



## Chapter 3

# Challenges in Facing Indonesia's Energy Commitment

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### A. Overview of Indonesia's Energy Security and COVID-19

As the largest country in population and geographically among other ASEAN countries with abundant natural resources, Indonesia has enormous potential for sustainable energy resources, especially from an energy perspective. Located on the equator line, this country has had a constant solar power supply over the year. Indonesia is an archipelago surrounded by water standing above the ring of fire, granting this country abundant geothermal energy sources and other climate-friendly energy sources such as biogas and biomass. Additionally, we shall not forget new kinds of energy that are making trends: hydrogen and nuclear energy. However, these energy potentials need to be aligned with proper human resources to meet the supply and demand and to enforce Indonesia's sovereignty over energy.

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In the past ten years, the costs of solar and wind energy have fallen by 90% and 70%, respectively, and this trend will no doubt continue. Yet today, fossil fuels—coal, oil, and gas—provide 80% of energy worldwide (Lomba, 2019). With the addition of COVID-19 which has spread since early 2020, the shifting process from fossil-based energy sources to renewable resources outweighed the existing effort as the world is focusing on living with it and reducing the fear inch by inch.

Since World Health Organization (WHO) raised the COVID-19 status from endemic to pandemic at the beginning of 2020 after its first outbreak in Wuhan, China in 2019, everyone has been forced to vastly adapt and make quick decisions to put everything under control. Years afterward, this ambiguous event affected broad sectors including the energy sector. The urge to shift the energy reliance into climate-friendly options is getting even higher, as today, Indonesia is one of the top countries with the highest ecological footprint in the world along with China, India, the United States, Russia, Brazil, Japan, Germany, Mexico, and the United Kingdom (Pata et al., 2021). This chapter highlights five crucial challenges related to the energy sector that Indonesia is currently facing to actualize its national and international commitments. Those five challenges are Reviving the National Economy Post-Covid, Battle of Energy Security and Energy Transition, The Hardship to Challenge the National Coal Industry, The Reliance of the Industrial Sector on Fossil Fuel, and Regulating and Financing the Transition.

## **B. Reviving the National Economy Post-Covid**

It has been more than two years since the World Health Organization (WHO) officially declared the COVID-19 pandemic on March 11, 2022. A week prior, Indonesia's President, Joko Widodo announced the first discoveries of 2 positive cases in Indonesia's territory on 2 March 2020. Today, we are facing more than the original strain of SARS-COV-2, but also the mutated variants named Delta, Omicron, and possible future variants with less overwhelming effect than its original.

At the end of 2019, the Indonesian Statistics Bureau (BPS) recorded economic growth of 5.02% during the year despite the global situation especially in the trading sector. The economy during this year was dominated by the domestic demand for government consumptions and investments. This increase in growth has successfully decreased the unemployment rate and gap while also maintaining social welfare (Kementerian Keuangan Republik Indonesia, 2019).

Unfortunately, at the beginning of 2020, the world is facing one of the most unpredicted situations with the outbreak of COVID-19. Indonesia started the year with a good start in the trading sector after the US and China finally sealed a deal to end the trade war between them (Kementerian Keuangan Republik Indonesia, 2020). However, the dawn of the pandemic has forced people to adapt to the concept of “new normal” by living in a series of lockdown situations, working from home, wearing masks daily, and maintaining physical and social distance. This situation automatically slows down economic activities. Not only nationally, but also globally. Indonesia’s composite stock price or IHSG was freefalling instantly for more than IDR 2000 or lost almost 50% from its initial value compared to December 2019 (Kiky, 2020). Globally, the pandemic forced many businesses to bankruptcy and sent people home unemployed. Even more, it was recorded for the first time in history that US crude oil prices fell into negative territory in late April 2020, which means that the sellers are effectively paying the buyers to purchase the crude oil.

As a pandemic, COVID-19 hits not a specific country or region but the whole world. For the economic sector in Indonesia, in 2020, the BPS officially announced the country was facing its first economic recession since the financial crisis in Asia in 1998 with economic growth standing below zero, precisely at -3.49% compared to 2019. This event forced companies to cut off their employees due to the lack of economic activity, which consequently impacted the unemployment number to 9.77 million people by August 2020. With all this disturbance, the Government needs to go the extra mile to keep national stability and strengthen economic resilience. In this context,

the Government has decided to widen the deficit to 6.34% of Gross Domestic Product (GDP) to handle both COVID-19 situations and recover the economy.

In late 2020, the invention of COVID-19 vaccines to fight against the current pandemic brought an optimistic hope to restore the situation to the "real normal" gradually. The President, Joko Widodo opened the national vaccination program at the beginning of 2021, with high hopes that this stressful event could end soon. Economically speaking, since having huge contraction by having a negative economic growth level of 5.32% (year-on-year), Indonesia showed a positive trend as the growth stood better at -3.49% (year-on-year) in Q3 and closed the year of 2020 with -2.19% (year-on-year) (Kementerian Keuangan Republik Indonesia, 2020). BPS stated that the economy grew 3.51% (year-on-year) in Q3 2021 compared to the previous year, while for 2022 the World Bank predicts Indonesia Economy situation will grow to 5.2% in 2022 (the base year 2020) under the assumption of the absence of another massive shock from COVID-19 (Badan Pusat Statistik, 2020; World Bank, 2021)

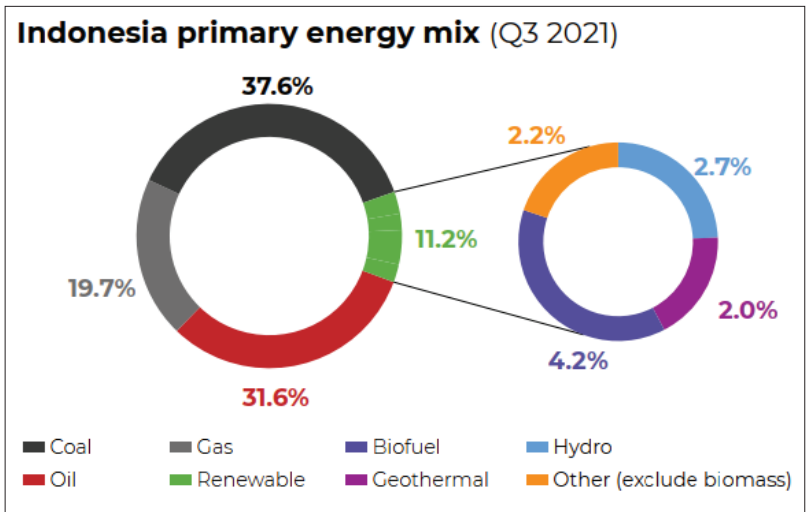
### **C. Battle of Energy Security and Energy Transition**

One extensive challenge facing Indonesia during the pandemic from an energy perspective is balancing energy security while staying on track with shifting the energy supply to sustainable energy resources. Since the pandemic hit the country, the domino effects have hit many sectors, leaving out-of-control situations in multiple sectors. In the energy sector, these events have disturbed the energy transition agenda as the Government needed to focus on the health and socio-economic sector first as a priority.

An unusual event is seen during the pandemic, namely an unprecedented decrease in carbon emissions since the industrial era due to the drastic change in the way of life globally. Unfortunately, this reduction is neither substantial nor long-lasting as carbon emissions are set to surge post-COVID-19 as many countries, including Indonesia, try to bounce back their economy. As a result, energy

demand is expected to increase dramatically to support simultaneous global development. Therefore, Indonesia is urged to assess its current position on energy transition to meet its commitment to have new and renewable energy at least 23% in 2025 and at least 31% in 2050 on its primary energy supply mix based on the updated NDC 2021.

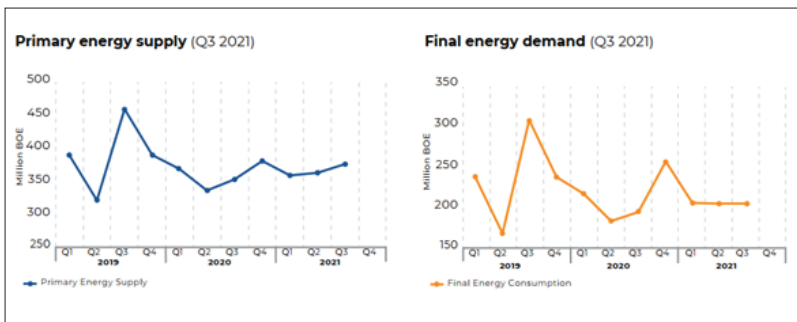
In a pre-COVID-19 situation in 2019, more than 90% of Indonesia's primary energy demands were supplied from fossil fuels. Renewable energy only accounts for approximately 8% of the total energy supply mix (National Energy Council of Indonesia, 2020). Moreover, Indonesia has had a relatively unambitious growth in developing new and renewable energy capacity in the last decades, specifically at around 334 MW per year, far below our neighbor, Vietnam, which can achieve 1745 MW per year (Sumarno & Sanchez, 2021). Some major renewable energy deployment projects were delayed. This postponement leads to the slower growth of the renewable energy sector. As seen in Figure 3.1, renewable energy accounts for only 11.2% of Indonesia's energy mix by Q3 of 2021 (IESR, 2022).



Source: IESR (2022)

**Figure 3.1** Indonesia Primary Energy Mix (Q3 2021)

During the recovery process from COVID-19, economic growth showed a positive trend and the situation is under better control than in these past years. The energy sector also offers a recovery in increasing activity after experiencing a massive shock in 2020 due to COVID-19. As seen in Figure 3.2 below, the energy activity plunged drastically. Consequently, the Government should ensure the security of the energy supply to meet these growing demands that are predicted to keep increasing in the future alongside the peak in economic development targets. However, until the third quarter (Q3) of 2021, fossil fuel still dominates the primary energy mix (IESR, 2022).



Source: (IESR, 2022)

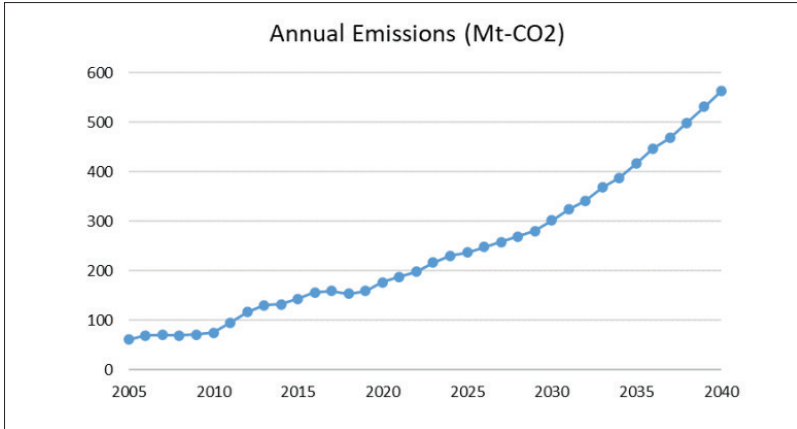
**Figure 3.2** Primary Energy Supply (Q3 2021) and Final Energy Demand (Q3 2021)

Additionally, according to the National Economic Recovery (PEN), fossil fuel is still supported by representing 8% of Indonesia's total budget in the form of cash in most packages. PEN 2020 also supports cleaner energy sources, but only biodiesel receives a direct injection of cash. It appears that investing in fossil fuels is still more attractive than renewable energy sources. Therefore, the battle of energy security and energy transition would be very tricky to implement as the Government was forced to face another dilemma. A stronger policy and a more attractive package for investors to accelerate the transition to cleaner energy sources are urgently needed to keep Indonesia's climate change mitigation commitment on track.

## D. The Hardship to Challenge the Coal Impact of the Country

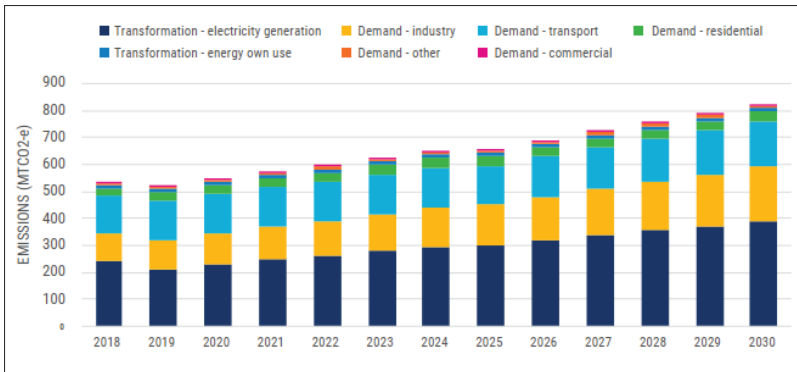
It is a fact that fossil fuel is the main energy source until today, with coal making up the biggest portion of it. Indonesia has around 3% global coal reserves (bp, 2021). Additionally, this country is the biggest coal exporter in the world, with 80% of coal being exported and the rest being used domestically. Almost 20% of the total share of national final energy consumption is electricity, with 47% of the portion still dominated by coal in June 2021 (Indrawan, 2021). Domestic use of coal in Indonesia mostly goes into electricity production under Perusahaan Listrik Negara (PLN), a state-owned company monopolizing Indonesia's power market. As a state-owned company, PLN has a constitutionally mandated monopoly on transmission and distribution. They also have a legal obligation to provide "reasonably priced" power to the citizen, the price of which is set by the Ministry of Energy (Guild, 2019). This political perspective shows the impact of PLN is on the country.

Indonesia has four types of Coal-fired Power Plant (CFPP): subcritical, supercritical, ultra-supercritical, and fluidized bed. Subcritical is the most common use of CFPP in the country. Based on a study conducted by ASEAN Centre for Energy (ACE) on CO<sub>2</sub> emissions from CFPPs (see Figure 3.3), emissions from CFPPs in Indonesia are projected to rise between 2017 and 2040, reaching an accumulative amount of 8623 million tonnes from 2005 to 2040 due to increased demand for electricity (ASEAN Center for Energy, 2021). Additionally, coal-fired power plants are major sources of air pollution in the country and are considered a direct cause of numerous non-communicable diseases (Sanchez & Luan, 2018). Thus, this sector is crucial to consider when discussing Indonesia's energy.



Source: ASEAN Center for Energy (2021)  
**Figure 3.3** Annual Emissions Profile of the CFFP in Indonesia

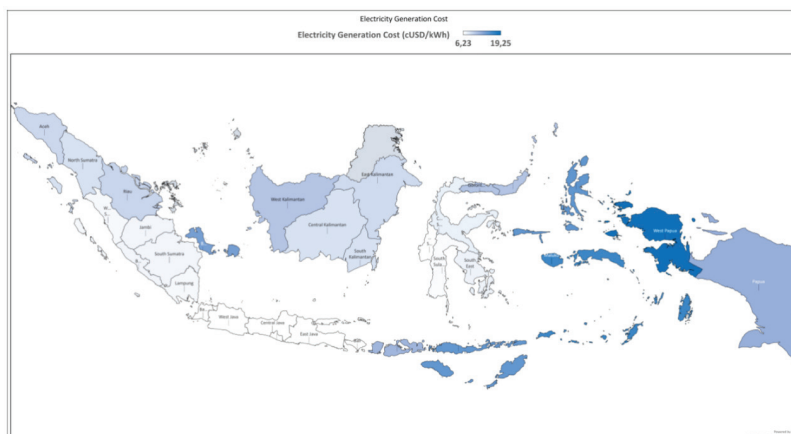
According to the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), the report of Indonesia’s energy sector emission outlook in the current policy scenario 2020–2030 shows that as the energy needs keep increasing, the emission also follows, following the BAU scenario (see Figure 3.4). The graph shows how the transformation from electricity generation is the top main source of emission, and it still dominates until 2030.



Source: UNESCAP (2020)  
**Figure 3.4** The Outlook of Indonesia’s Energy Sector Emission in the Current Policy Scenario 2020–2030



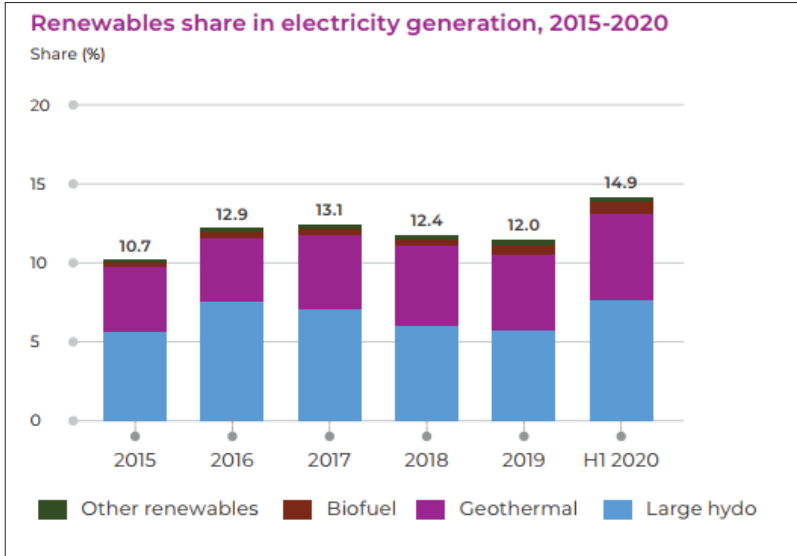
In addition, due to the geographical characteristics of the country with thousands of islands spread across the archipelago, Indonesia struggles with an uneven electricity generation cost. As shown in Figure 3.5, electricity generation costs in the eastern part of Indonesia could be three times more expensive compared to the cheapest cost in Java Island as the center of economic activity in the country. It is a huge gap that needs to be filled, especially in the eastern part of the country, where the development is still low and yet at the same time, it is rich in mining products. The uneven price of electricity generation costs is a big reason why renewable energy is a crucial solution for Indonesia, especially in terms of electricity generation aside from emission reduction.



Source: Kementerian ESDM RI (2021)

**Figure 3.5** Geography of Electricity Generation Cost under MEMR 2021

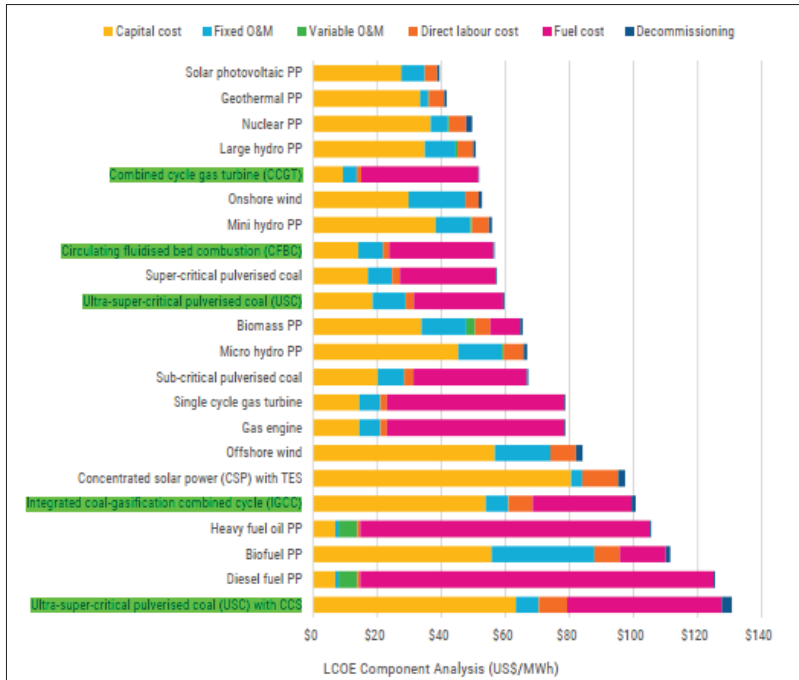
Figure 3.6 shows very few renewables in Indonesia's electricity generation share. Until the half of 2020, the share of renewables in electricity generation is less than 15% (IESR, 2021). From this point of view, PLN, the main actor in the energy industry, should be active in decarbonizing its annual emissions to support the Government in achieving its commitments to reducing carbon emissions.



Source: IESR (2021)

**Figure 3.6** Renewables Share in Electricity Generation, 2015–2020

The study conducted by the UNESCAP with the LCOE (Levelized Cost of Electricity) method shows that the electricity generation using renewable power plants such as solar photovoltaic, geothermal, hydro, and on-shore wind, is cheaper than coal-fired power generation which is used abundantly in Indonesia (Fig. 3.7). The LCOE method sums up the lifetime costs of an energy system divided by their respective lifetime energy generation. The use of lifecycle costs of the systems balances out the disparity among technologies with high capital costs but low operating costs or vice versa (UN, 2020).



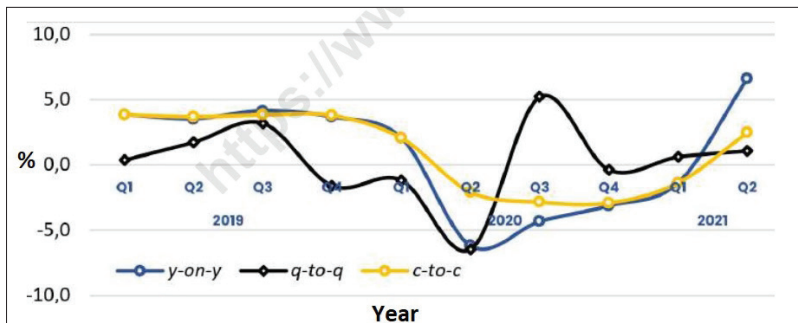
Source: UNESCAP (2020)

**Figure 3.7** LCOE of Different Power Plant Technologies in Indonesia

Additionally, with current conditions, international development agencies and NGOs are actively promoting and spreading awareness to fight against climate change, particularly in the energy sector as the most influential source of a global emitter. However, these actors are seen to be sided and bring no influence on Indonesia’s energy policy. A growing civil society movement and NGO network that criticizes coal mining and the construction of new coal power plants have emerged over recent years and contributed to changing public attitudes and evaluating and revoking of mining permits (Fünfgeld, 2019).

## E. The Reliance of Industrial Sector on Fossil Fuel

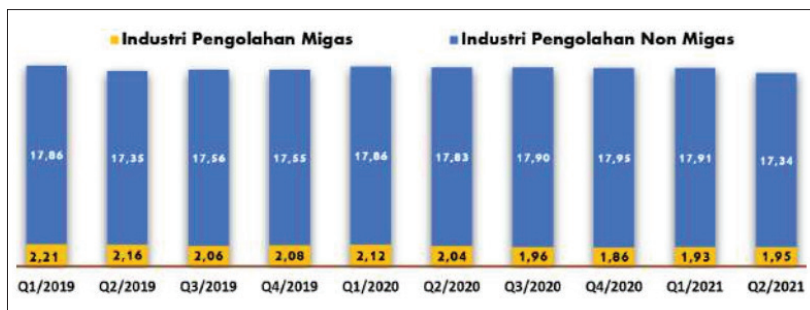
The energy sector is responsible for more than 70% of global greenhouse gas emissions. Meanwhile, energy use in industries contributes more than 24% or almost a quarter of total GHG emissions that need to be decarbonized to keep the global average temperature increasing below 2°C from pre-industrial levels, as stated in the 2015 Paris Agreement. As an emerging country whose economic growth depends on the industrial sector, Indonesia has a huge percentage of energy use in its total energy consumption. Specifically, this country relies heavily on gas and coal as the main energy sources in industry, which is predicted to remain at that level until 2050 in BaU condition (National Energy Council of Indonesia, 2020).



Source: Badan Pusat Statistik (2021)

**Figure 3.8** Industry Sector Growth, 2019–2021 (%)

The industrial sector, specifically the highly intensive energy sector, has been a crucial driver of growth in the Indonesian economy. Besides making a big contribution to Indonesia's GDP, these sectors also absorb huge workforce, especially those from lower economies. Figure 3.9 shows a disruption in 2020 (y-o-y), but it keeps increasing until Q2 2021.



Source: Badan Pusat Statistik (2021)

**Figure 3.9** Industry Sector in GDP, 2019–2021 (%)

However, regardless of the pandemic, the Indonesian industrial sector experienced an insignificant change throughout the year. It shows how the industrial sector is a strong aspect and an essential factor for Indonesia's economic growth. In a recent event, the Government stated they would like to increase their export industry to support the national economic growth and improve the economic structure, especially after the COVID-19 event which caused disruptions in many sectors, including the industrial sector. The increase in export and industrial activity will directly impact on the increasing GHG emissions, mainly for highly intensive energy use subsectors, simultaneously with the rise in fossil fuel use and production capacity.

The industrial sector in Indonesia, in particular the non-oil and gas manufacturing industry, is the country's major user of energy consumption. Specifically, six industrial sub-sectors highly consume energy, such as cement, metal, food and beverage, fertilizer, ceramics, and pulp and paper industries (National Energy Council of Indonesia, 2020). The total energy demand of these six industries contributes 87% of the total energy consumption in the industrial sector. Specifically, on the energy source, gas is mainly used to meet the metal demand, fertilizer (as feedstock), and ceramics industries. These three industries consume around 83% of gas from the total gas demand in the industry. While coal is 90% consumed by the cement industry. Moreover, Decarbonisation Data Portal from Climate Action

Tracker found that the intensity of carbon emission from cement production in Indonesia is higher than the world average, 657kgCO<sub>2</sub>/tonne product compared to 614 kgCO<sub>2</sub>/tonne product. These facts put a lot of pressure on decarbonizing and penetrating their energy use into low carbon energy options due to the high reliance on fossil fuel energy sources (Climate Action Tracker, 2020).

These dilemmas will indeed become another tough challenge for the industrial sector in Indonesia as the Government has pledged to reduce their emission to 29% by 2030 with their effort, or 41% conditionally with international support. The country must stay on its commitment to fight climate change, but at the same time, must increase the production activity in the industrial sector. Therefore, the Government needs to arrange its deep decarbonization roadmap from introducing technological innovation to lowering energy use by increasing efficiency. Moreover, using more sustainable alternative fuels such as hydrogen and electrification, or any other climate-friendly choices in the sector.

## **F. Regulating and Financing the Transition**

Transitioning is not a one-night process, including energy transition, as people have been living and relying on fossil fuels for decades. Proper movement on regulating and financing the transition is crucial to assist the implementation. However, despite the commitment that Indonesia's leader has stated in the international and national events, it is seen that fossil fuels still got favoritism in the implementation process.

Indonesia currently subsidizes fossil fuels as part of its yearly budget and has offered support to fossil fuel-intensive sectors. In particular, cash support to PT PLN (state-owned electricity enterprise that mainly uses coal for power generation), PT Pertamina (state-owned energy enterprise that operates in the oil and gas sector, both upstream and downstream), PT Garuda Indonesia (state-owned aviation enterprise), and PT Kereta Api Indonesia (state-owned rail

enterprise). The budget totals IDR 95 trillion (USD 6.6 billion), also included in COVID-19 recovery packages (Sumarno & Sanchez, 2021). The “forever existence” subsidy on fossil fuels in the country encourages energy consumption to lean on cheap energy sources. Hence, this policy instrument keeps making the conventional energy source more attractive than cleaner choices.

Besides, from a financing perspective, Indonesia’s current financial market is relatively small and dominated by the banking sector, in which the low carbon infrastructure projects in the country would significantly depend on bank lending (Setyowati, 2020). A recent study stated that the national bank’s policy is yet to explicitly present a commitment to moving away from fossil-fuel investment to renewable energy. The study found that only one national bank obtains a score in climate change due to transparent disclosure of investment portfolios toward efficiency and conservation of energy. While foreign banks dominate others as they have already had policies to mitigate climate change risks by setting specific targets for reducing carbon emissions (Perkumpulan PRAKARSA, 2019). The local banks also often opt to invest in coal power generation rather than in renewable energy because coal is deemed more economically feasible and they perceive that investing in renewable energy in a high risk (Setyowati, 2020).

Additionally, the financial services regulator, OJK (Otoritas Jasa Keuangan), issued a roadmap for sustainable finance in 2014. Since then, the Ministry of Energy and Mineral Resources has been experimenting with various incentives for jump-starting growth in renewable energy since at least 2011. These efforts have included the feed-in-tariffs (FiT) and government financial guarantees for qualified projects. However, despite years of tinkering, these efforts have yielded almost no growth. For instance, between 2013 and 2017, FiT produced almost no increase in solar, wind, or biomass energy due to poor policy design and regulatory architecture that constantly change, which drove down investor confidence (Guild, 2019).

Moreover, at the end of 2017, the Ministry of Energy and Mineral Resources introduced Ministerial Regulation 50/2017. It benchmarks the price that the state-owned company, PLN (Perusahaan Listrik Negara), can pay to off-take power from IPP (Independent Power Purchase) to its local and national costs of production (known as Biaya Pokok Penyediaan or BPP in Indonesia). In other words, PLN will not pay more to IPPs to purchase power than it costs for the utility to generate electricity from its plants. In Java and Sumatra, where large grids are powered mainly by cheap coal-fired plants, more expensive renewable energies like solar or wind will struggle competitively. With this regulation, PLN becomes more constrained in what it can pay as solar is less likely to be financially competitive on Java, where the demand is at the highest (Guild, 2019).

Regulating and financing the transition is one of the essential processes in implementing the energy transition. As an emerging economy country, Indonesia should be able to serve affordable and accessible energy across the country. In addition, for local sovereignty, the policymakers need to take their words seriously on their commitment to shifting their energy source to cleaner choices to reduce emissions and save the planet.

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