highly recommended to consider the lithology, thickness, amount of mineable seam, coal seam thickness, dip (e.g., slope) and lateral continuation. The best practice is if it is wide enough and if disturbed by any fault, there will be some displacement of coal. Hence, mine design must be properly calculated and prepared.

The most common method for underground mining is with rooms and pillars, where mining activity is carried out by leaving pillars to support the roof (ibid). In the production area, there is generally a minimal support for the room, thereby saving mining costs. This type of long wall sub-method is commonly used since it is considered to be the best in terms of efficiency and productivity, yet rather expensive. The compensation is based on higher results on mining volume since there are no pillars left. Another complementary technique that is commonly used is backwards mining, where the performed forward or backward technique depends on the geological conditions or the initial design. However, advanced techniques are also widely used towards the main tunnel. The long wall technique opens a long wall of coal, which can be up to 100 meters long with sophisticated equipment. The method for the 100 meter long coal area with power roof support rocks is fairly expensive yet comes with high productivity since everything is fully mechanized. Manual mining techniques are possible to be used although considered to be a little tricky. The preparation took a long time since it needs to create several tunnels leading to the production site. Usually the use of shear wall technique is not yet available in Indonesia and it can also be replaced with mechanical and manual hybrid techniques such as blasting or jack hammer despite less productivity. The method can only be used with certain geological conditions since it requires a flat and stable area with sufficient thickness. The advantage of the long wall method is relies on its high productivity, although with a longer preparation process due to complicated and enormous equipment. The power roof supports are also reinforced by wood since for the next production area, the backside of the tunnel is preferred to be collapsed on its own. The room and pillars method is possible to be used manually based on the strength of the roof and it is common to use manual techniques for implementation



with a crowbar. For mechanical equipment, it is possible to use jack hammer, hydraulic chisel, hydraulic hammer and blasting. The long wall method is fully mechanical because of its elongated nature. In general, it is possible to use a mechanical shear wall and it can also be carried out by blasting, i.e., semi-mechanical, which then puts the produced coal into the conveyor manually.

For the transportation system, on the front line are coal collectors which are all heavy duty equipment that will be continuously utilized and will be impacted by heavy weight regularly, where most are not in the form of a conveyor belt but with a chain conveyor form. There are categories of premier coal transportation which is a conveyor belt and lorry, secondary coal transportation which is a tertiary link to the premiere and tertiary coal transportation. The conveyor could have the form of a chain or a belt, depending on the tunnel dipping, where if it is more than 6-7 degrees, then the company cannot use the belt and have to use the chain conveyor since it will be lifted per block. In practice, there are several operational blocks that work in parallel, where the main or primary conveyor is usually at the bottom, subsequently at one point if the coal is tilted, the main tunnel will also be tilted yet towards the surface or mine entrance, it will be made as level as possible for the sake of equalization with the transportation system outside the underground mine.

In terms of mining recovery, coal is more specific due to its physical form of a lateral layer with different thicknesses, while the layer is vertically above other mining resources in which generally it will be at another coal mining location or another production point. Mining points may at one time exist and operations are carried out in parallel or simultaneously in more than one production point. However, it will be a complicated operation in terms of transportation, equipment and coal characteristics. For gas issues, detectors are planted permanently at several points. Mining workers also carry their own personal sensor, apart from the common safety gears. All electrical equipment should be on standard for underground coal mining operation, especially those with the potential of producing sparks, including cables, connectors, bolts, lighting, fans and suction machines. Transportation systems with contacts between steel to steel or metal to metal must be protected with rubber. The safety of the roof for primary, secondary as well as tertiary tunnels must be based on the tunnel specifications and mine tunnel quality structure must be applicable in terms of costing along with safety since those factors are vital during mining activities. Roof and wall support must be considered carefully since it is the main connectivity system between the surface and production location. The category that can be mined is more rigid in terms of mineable reserve, where it is not dependent on the type of equipment as well as the company's readiness in capital funding (ibid). Geological conditions actuate which limits of what can be mined based on investment and equipment, including reserves and resources. For reserves, exploration data is already considered to be qualified to carry out the next phase for underground mining operations analysis. For the SMI area, its geological conditions can be categorized as complex, where on a scale of 1 to 10, SMI is in the position of 6.5, due to the thickness, dip and parting of coal. It also depends on the company's ability and planning to utilize primary transportation, since it will affect the extent to which mining will be carried out in a down dip.

Furthermore, underground mining costs could be highly expensive due to different safety aspects and standards, where it depends on the mining equipment selection and mining method. The quality and ability of human resources is not really affecting since there are many experts and miners in Indonesia, considering numerous schools specialized in underground mining, especially for training the operators. Higher cost

is also related to the greater risks of work accidents and its prevention on mining safety aspects, especially regarding gas explosion (e.g., methane), roof failure, water flooding, lack of ventilation and worker's mentality. Company and expert miners have their own safety standard and procedures of underground mining operations, especially by monitoring all the critical parameters that related to the operational activities. Carefully selected dedicated and keen workers to maintain the highest safety standard are vital for the implementation of such procedures and prevention. Moreover, shifts for standard workers in general are divided into three different shifts, with the duration of eight hours per shift and in every week there is a mandatory single shift for maintenance which normally is done twice a week or once in every three days to ensure the safety and effectiveness aspects of mining operations (ibid). Due to different characteristics of underground mining, a project evaluation must be carried out gradually and partially at the beginning since SMI need to prepare further data as well as capital in parallel with the open pit mining activities. It is necessary to increase the number of drills continuously to complement the existing data. Underground mining should ideally have data per 25 meters, i.e., grid, where additional data within three years starting from the start of open pit mining that have gathered will enable to visualize the true potential and possibility of underground mining based on the calculation, since it will be achievable if contain of at least one to two coal seams to be considered economical (ibid).

Moreover, the impact on the environment is much less negative than that of open pit mining, where in percentage it can be said to be almost non-existent, even though on the downstream side there are negative impacts that are similar to open pit mining, such as in the process of transportation and electricity generation. Such reasons arise due to the surface land clearing process that is almost absent since open space activities are being kept to a minimum. The worst case of negative impact is on land subsidence effects where it can be categorized as insignificant due to small size of less than 1 cm per year (ibid). On the other hand, permits for underground mining in protected and conservation forests are much easier to obtain as long as the mining entrances are outside the referred forest. However, permits related to protection forest must be reviewed and approved by the House of Representative and the Ministry of Forestry and Environment. In addition, for the state revenue from royalty, produced coal from underground mining method have less percentage than from open pit method due to higher risk and expensive costs, including less negative environmental effects.

### **1.6.7.3 Shrimp farm**

Shrimp farming is an alternative for the utilization of post-mining and reclamation land area. In general, such activity is included in the aquaculture category, in accordance with FAO's definition as "the farming of aquatic organisms, including fish, molluscs, crustaceans, and aquatic plants. It implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated. For statistical purposes, aquatic organisms which are harvested by an individual or corporate body which has owned them throughout their rearing period contribute to aquaculture, while aquatic organisms which are exploitable by the public as a common property resource, with or without appropriate licenses, are the harvest of fisheries." (FAO) In Indonesia as an archipelago, especially in Aceh, is having part of its traditions and habits of society regarding seafood consumption, which is related to the abundant, easier to obtain, and have high protein value natural

resources. Shrimp farms have a contribution of 55% of the total shrimp supply in the world (World Wild Life), where countries that produce shrimp aquaculture products in huge numbers are China, Indonesia, Thailand, Vietnam, Brazil, Bangladesh, Ecuador, and India. Such a sector contributes a sizable income to the size of developing countries. In addition, developed countries and regions that are big buyers of these products are Europe, USA and Japan, where their standards are set to be fairly high and require integrated systems along with modernization in shrimp farming activities. Sustainability is one of the main problems that is required to maintain the quality and quantity for consuming countries and companies. In order to create a sustainable aquaculture strategy, it is needed to have a fair and an equitable distribution between costs and benefits, creating jobs while improving the living standards of the community as well as shrimp farmers, create sustainable system between the government and the farming industry, provide adequate and nutritious food access for the community along with paying attention to environmental balance, as well as avoiding pollution and waste.

In the common practice, there are several stages in the operation of shrimp farming, such as the stage of making or supplying and hatching shrimp seeds, breeding stage of baby shrimp to young shrimp and the final breeding stage of young shrimp to adult shrimp. In addition to the aquaculture industry, there are several classifications that are made for its operational activities, such as extensive, semi-intensive, and intensive. Extensive classification is given if the growth process is done naturally without any meaningful or intense intervention, such as natural food without additional nutritional inputs and water characteristics in the area of farms that use currents, contours and natural water from nearby sea. As for the semi-intensive classification, natural feeding is still carried out even though additional supplements are still given to ensure the quality growth of shrimp. Lastly, intensive classification is given if there is a significant intervention in the process based on the level of intervention, such as provided food modification along with regulation of temperature, acidity, saltiness and oxygen levels including shrimp farm density control. The common method is to use artificial ponds where the bottom has been specially coated to ensure the desired result. An intensive system with interventions in the growing process continues to include the use of water wheels for the supply of oxygen, where during the day, only two wheels are turned on while at evening, it becomes four windmills. Modified foods for shrimp are continue to be provided daily, including cleaning shrimp faeces, where the waste is always gathering at the edge of the pond as well as considerations to combine aquaculture and agriculture, such as shrimp and hens. However, it is not yet implemented due to several limitations of data, experts and funding.

#### **1.6.7.4 Poultry**

Poultry is one of the massively growing industries in Indonesia, which is related to the number of products that can be used for food (e.g., meat, wings, legs, eggs, etc.) and feathers that can be used for decoration and household items. Ease of breeding in terms of food, area, number of chicks, and costs are factors supporting the outbreak of this industry. FAO has defined it as “domesticated avian species that can be raised for eggs, meat and/or feathers. It covers a wide range of birds, from indigenous and commercial breeds of chickens to Muscovy ducks, mallard ducks, turkeys, guinea fowl, geese, quail, pigeons, ostriches, and pheasants.” Chicken is the most widely bred type of poultry, with around 91% of the world's poultry industry, while other types are consist of ducks with a fairly huge population in Asia, amounting to 5% of the world's

poultry industry, Turkey which is quite abundance in America with a population of around 2% of the world poultry industry and guinea fowl and geese with a high number of population in Africa, including in Asia, with around 2% of the world's poultry industry. The types of poultry above are farmed on a large and small scale, but for quail, pheasants, and ostriches, in general, are only found on large scale farms. From the data mentioned above, chicken is the largest poultry meat supply in the world, around 89%, followed by turkey by 5%, ducks by 4% and guinea fowl and geese by 2% (FAO, 2019).

The pilot project will be developed in Aceh due to its potentials from local menus and community consumption of chicken eggs, where the majority suppliers are originates from the city of Medan in North Sumatra province with the remaining originating from within Aceh itself that generally are not in large operational capacity and not well systemic, i.e., traditional type. Statistically, chickens produce around 92% of world egg production, with regional numbers of 13% in Asia, 1% in North America, 3% in Latin America, 0.6% in Oceania and 0.9% in Europe, while for the African region, egg production from farm systems is almost non-existent (ibid). Other challenges also arise in this industry, where the Indonesian Ministry of Agriculture/*Kementerian Pertanian* and the FAO Emergency Centre for Transboundary Animal Diseases (ECTAD) of Indonesia have provided information and warnings regarding avian influenza and other viruses. It is based on an unfortunate event in 2017, where chicken egg production dropped by around 70% due to the discovery of the spread of the H9N2 Low Pathogenic Avian Influenza (LPAI) virus. The response has been carried out by training farmers and government officials in the poultry sector, including by holding seminars and expositions. Such action has raised the level of community and farmer awareness about the best handling, prevention, and methods of raising chickens to reduce the existing and potential risks (Tempo, 2018). The issue of infrastructure is also a challenge in Indonesia in the operational activities of the poultry industry. One example is regarding the feed bins which are not commonly used due to its capacity of 100 metric tons and the diameter of 1.5 to 5 meters along with the height of 3 to 12 meters, which require special transportation and road conditions which hinder food deliveries. The commonly used method is manual feeding to overcome infrastructure constraints even though it requires higher cost and manpower. Improvement in infrastructure will have several benefits on the final price of chicken and eggs. Not only should the impact of transport costs be reduced, lowering the cost of production, but better roads would allow the transport of specialized equipment such as feed bins (Ferlito and Respatiadi, 2018).

#### **1.6.7.5 Plantations**

Based on the definition of the Indonesian Center for Estate Crops Research and Development/*Pusat Penelitian dan Pengembangan Perkebunan Indonesia* (PPPI), “Plantations are all activities that commercialize certain plants on land and/or other growing media in suitable ecosystems, process, and market the goods and services of these crops, with the help of science and technology, capital and management to realize prosperity for plantation businesses and the community. Plantation land is vast agricultural land that is usually located in the tropics or subtropics area, which is used to produce large-scale trading commodities (e.g., agriculture) and sent to distant markets, with only a small portion for local consumption. It can be sowed with industrial plants such as cocoa, coconut, and tea, where the size of the area is fairly relative and depends on the size and volume of the commodities. However, it requires

a minimum size of land to maintain profits through the applied production system. In addition, plantations generally implement the monoculture method. Another feature, although not always the case, is the processing or packaging of the harvested commodity on the plantation area prior sending the product to buyers (Indonesian Center for Estate Crops Research and Development). The positive aspect of plantation is to aim the integration of company for not only focusing on coal and minerals yet could also create additional jobs, profits, and benefits in the same territory that will be transformed and prepared for plantations, farms, fishery ponds, etc., where the development of such activities and business is considered purely as part of their CSR program. Companies should not solely replace the land for local communities but by developing complementary aspects, such as preparing roads and accesses, clearing lands, seeking prime quality seeds as well as other related activities and programs, by making and preparing local people's businesses to receive sustainable results (Setiawan, 2019). CSR could be done in collaboration with cooperatives or villages, where employees from nearby areas, i.e., locals, are hired, in collaboration with the mining company within the mining period, where partnership is carried out to support mining operations such as catering, cleaning services, laundry, camp management, coal transportation and waste disposal. Furthermore, there will be remaining assets that could be used for future projects when the initial works have been finished.

As planned in Lancong area, the community empowerment programs are desired to be accomplished through activities that are directly related to the economic conditions, such as improving literacy on technology in agricultural or livestock business, as well as taking into account the fertile natural conditions, where each planted seeds will relatively be able to survive until the producing or harvesting phase. However, the current shortcoming lies in the absence of sustainable cultivation, where current benchmark and extension is issued only for palm oil plantations, which used to be in good condition despite at present have shifted to the industrial sunset phase due to declining selling prices and absence of benchmark for farmers on the short and medium term (Setiawan, 2020a). SMI has a mission to empower the local people in agricultural commodities or plantations that have high economic value and broad markets such as fruit or plants which have unique specifications and have been proven to be possible for planting in lowlands and other areas with special features such as in the SMI's mining area. Some examples are the Dragon's blood resin (*Jernang*) that can be used as cosmetic ingredients, followed by Durians, Avocado and Thorny Palm (*Salak*). The main source of income of the community around the location of the majority have further dependence on the plantation and agricultural sectors, where detailed and updated information are also obtained from the Aceh Plantation Service.

Moreover, it will serve as an option to overcome their alternative work as illegal gold miners that have vastly greater risks. The authorities in this regard are the KPH which is under the central government and has authority over all forest areas, including those with Other Areas of Use/*Areal Penggunaan Lain* (APL) status on a regional basis, along with authority over land status, where the management for agriculture is handled through the agriculture and plantation services. Seedlings are already available and free, however the obtaining process is considered to be complex due to bureaucratic systems. The initial phase is considered to be good yet still requires counselling, since normally the ongoing maintenance has not been properly conducted (ibid). Some have succeeded in several places, yet from time to time and also from one region to another, studies must be carried out to discover the most appropriate method which is also in line with the thoughts and desires of the local community, since modification of common practice will require a strong and a sustainable effort. Many

cases show that the progress in the beginning was favourable, however after the government or company's aid had ended, most of their continuation progress deteriorate and eventually failed.

Another alternative is to use a hydroponic system to meet the needs of food production due to damage and reduction of fertile land by the reason of economic and construction activities to address the increasing necessities of mankind, where common traditional techniques of agriculture and plantations are highly affected. With limited area and allotment that has transformed into an urban area, making non-soil with less cultivation method to be one of the best choices. Other types of utilized techniques are aquaponics and aeroponics. However, compared to the last two, hydroponics receive growing popularity due to its simplicity and efficiency, especially for growing and harvesting commercial crops. The system uses water and rockwool as its main media, including the additional use of nutrient solutions along with recycling and reuse techniques. In definition, hydroponics is considered as "a technique of growing plants in nutrient solutions with or without the use of an inert medium such as gravel, vermiculite, rockwool, peat moss, saw dust, coir dust, coconut fiber, etc. to provide mechanical support" (Sharma et al., 2019, p. 364). Horticultural plants that are usually developed are leaf vegetables, fruit vegetables, fruits, ornamental plants, landscaping, and medicinal plants. In Indonesia alone, such cultivation techniques began to be applied since 1980 and are still developed for vegetables although recently become popular and reached massive commercial activities, due to its perception as an alternative for healthy and organic vegetables and crops. In general, there are several types of hydroponics such as Wick System, Floating Hydroponic System (FHS), Tidal/Flood and Drain System, Drip Irrigation System, Nutrient Film Technique (NFT) as well as Aeroponic System. The latest is proven to be able to produce the best results and is widely used for high quality products and niche markets such as famous restaurants and supermarkets. However, adjusting to the implementation possibilities and required costs, NFT that was developed in the 1960s by Dr. A.J Cooper at the Glasshouse Crops Little Research Institute in England to overcome the shortcomings of Ebb and Flow System, i.e., Flood and Drain, is commonly used by industrial and home scale cultivation. It relies on supporting water media with the regulation of water and oxygen circulation via pumps throughout the entire system, as well as providing optimal nutrition. The plants are placed in perforated tubes at sparse and predetermined intervals and cradles, where the most common plant cultivated with this method is lettuce.

In terms of environmental issues, hydroponics is regarded as a clean and sterile farming since the use of pesticides can be diminished due to no risk of soil-borne disease insect or pest infection along with harmful chemical compounds left in the soil or conventional water sources. Furthermore, the system is also helpful to save a large amount of water by 70%-90% (ibid, p. 369) which is usually used for irrigation and watering in traditional techniques to wet and maintain the moisture of soil. Plant roots are submerged in water or wet substances where absorb nutrition can be applied efficiently in water that is flowed continuously in a recycle or rotating pattern to be pumped back into the growing media. In addition, the use of water and needed nutrient solutions that can be adjusted according to the needs of each type of plant makes the growth to be faster, healthier and bigger. Hence, the price will be higher and more profitable for local farmers along with former or retired mining workers. In addition, even though Indonesia is in a tropical climate area with two different seasons, there is an uncertainty of seasonal changes due to global warming which makes planting and cultivating ineffective. Hence, it is possible to overcome such issues with this system.

Furthermore, higher density or huge amounts of plants per unit due to more systematic and more effective arrangements can also reduce land usage where other unused areas can be utilized for other needs or conserved as a natural area in post mining activities or post reclamation, along with higher yields. However, there are some limitations and obstacles in conducting hydroponics, especially related to the requirement of in depth technical knowledge to be aware installation and utilization of the right tools along with the accuracy of temperature, oxygen levels, pH, electrical conductivity (EC), nutrition, etc., which in the end causing the high initial cost or capital. Unfortunately, some hydroponic equipment is still not widely available in some regions and electricity is also needed continuously to keep the water pump engine and lights operating as well as for periodic checking. In addition, the use of nutrients and water are similar for each plant in the same network or facility, causing a higher risk of spreading water borne diseases (Ikeda et al., 2002), such as fungal infection since the roots are constantly in contact with water or nutrients.

The local community can receive the benefits in terms of ecosystems and economy due to high demand, especially in the global market which is estimated at US\$ 21,203.5 million in 2016 for hydroponics, where tomatoes is the largest segment that has a global market share of 30.4% (Sharma et al., p. 369). The biggest growth comes from developed countries that have high awareness regarding environment and health issues, especially for organic plants. Moreover, developing countries which have high economic growth rates are also beginning to show the same growth in their demand. In addition, FAO has a concern that prior 2050, food production is expected to increase by 70% in order to meet future needs, where hydroponics is one of the methods that promote technological improvement and productivity growth. It can also overcome yield gaps and economic inequality for farmers, especially in a more prosperous island, such as Java due to lack of information, suppliers, complementary services and technical skills. Adoption of hydroponic technology that is commonly carried out in Java to Aceh is triggered by SMI, including by adapting to local conditions and assisting in the construction of related infrastructure which able to be a solution as well as an example, not only for the local community but also for the local governments, to gain their interest in implementing and developing this method.

#### **1.6.8 Is it possible to implement the Australian Fly-in Fly-out system in coal mining activities in Aceh?**

Regarding fly-in and fly-out systems for workers, companies generally have organic and non-organic workforce, where most are recruited by themselves as permanent employees. However, there are also workers from third parties such as contractors who are more suitable to be categorized as fly-ins and fly-outs which can be applied according to the Aceh government, where they also have permanent employees that they recruit themselves accordingly by empowering the local community (Dewi, 2019). Furthermore, the Ministry of Energy and Mineral Resources itself does not deal with labor, since related coordination is performed only to BKPM, regarding the status of the workforce, numbers of needed personnel and the required documents. The Ministry of Energy and Mineral Resources only focuses on seeing the types of investments to be made, feasibility studies, and how much investment is needed, while management issues related to labor are the focus of the Ministry of Manpower. The coordination and authority of BKPM itself has been divided into several ministries and placed in the same building to improve and facilitate better and faster arrangement. For the impact of Fly-In-Fly-Out (FIFO) work practices on local

Government, there are some positive aspects, such as high wages, low living costs, large amounts of quality time with family and friends during leave, and a high level of empowerment among the partners of fellow FIFO workers (Australian Centre of Excellence for Local Government, 2002). However, it should be noted that even though there are advantages, the longer duration of working time in the FIFO system can trigger stress and mental fatigue. A study from Griffith University (2012) stated that there was a greater percentage of short-term illnesses for FIFO workers compared to the general population, while other research from a research firm (Kinetic Group, 2012), explained that there were higher employee turnovers of up to two times compared to other similar industries.

FIFO system that is widely used in Australia and Canada has also been used in Indonesia, where it has been divided into several categories such as for remote areas, i.e., 4 weeks of works and 2 weeks of leave, and cities, i.e., 8 weeks of works and 2 weeks of leave (Kasli, 2019). The oil and gas industry generally uses 2 weeks of work and 2 weeks of leave system due to its offshore location (ibid). During the returning period to their area of domicile, it will be considered as leave. However, special cases occasionally happen where their physical presence are needed at the head office and obliged to come for a meeting and to work on delegated tasks, with transportation and accommodation costs that are covered by the company. Living costs in towns near mining sites has been reported to increase yearly due to the inflation caused by a higher gap of salary from mining staff compared to local people which in turn elevates not only the price of accommodation but also related to foods and entertainments. An interesting method was discovered and called 'bed-hopping' to deal with the lack of accommodation in several areas. For example, three mine staff will sleep in the same bed for 8 hours in a period of 24 hours, where this will reduce comfort but could be a solution for limited facilities as well as improving efficiency.

However, in order to avoid social conflict and maximize the role of local communities, companies are required to develop mining technical workforce in accordance with the approved annual RKAB, which can be completed by preparing technical workforce competency improvement programs; implementing local and national technical workforce development programs; transfer of technology, expertise and skills; as well as the transfer of foreign workers' post-contract job opportunities to local or national workers, which is based on Government Regulation Number 23 Year 2010 in Article 86, informing that companies must prioritize the use of local workers and if foreign workers are hired, they obliged to submit an application to the Minister, which will be a subject for technical evaluation to implement and execute Government Regulations related to the field of labour.

#### **1.6.9 Is it possible to establish the sovereign wealth fund in Indonesia and particularly in Aceh from its natural resources revenues?**

Sovereign Wealth Fund (SWF) is commonly used by countries to take advantage of the proceeds from the sale of their natural resources. By definition, SWF is a "special purpose investment funds or arrangements, owned and created by the general government for macroeconomic purposes, as well to hold, manage, or administer assets to achieve financial objectives, and employ a set of investment strategies which include investing in foreign financial assets. It is commonly established out of balance of payments surpluses, official foreign currency operations, the proceeds of privatizations, fiscal surpluses, and/or receipts resulting from commodity exports" (IWGSWF, 2008, p. 27). It was started in the 1950s and has been given more attention



since 2000 due to the growing and successful investment through such funds, particularly in listed companies. Hence, its main focus is external accounts, public finances and monetary policy (Al-Hassan et al., 2013, p. 3), with a global estimation of more than US\$ 138 trillion assets in total (SWFI, 2020). Historically, the Kuwait Investment Authority is the oldest sovereign wealth fund in the world, dated back to 1953. Other SWF that use funding from fossil fuels to strengthen their long-term fiscal management and conserve their hydrocarbon wealth are State Oil Fund of the Republic of Azerbaijan, Future Generations Reserve Fund of Bahrain, Heritage Savings Trust Fund of Alberta (Canada), Libyan Investment Authority, Oil Revenues Stabilization Fund of Mexico, Government Pension Fund of Norway, Qatar Investment Authority, Reserve Fund and National Wealth Fund of the Russian Federation, Timor-Leste Petroleum Fund, the Heritage and Stabilization Fund of Trinidad and Tobago, Abu Dhabi Investment Authority and Alaska Permanent Fund Corporation of the USA. Currently, Norway is in the top position for their SWF funds amounting to US\$ 1,108.7 billion, which is followed by China Investment Corporation at US\$ 940.6 billion and the Abu Dhabi Investment Authority at US\$ 579.6 billion (ibid).

Fund management through SWF prioritizes returns rather than liquidity, in which it tends to be riskier than traditional foreign exchange reserves, where some countries that prioritize liquidity will limit SWF investment to only for highly liquid debt instruments, such as government debt securities. However, there are also some SWFs that invest directly in domestic industries.

**Table 11: Asset Allocation Characteristics of Stabilization and Savings SWFs**

<b>Characteristic</b>	<b>Stabilization funds</b>	<b>Saving funds</b>
Investment horizon	Short term	Long term
Asset composition	Limited to highly liquid assets	Broader asset classes
Currency composition	Negatively correlated with commodity prices	Matching net import of the country
Performance benchmarks	Minimizing expenditure volatility and maintaining adequate liquidity	Achieving real expected returns for long-term periods to maintain the long-term purchasing of the wealth
Risk tolerance	Low risk-return profile	Active investment management with higher risk-return profile
Asset and liability management	Ensuring the sustainability of future fiscal expenditure	Maximizing net value of the fund taken in account the correlation between asset prices and liabilities

*Source: International Monetary Funds*

In general, there are five types of SWF, where the first one is stabilization funds that are used to limit budget and economic conditions from the influence of price changes and external factors (Table 11). Generally, they prefer to invest in assets and portfolios that are remarkably liquid, such as the central bank reserve manager to maintain and reduce the impact of instability, e.g., Russia, Timor-Leste, Chile and Iran. The second type is savings or future generations funds, which aims to develop capitals obtained from different businesses for diversification, with a focus on high-risk high return investment, e.g., Libya, Abu Dhabi dan Russia. The third type is development funds that aim to establish programs related to the economy and social affairs, such as

infrastructure, e.g., USA, Iran and the United Arab Emirates (UAE). Subsequently, pension reserve funds that are used to empower immense pension resources and to anticipate an increase in pension burden and responsibility in the future, e.g., Ireland, New Zealand and Australia. Lastly, reserve investment corporations that aim to increase profit or return while at the same time reduce costs incurred from holding reserves, e.g., China, Singapore and South Korea.

However, in order to establish a SWF, it requires legal guarantees, since foreign investors who intend to invest in Indonesia are often hampered by its legitimate status and consistency as well as poor fund management governance and risk control. Thus, intense and close coordination in addition to communication with the government are essential to ensure appropriate macroeconomic policies and support for these funds, where generated revenue will be able to contribute upon positive effects on monetary conditions, public finances, external accounts, etc. (Al-Hassan et al., 2013, p. 7). Furthermore, it is also to support the process of information sharing and transparency, since it is related to utilization of public funds for the strategic interests of the state, where it has become a major concern, thus clear supervision and regulations are needed (Butt et al., 2008). Moreover, the Linaburg-Maduell transparency index system used by the SWF Institute can be one of the main choices as the current indicator and measurement as well for future improvement. Based on the ranking with this index, Norway is placed in the top rank and considered as the most transparent country in managing SWF (Wagner, 2014, p. 37). Thus, it is hoped that a good strategy in the utilization of these funds will be able to reduce the effects of Dutch Disease or Resource Curse which is prone to occur in Indonesia considering it can promote diversification of industry and economic activities, including to maintain external stability. The investment strategy which also focuses on technology and other energy sources is also expected to eventually reduce dependence on fossil fuels in which there will be fewer non-renewable energy sources and greater demand on renewables.

Additionally, there are several categories that could be chosen for the establishment of SWF, such as: separate legal entities under law with legal identities and full capacity to act (e.g., Australia, Kuwait, New Zealand, and UAE); adopt the form of state-owned corporations including distinct legal persona (e.g., Temasek of Singapore); and a pool of assets owned by the state or the central bank, without a separate legal identity (e.g., Botswana, Chile, Norway, and Timor-Leste) (Al-Hassan et al., op cit., 2013, p. 9). The latest option through the central bank is commonly performed to gain tax privileges and sovereign immunity status. However, the taxation benefits depend on whether the investment is part of the government's financial management, including whether there are bilateral tax treaties and agreements, as implemented by Norway for their SWF. Furthermore, regarding bilateral political relations, SWF management is eager to invest in countries that have lower political relations with the country of origin of such funds, in contrast to the theories and literatures that stated SWF has no non-financial reasons regarding their investment strategy (Knill et. at., 2012). It is also worth noting that the separation between governing bodies, owners and management could provide independence and freedom to operate, especially from internal political influences.

To ensure transparency, accountability and prudent investment practices, which are important elements in good governance systems and procedures, the International Forum of Sovereign Wealth Funds (IFSWF) has established the 24 Generally Accepted Principles and Practices (GAPP) or commonly referred to as the Santiago Principles, to provide institutional governance and risk-management frameworks. Members of this forum are encouraged to conduct bi-annual self-assessments along with producing and publishing their case studies regularly. Historically, the

International Working Group of Sovereign Wealth Funds was created by 23 state-owned investors in 2008 followed by meetings and discussions with the G20, the IMF and the US Department of the Treasury. In addition, the European Commission is acting on behalf of the European Union, as agreed by the European Council on March 14 in the same year. Afterwards, the continued discussions resulted in the initiation of IFSWF through a joint agreement in the Kuwait Declaration in 2009 to collaborate and strengthen member countries that have SWF, through research, discussion and self-assessment. Currently, it consists of 34 full members and 4 associate members around the globe, with various mandates and stages of development. The GAPP covers practices and principles in several key areas, such as: legal framework, objectives, and coordination with macroeconomic policies; institutional framework and governance structure; and investment and risk management framework (IWGSWF, 2008, p. 5). Another organization that is related to the SWF and can be used as a reference is the Sovereign Wealth Fund Institute (SWFI) which “is a global organization designed to study sovereign wealth funds, pensions, endowments, superannuation funds, central banks and other long-term institutional investors in the areas of investing, asset allocation, risk, governance, economics, policy, trade, and other relevant issues. It facilitates sovereign fund, pension, endowment, superannuation fund, and central bank events around the world.”

Furthermore, there is a concern about whether investment needs to be done directly or indirectly, where the earliest option means that it will be done by the government itself and the latest option means that it could be conducted by another capable authority or state-owned company. Hence, it requires proper investment process and external asset managers to ensure that transparency can be achieved through a more convenient reporting and disclosing activities (Kern, 2007, p. 5) regarding procedures, policies and rules that are related to SWF in spending and funding operations on a timely basis, especially for annual report along with its financial statements. Moreover, an external audit needs to be carried out accompanied by the selection of human resources with sufficient competencies, clear as well as clear and consistent standards for investment strategy and risk tolerance. In addition, planning on SWF distribution requires a minimum threshold in order to secure the sufficiency of future capital, through various investment routes that have passed risk management analysis as well as interventions and modifications that are necessary to reduce existing and possible risks. Hence, it requires approaches that consolidate the economies' endowment with resources, including human capital, with their investment motives. Moreover, investment objectives could be divided into several main groups, namely intergenerational wealth transformation, strategic investment and intergenerational wealth accumulation (Wagner, 2014, p. 49).

**Table 12: Framework of macroeconomic objectives of sovereign investors wealth funds**

Mission	Objective	Description
Capital maximisation	Balancing intergenerational wealth	Building a capital base for the growth and preservation of national wealth
	Funding future liabilities	
	Investing reserves	

Stabilisation	Facilitating fiscal stability	Macroeconomic management and reinforce the economy
	Stabilising the exchange rate	
Economic development	Investing in hard infrastructure	Investment to boost a country's long-run productivity
	Investing in social infrastructure	
	Pursuing industrial policy	

*Source: PricewaterhouseCoopers (PwC)*

In addition, for its macroeconomics objectives, the SWF has a mission to achieve capital maximization, with the objectives of balancing intergenerational wealth, funding future liabilities and investing reserves by building a capital base for the growth and preservation of national wealth (Table 12). Furthermore for stabilisation, the objectives are to facilitate fiscal stability and stabilising the exchange rate by macroeconomic management and reinforce the economy. Finally, for economic development, the objectives are achieved by investing in hard infrastructure as well as social infrastructure and pursuing industrial policy by encouraging investment to boost a country's long-run productivity. The initial establishment of SWF in Indonesia has actually been conducted years ago, where the Ministry of Finance established the Government Investment Center/*Pusat Investasi Pemerintah* (PIP) as the embryo of the Indonesian SWF based on the Minister of Finance Regulation Number 52/PMK.01/2007. The formation of PIP refers to the SWF scheme owned by Singapore, namely the Government Investment Center (GIC) and Temasek Holding, as well as Khazanah in Malaysia and it has received an initial capital injection of IDR 4 trillion (2019US\$ 282.76 million). After being established for nearly eight years, PIP was liquidated in 2015 due to lack of performance and achievements based on the government standards and expectation, with the Minister of Finance Regulation Number 232/PMK.06/2015. On the other hand, GIC, Temasek, and Khazanah were able to operate since their countries have excess foreign reserves, in contrast to Indonesia's limited foreign exchange reserves. In addition, PIP's status as a Public Service Agency/*Badan Layanan Umum* (BLU) makes its budget sources limited only from the APBN. Subsequently, PIP assets worth IDR 18.4 trillion (2015US\$ 1.32 billion)<sup>8</sup> were transferred to PT Sarana Multi Infrastruktur which later became an infrastructure bank, in the form of cash and direct investment. However, in the future SWF will be regulated in the Omnibus Law which is currently being discussed by the government.

In its development, Indonesia through the current government plans to continue the program to establish SWF as one of the financial sources for conducting state projects, particularly for infrastructure development, which is prioritized for the development of a new state capital in East Kalimantan and also for several projects in Aceh. There is already interest in investing from abroad into this fund, namely from the UAE with

<sup>8</sup> Bank of Indonesia, Middle Transaction Rate/Kurs Transaksi Tengah, USD 1 = IDR 13,889.41, [www.bi.go.id](http://www.bi.go.id), (2015).

the amount of US\$ 6.8 billion, the Japanese conglomerate SoftBank Group with the amount of US\$ 40 billion and the US International Development Finance Corporation (IDFC) with the amount of US\$ 5.5 billion, where potential sectors that can be developed have been agreed. Thus, it is believed to be able to support the increase of capital inflow from abroad by at least US\$ 20 billion (Akhlas, 2020). The formation of this SWF can be created through a single entity from the central government or by having other several separated entities from the provincial government, especially Aceh which has the status of special autonomy. Based on the discussion of the SWF task force from PERHAPI, the specificity of this fund can be referred to as the Sustainable Mining Fund (SMF) or the Natural Resources Fund (NRF) with sources of funds from Non-Tax National Income where historically, the 6.5% from coal sales revenue was originally part of the Ministry of Energy and Mineral Resources which was later taken over by the Ministry of Finance. The funding calculation is also based on mineral and coal based assets. It is worth to be noted that SWF is proved to be able to reduce financial losses during economic crises if the conducted investments have strategic benefits, such as in 2008 where this fund experienced lesser capital outflows and investments lost when compared to hedge funds (Wagner, 2014, p. 49). However, the massively invested saving funds of SWF in equities have experienced a sharp decline, although in the end, the occurred recovery could restore most of their losses in the following years due to their determination of long-term investment strategy as well their persistence to get through such a crisis (Papaioannou et al., 2013). Thus, proper risk planning and suitable tolerance level are obliged to ensure the ability to endure risks along with the demonstration of greater accountability (Al-Hassan et al., 2013, p. 4).

Currently, in this Covid-19 pandemic, the Indonesian government has issued a global bond of US\$ 4.3 billion to cover the fiscal deficit (Ulya, 2020). Other financing alternatives besides debt, namely establishing an endowment fund in the form of SWF are also needed to overcome this crisis. However, a crisis situation would create opportunities and increase the risk of abuse and misappropriation, such as in the case of the 1 Malaysia Development Berhad (1MDB) due to its illegal financial fraud and money laundry activities with a figure of US\$ 4.5 billion. In addition, similar cases related to the misuse of investment funds in Indonesia also occurred in PT Asuransi Jiwasraya that is owned by the government (Akhlas, 2020). Those can be avoided through the management of funds carried out by an independent body formed by the government based on law and managed in a directed, responsible and transparent manner, including becoming a member of the IFSWF to prevent political interests and transparency. The revision of the Minerals and Coal Law does not include any provisions that adopt endowment funds of natural resources. However, this is accommodated in the draft of Omnibus Law in Chapter Ten concerning Central Government Investment and the Ease of National Strategic Projects, including the Investment Management institution. The vital point in this law is related to the professional aspect, especially for the board of trustees and the board of directors who cannot have the status of state officials and politicians. On the other hand, Indonesia must increase exploration activities to increase the balance of mineral and coal resources as well as its reserves in order to be used for asset-based monetization or securitization. Report on the results of exploration and estimation of resources and reserves must be carried out in accordance with general practice and international standards (i.e., KCM, JORC, etc.) and by CPI in order to be recognized by the international community and for the purpose of issuing bonds, etc. Funds that are received and managed must be in the form of US Dollars to ensure flexibility in its

operations even though the spending can be done in different currencies. Its distribution can be used in the upstream sector to support national resilience (i.e., increasing exploration to support low-carbon economic development), a combination of the upstream and downstream sectors for human capital acceleration and capacity building (i.e., sectoral and regional of natural resources producing areas) and purely in the downstream sector to diversify the local-regional economy in maximizing the benefits of minerals and coal and releasing dependence on non-renewable natural resources. One of the spending priorities needs to be used for acquisitions and technology transfer, including for the downstream sector related to mining and its complementary businesses. Thus, it will give Indonesia the capital strength for mining development such as building smelters, research centres, etc. Hence, the preference for initial formation of this SWF is in the form of Development Fund which later could be developed into Future Generation Fund.

Most of the funding for the Endowment Fund comes from two sources, namely the Oil and Gas Revenue Sharing Fund/*Dana Bagi Hasil* (DBH) and potential dividends from BUMD. The dividend is the result of a regulatory obligation that requires the participation of BUMD in a consortium of private contractors who enter into production sharing contracts with government representatives. In connection with the potential for the establishment of a natural resource endowment fund in Aceh, the Bojonegoro Regency Government in East Java took the initiative to form the Bojonegoro Oil and Natural Gas Endowment Fund. This idea is in line with the fact that in the long term, this region will contribute significantly to domestic oil and gas production and also the fact that Bojonegoro has succeeded in alleviating poverty, in an area that was once considered the poorest district in Java. In addition, it happens due to the reason that when oil and gas revenue drops, natural resource producing regions are threatened with default, in which the planned development program must be rescheduled or cannot be realized. It is hoped that the Eternal Fund can be borrowed for fiscal stabilization when regional revenue receipts experience a very extreme decline. For the case in Bojonegoro, the source of funds is around 40-50% of the annual DBH received, apart from the funds taken from the BUMD Participating Interest (PI) which will be allocated after deducting the share of its strategic partners (Sholikin, 2019, p. 141).

In mid-December 2014, the draft of regional regulations and the Academic Paper for the Oil and Gas Endowment Fund were concluded, where the District Government has involved various parties, such as the Regional People's Representative Council/*Dewan Perwakilan Rakyat Daerah* (DPRD), Bojonegoro Institute, Natural Resource Government Institute (NRGI), World Banks, United Nations Development Programme (UNDP) and other related parties. It has also been consulted with the Ministry of Home Affairs, the Ministry of National Development Planning of the Republic of Indonesia and the Ministry of Finance. Initially the targeted fund was IDR 30 trillion (2014US\$ 2,4 billion)<sup>9</sup>, in which however, taking into account the decline in oil and gas prices, the target was reduced to IDR 20-25 trillion (2014US\$ 1,6 billion-2.21billion), which was collected over a period of 30 years plus 20 years and could even be extended (Huda, 2016). The provision for this extension was made with the aim that the principal savings of funds could not be withdrawn for the sake of maintaining its immutability and would be decided based on the joint approval of the Regent and the Regional People's Representative Council with the consideration of the Trustee, while the principal value of the Endowment Fund cannot be used during this

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<sup>9</sup> Bank of Indonesia, Middle Transaction Rate/Kurs Transaksi Tengah, USD 1 = IDR 12,368.67, [www.bi.go.id](http://www.bi.go.id), (2014).

period. The period of thirty years is based on the estimated time frame for natural resource production activities in Bojonegoro Regency with the estimated funding target around US\$ 2.5 billion in the next 20 years (Sholikin, 2019, p. 141). The method of payment or depositing is paid from the proceeds from the two sources of funds and will be first entered into the APBD. Thus, parliamentary approval is required to set aside a portion of it prior deposited into the Endowment Fund. In this context, it cannot be completely separated from the budget, even though its management is under the discretion of the manager. Regarding licensing requirements, the institution that houses this fund does not operate as a development bank or an investment fund management company, which will not require a permit from the Financial Services Authority. However, in fund management, it is possible to partner with state-owned banks or investment companies registered with the Financial Services Authority. For potential future expansion, the Endowment Fund can form a subsidiary with a particular focus, including strategic direct investment or asset management companies and can be projected for listing, i.e. Initial Public Offering (IPO), if it is considered commercially viable. Related regulations are Law Number 23 Year 2014 concerning Regional Government and Law Number 17 Year 2003 concerning State Finances in Article 3 paragraphs 7 and 8 as well as in Article 17.

In principle, the DBH and PI funds go to the Regional Expenditure Budget/*Anggaran Pendapatan Belanja Daerah* (APBD), while the draft of APBD draft and its draft of amendment are prepared by the Regional Head and are accountable for their implementation to the DPRD for joint discussion. The Regional Government has the right to form an Endowment Fund in accordance with the provisions of laws and regulations, where in the Regulation of the Minister of Home Affairs Number 13 Year 2006 concerning Guidelines for Regional Financial Management, the APBD is prioritized in a state of surplus and for payment of principal debt, regional capital (i.e., investment), providing loans to the central government or other local governments and/or funding social security improvement spending. Furthermore, local governments are required to report the APBD surplus or deficit position to the Minister of Home Affairs and the Minister of Finance every semester in the current fiscal year. In addition, there are basic provisions for the management of the Reserve Fund, that are recorded in a separate account in the name of the Government Reserve Fund which is managed by the Regional General Treasurer/*Bendahara Umum Daerah* (BUD) and cannot be used to finance programs outside the Regional Regulation for the Formation of Reserved Funds, which are listed in Article 139. Furthermore, in Article 140, it is possible for the Reserve Fund to be invested for certain interests, resulting in a Reserve Fund investment portfolio that provides fixed returns at low risk, which include Time Deposits/*Deposito*, Bank Indonesia Certificates/*Sertifikat Bank Indonesia* (SBI), Treasury Bills/*Surat Perbendaharaan Negara* (SPN), Government Securities/*Surat Utang Negara* (SUN) and Other securities guaranteed by the government. Surpluses can be set aside to form a Reserve Fund or to participate in share ownership in BUMD. The annual APBD as approved by the DPRD can state that the budget surplus can be injected into the regional reserve fund. In the explanation of Article 17, it is clear that the budget surplus must be prioritized for debt repayment, reserve funds, social welfare and intergenerational justice.

In this case study, the mechanism for determining the allocation of funds uses a moving average resource revenue pattern, using the projected natural resources revenue. The amount of the allocation value of the Oil and Gas Endowment Fund which is budgeted annually in the Regional Expenditure Budget is 40% of the five-

year average of all revenues from the Oil and Gas Natural Resources Sharing Fund/*Dana Bagi Hasil Minyak dan Gas* (DBH Migas) and the Land and Building Tax Revenue Sharing Fund/*Dana Bagi Hasil Pajak Bumi dan Bangunan* (DBH PBB) in mining sector (Huda, 2016). The five-year average is calculated based on the realization of the previous three years, the current year's budget, and projections for the next year. Apart from DBH Migas and PBB for the Oil and Gas Sector, all Participating Interest received by Bojonegoro Regency is also added in the current year. The Endowment Fund Management Agency is in the form of a Regional Public Service Agency/*Badan Layanan umum Daerah* (BLUD), with reasons of conformity and based on the recommendation letter from the Ministry of Finance. This is due to the practice of an education endowment fund managed by the Education Fund Management Institution/*Lembaga Pengelola Dana Pendidikan* (LPDP) in the form of a BLU at the central government level. Consequently with this BLUD form, the Endowment Fund account becomes separate from the regional cash account, hence it will not include in the idle cash category. In addition, there are trustees who are non-structural, voluntary, independent and also serve to represent the interests of the community in monitoring the Endowment Fund. They have a duty to provide input regarding the extension of the term of the Endowment Fund, give approval for the implementation of public consultation, supervise every management, utilization of the Endowment Fund, as well to provide suggestions or input whether requested or not to the Regent in order to improve the performance of the fund's management. In order to maintain the immutability of the Oil and Gas Endowment Fund, it was initially proposed to use a referendum mechanism for every process of changing or canceling regional regulations to be carried out, intended as a long-term and cross-generational legal instrument. However, considering the term referendum to be sensitive, it was agreed to use the term of public consultation.