

# Chapter 1

## Background of the Study

November 2022

**This chapter should be cited as**

ERIA Study team (2022), 'Background of the Study', in ERIA (eds.), *The Strategies of National Oil Companies in Southeast Asia under Energy Transition*. ERIA Research Project Report FY2022 No. 15, Jakarta: ERIA, pp.1-7.

# Chapter 1

## Background of the Study

This chapter analyses the climate change issue by providing the background for this study, the outlook for global energy consumption, and the outlook for energy consumption in the Association of Southeast Asian Nations (ASEAN). This chapter also discusses issues in ASEAN's pursuit of carbon neutrality (CN).

### **1. Growing Climate Change Issue**

Recently, there has been growing interest in climate change due to abnormal weather events such as floods caused by strong typhoons, droughts, heat waves, rising sea levels, wildfires, and other disasters. Awareness of these issues led to the first meeting of the Conference of the Parties (COP) 1 in 1995 to discuss a comprehensive framework for greenhouse gas (GHG) reduction. The Kyoto Protocol was adopted at COP3 in 1997, and the Paris Agreement took effect at COP21 in 2015.

### **2. Outlook for World Energy Consumption**

Both natural and human-induced factors cause climate change. But current extreme weather events are thought to result from a rapid increase in atmospheric carbon dioxide (CO<sub>2</sub>) emissions due to increased human industrial activities, intensifying the greenhouse effect.

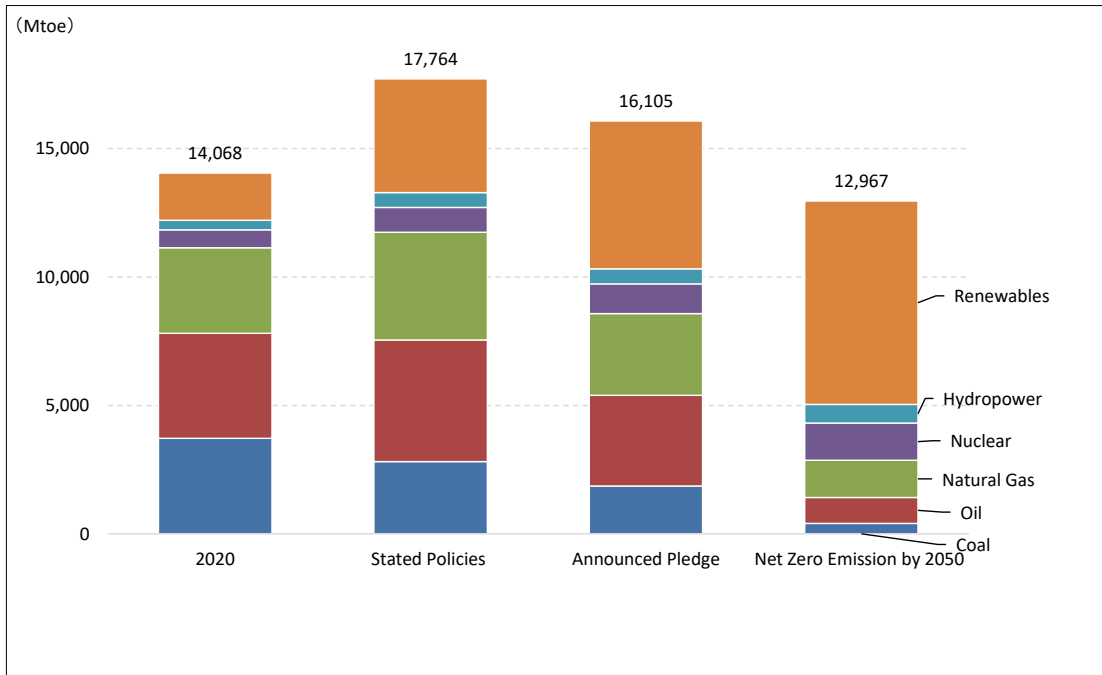
At COP21 held in Paris in 2015, the Paris Agreement, a new framework for combating global warming, entered into force. The Paris Agreement limits global warming to below 2<sup>o</sup>C, preferably to 1.5<sup>o</sup>C, compared to pre-industrial levels. Subsequently, there were growing calls to limit the temperature increase to 1.5<sup>o</sup>C because the 2-degree increase limit would not be enough to prevent the expected enormous impact.

The International Energy Agency (IEA) has set several future scenarios to limit future temperature increases.

- (1) Net zero emissions (NZE) by 2050 scenario sets out a narrow but achievable pathway for the global energy sector to achieve net-zero CO<sub>2</sub> emissions by 2050.
- (2) The announced pledges scenario assumes that all climate commitments made by governments around the world, including nationally determined contributions (NDCs) and longer-term net-zero targets will be met in full and on time.
- (3) Stated policies scenario reflects current policy settings based on a sector-by-sector assessment of the specific policies in place, as well as those that governments worldwide have announced.

Figure 1.1 shows IEA's energy consumption outlook by scenario for 2050. Global primary energy consumption in 2050 is expected to reach 17,764 Mtoe, about 1.26 times higher than in 2020 under the announced policy scenario, and 16,105 Mtoe, about 1.14 times higher than in 2020 under the stated commitment scenario. On the other hand, the scenario for realising NZEs 2050, which is intended to limit the temperature increase to 1.5°C, is expected to reduce primary energy consumption to 12,967 Mtoe, about 0.92 times lower than in 2020. Therefore, to limit the temperature increase to 1.5°C, primary energy consumption must be reduced more than the 2020 level.

**Figure 1.1. IEA World Primary Energy Consumption Outlook by Scenario (2050)**



Source: IEA (2021).

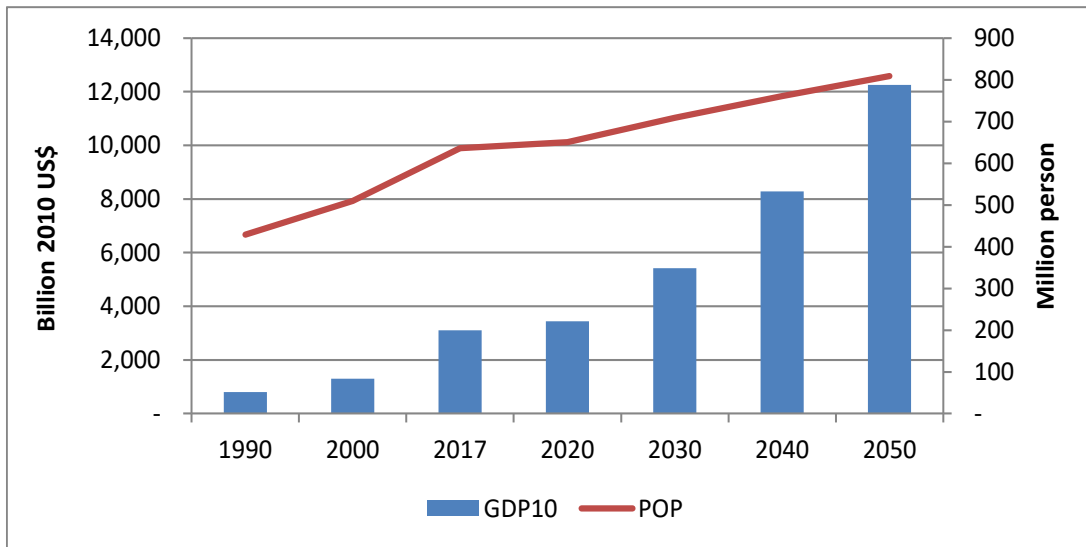
### 3. Energy Consumption Outlook in ASEAN

This section analyses the outlook for ASEAN-wide primary energy consumption, final energy consumption, and CO<sub>2</sub> emissions based on the ERIA Energy Outlook 2020 (ERIA, 2021).

#### 3.1. Population and gross domestic product (GDP) outlook in ASEAN

Figure 1.2 shows ASEAN’s population and GDP outlook as an assumption for future energy consumption. ASEAN's population is expected to continue to grow; at the same time, its GDP is also expected to grow steadily.

**Figure 1.2. Population and GDP Outlook in ASEAN**



Source: ERIA (2021).

### 3.2. Primary energy consumption outlook in ASEAN

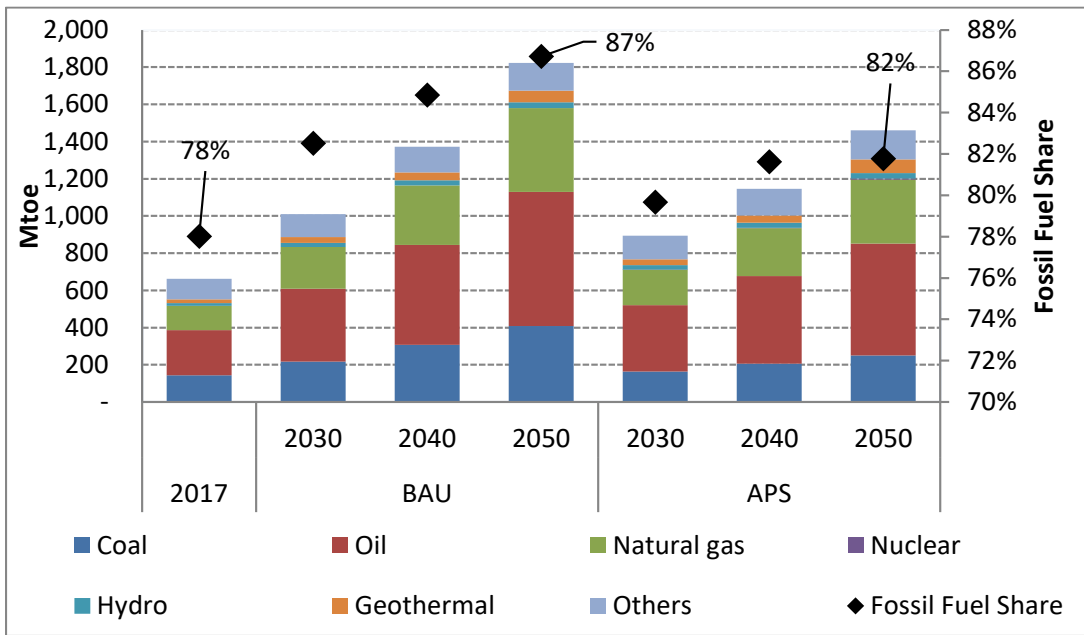
Figure 1.3 shows the primary energy consumption outlook in ASEAN. The primary energy consumption in ASEAN is expected to increase 2.8-fold from 662 Mtoe in 2017 to 1,823 Mtoe in 2050 under the business-as-usual scenario (BAU), and the alternative policy scenario<sup>1</sup> (APS) projects a 2.2-fold increase to 1,461 Mtoe in 2050. The share of fossil fuels, which emit CO<sub>2</sub> during combustion,<sup>2</sup> is expected to rise from 78% in 2017 to 87% in 2050 in BAU and 82% in 2050 in the APS.

---

<sup>1</sup> Additional energy savings and renewable energy penetration might be achieved.

<sup>2</sup> Coal, oil, and natural gas.

**Figure 1.3. Primary Energy Consumption Outlook in ASEAN**

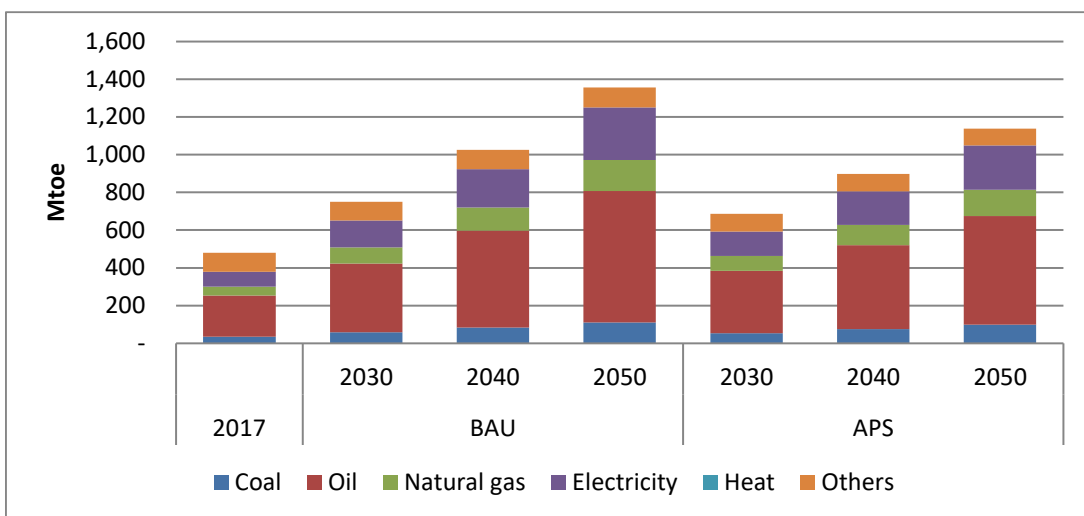


Source: ERIA (2021).

### 3.3. Final energy consumption outlook in ASEAN

Figure 1.4 shows the final energy consumption outlook in ASEAN. It is expected to increase a 2.8-fold from 480 Mtoe in 2017 to 1,356 Mtoe in 2050 in BAU and a 2.4-fold to 1,139 Mtoe in 2050 in the APS.

**Figure 1.4. Final Energy Consumption Outlook in ASEAN**

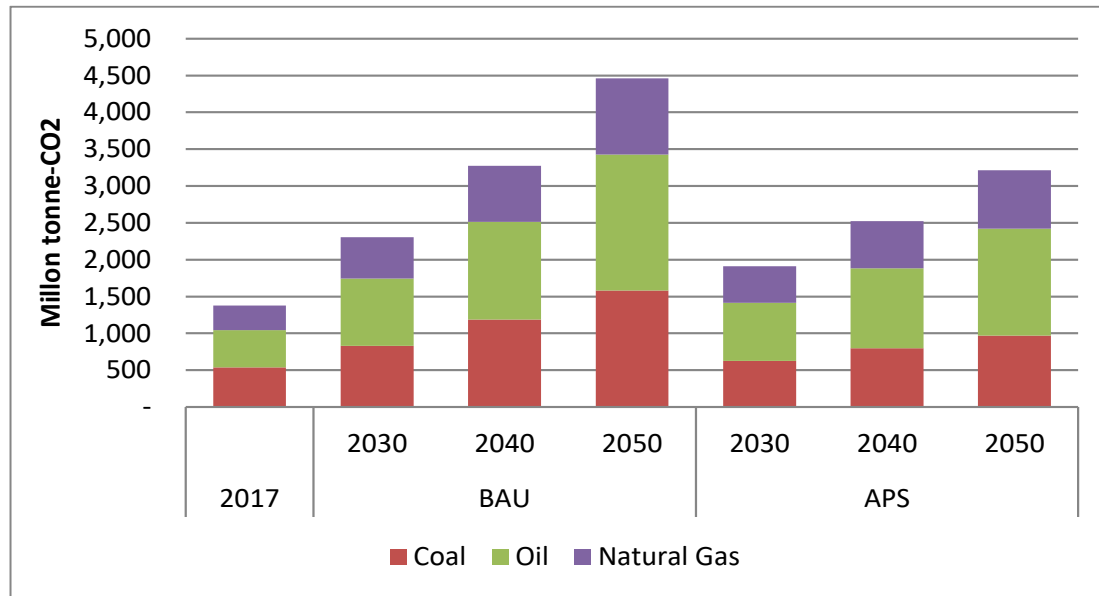


Source: ERIA (2021).

### 3.4. CO<sub>2</sub> emission from fuel combustion outlook in ASEAN

Figure 1.5 shows ASEAN's outlook for energy-derived CO<sub>2</sub> emissions. CO<sub>2</sub> emissions in ASEAN are estimated to increase 3.2-fold from 1,378 million tonnes in 2017 to 4,461 million tonnes in 2050 in BAU, and 2.3-fold to 3,212 million tonnes in 2050 in the APS.

**Figure 1.5. CO<sub>2</sub> Emission from Fuel Combustion Outlook in ASEAN**



Source: ERIA (2021).

## 4. ASEAN's Tasks for Carbon Neutrality

### 4.1. Carbon neutrality in a brief period: a huge financial burden

The IEA World Primary Energy Consumption Outlook by Scenario (2050) was created using the back-cast method (a method of first drawing a target future image and then tracing the path to realise that future image from the future to the present). However, Outlook 2022 of the Institute of Energy Economics, Japan (IEEJ) is created by the fore-cast method (a method of exploring the future starting from the present). IEEJ outlook 2022 estimates that the average cost required to achieve CN in 2050 in ASEAN is US\$213/tonne-CO<sub>2</sub>. The additional cost for CO<sub>2</sub> reduction will amount to a yearly average of 2.5% of ASEAN's total GDP through 2050. Incidentally, according to the IEA's net-zero road map, the global yearly average cost for realising CN by 2050 is expected to be 1% of total GDP, indicating that developing countries

must bear relatively inflated costs. Given these, pursuing CN in a brief period could result in a huge increase in the national burden on ASEAN.

#### **4.2. Planning and technical assistance for realising carbon neutrality**

The above suggests that developed countries and ASEAN are in different situations; therefore, the costs for realising CN are vastly different. Thus, it is not appropriate to uniformly require ASEAN countries to follow a path for transition to CN like that for developed countries. Instead, it is necessary to consider the various realities of the respective countries, provide technical assistance, and develop a process chart for CN suited to each country.

### **5. Importance of National Oil Companies**

National oil companies (NOCs) are less susceptible to decarbonisation pressures from nongovernmental organisations, institutional investors, and judicial organs. Their shareholders are their home governments, and if their governments do not require strong climate change countermeasures, they can continue to invest in upstream sectors and fossil fuel businesses as they have in the past. The energy transition from fossil to non-fossil fuels is expected to proceed gradually. The NOCs of oil-producing and emerging countries may become even more influential in the international market as important fossil fuel suppliers during the energy transition period.

Under these circumstances, ASEAN NOCs, in handling fossil fuels, must strengthen GHG emission reduction measures as they ensure a stable energy supply and strengthen their efforts in their existing businesses and low-carbon fields, such as renewable energy.

Based on the above, it is necessary to implement case studies and comparative analysis of existing efforts and low-carbon energy business sector initiatives by the ASEAN NOCs and the Western majors, and to study and make recommendations to the ASEAN NOCs regarding their efforts towards low carbonisation and decarbonisation.