

Chapter 1

Impact of COVID-19 on Energy Demand in ASEAN

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Chapter 1

Impact of COVID-19 on Energy Demand in ASEAN

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1. Background and Purpose

The coronavirus disease (COVID-19) pandemic started spreading worldwide in January 2020 and continues to mutate despite governments' dedicated efforts to control it. The pandemic has brought us many inconveniences: needing to stay home or work from home; maintaining social distance; avoiding crowds at restaurants, theatres, sport events, and other places of entertainment; using face masks; frequently washing our hands and gargling, among others. The pandemic has lowered energy consumption and given rise to negative trends because of the economic recession, although many countries have not yet released their official energy statistics. The Economic Research Institute for ASEAN and East Asia (ERIA) Working Group for Energy Outlook and Energy-Saving Potential in ASEAN and East Asia took up the challenge of measuring COVID-19's negative impacts on energy demand. The working group used energy outlook models of 17 countries of the East Asia Summit (EAS17) to measure short-term impact, in 2020, and long-term impact, up to 2050. Because not all energy outlook results are available, this report covers only eight Association of Southeast Asian Nations (ASEAN) members: Cambodia, Indonesia, Lao People's Democratic Republic (Lao PDR), Malaysia, the Philippines Singapore, Thailand, and Viet Nam (ASEAN 8). They represented 86% of gross domestic product (GDP) and 91% of total final energy consumption (TFEC) of ASEAN in 2017.

2. Methodology

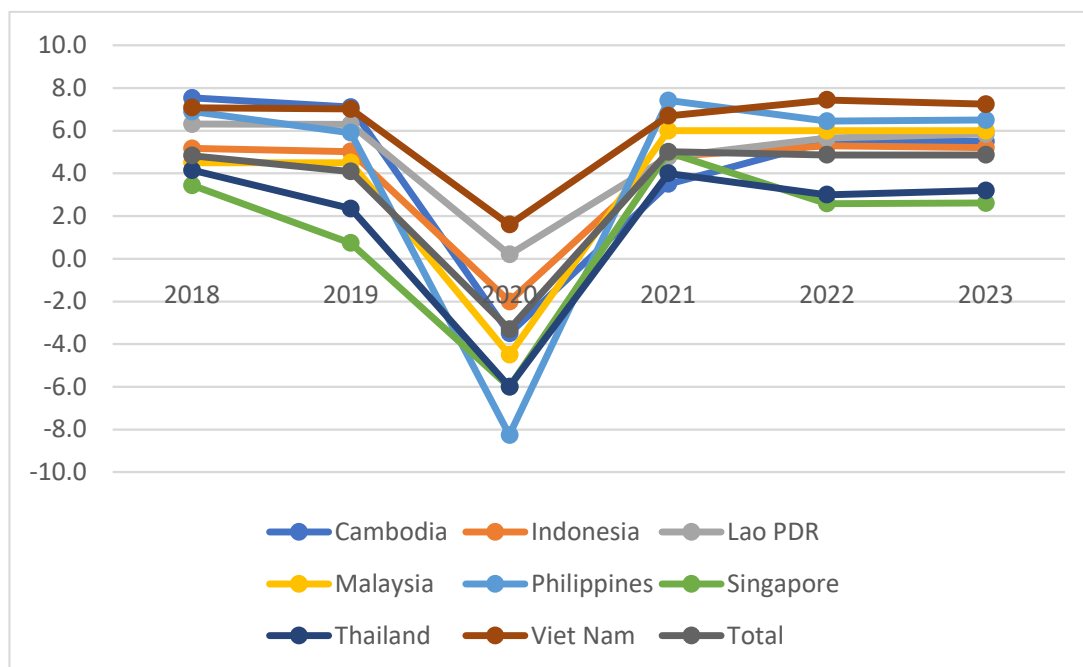
In 2019–2020, the working group updated the energy outlook models using the latest macroeconomic assumptions and energy development plans, including energy-saving and renewable energy deployment targets, to analyse energy-saving potential defined as the business-as-usual (BAU)–alternative policy scenario (APS) of energy demand. Based on BAU, the working group produced another APS: the COVID-19 scenario, which changes GDP and international crude oil prices of BAU because they are influenced by COVID-19. GDP is examined in 2020–2023, referring to sources such as the International Monetary Fund, and crude oil price is reviewed in 2020, based on global oil market information.

3. Assumptions

Assumed 2020 GDP growth rates of the ASEAN 8 are diverse: Lao PDR and Viet Nam may have positive rates but less than 2%, and the other six countries may show negative economic growth, from –2.0% in Indonesia to –8.3% in the Philippines. The weighted average of GDP growth rate of the ASEAN 8 is estimated at –3.3% in 2020. Figure 1.1 shows historical

assumptions of GDP growth rates of the ASEAN 8.

Figure 1.1. Assumptions of Gross Domestic Product Growth Rates, COVID-19 Scenario, 2018–2023



COVID-19 = coronavirus disease, GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic.
Source: Author.

Differences in GDP growth rate assumptions between the BAU and COVID-19 scenarios in all ASEAN countries are shown in Table 1.1. Rebounding economic growth starting in 2020 is indicated in 2020–2025 in the COVID-19 scenario. GDP growth rates are lower than in BAU because Malaysia, Singapore, and Thailand revise their economic growth assumptions after 2030. In 2017–2019, the GDP growth rate in the COVID-19 scenario is higher than in BAU because COVID-19 reflects observed GDP numbers.

Table 1.1. Gross Domestic Product Growth Rate, Business-as-Usual vs. COVID-19 Scenarios, 2017–2050

	2017-2019	2020	2020-2025	2025-2030	2040-2050	2040-2050
BAU	3.6	3.6	4.6	4.6	4.3	4.0
COVID-19	4.4	-3.3	4.8	4.4	4.1	3.8

BAU = business as usual, COVID-19 = coronavirus disease.
Source: ERIA (2019).

In 2020, international crude oil prices dropped sharply, so the crude oil assumption for the COVID-19 scenario was reviewed (Table 1.2).

Table 1.2. Crude Oil Price Assumption, Nominal Price, Business-as-Usual vs. Alternative Policy Scenarios, 2018–2050

	2018	2020	2030	2040	2050
BAU	75.1	87.7	126.9	187.2	248.1
APS	72.9	42.5	110.1	157.9	202.2

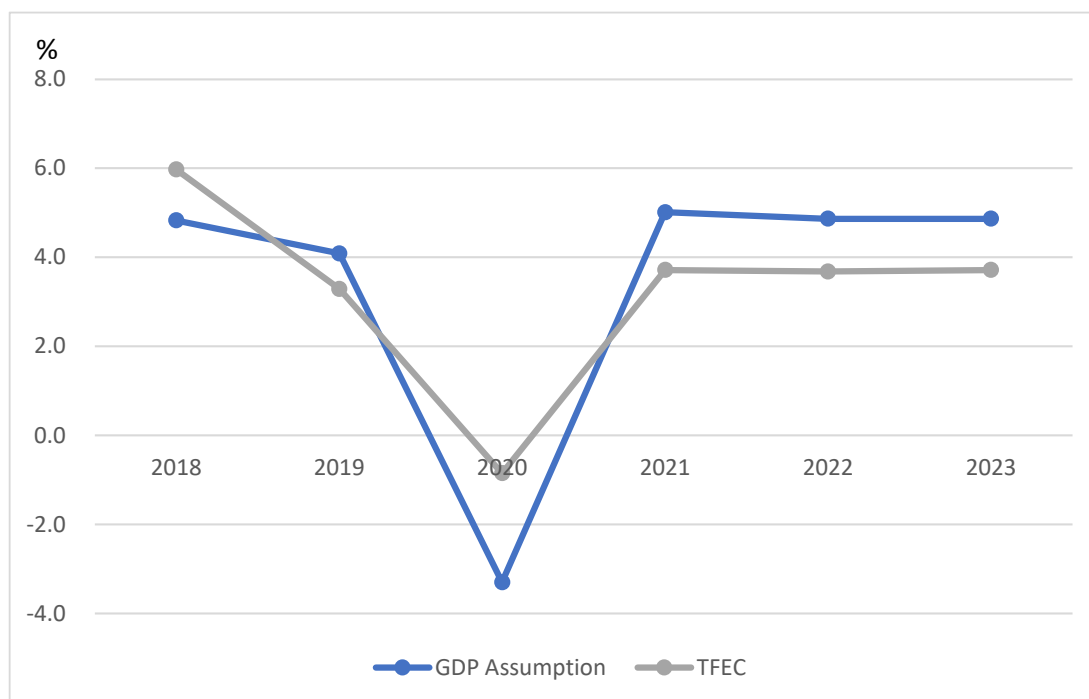
APS = alternative policy scenario, BAU = business as usual.
Source: ERIA (2019).

4. Impact on Final Energy Consumption

4.1. Short-term Impact

Because of negative GDP growth in 2020, TFEC of the ASEAN 8 reaches -0.8% ; in 2021, TFEC returns to the original trend of about 4% per annum. Because elasticity—growth rate of TFEC/growth rate of GDP—of the 10 ASEAN countries in 1990–2017 was 0.77 , elasticity after 2021 is 0.74 – 0.76 (Figure 1.2).

Figure 1.2. Comparison of Gross Domestic Product and Total Final Energy Consumption of All ASEAN Members, COVID-19 Scenario, 2018–2023

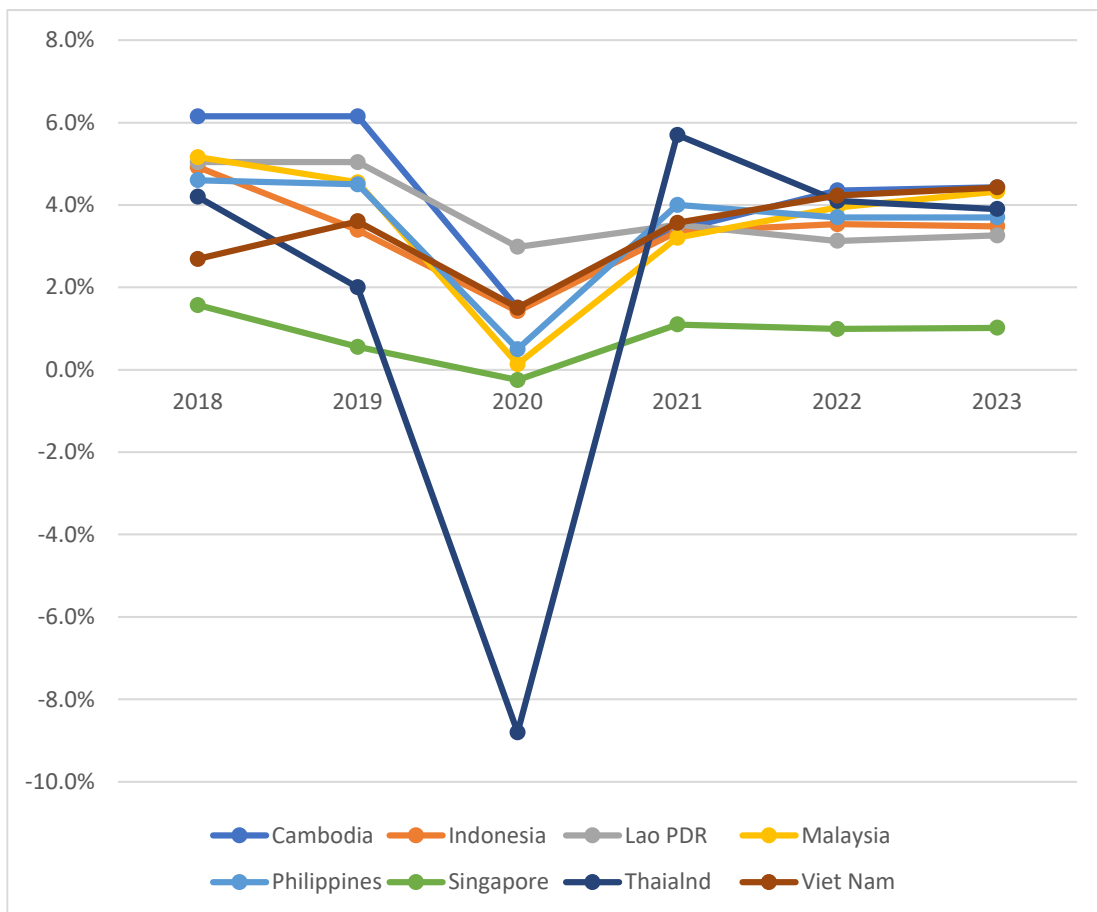


ASEAN = Association of Southeast Asian Nations, COVID-19 = coronavirus disease, GDP = gross domestic product, TFEC = total final energy consumption.

Source: Author.

According to the trial calculation based on assumed GDP growth rate in 2020–2030, the COVID-19 pandemic’s impact on ASEAN countries’ energy demand might not be serious, except in Thailand. All the ASEAN countries studied, except Lao PDR and Viet Nam, assume negative GDP growth, but only two countries show negative TFEC growth rate in 2020: Singapore and Thailand. Malaysia shows zero increase in TFEC. However, TFEC of the ASEAN 8 rebounds along with economic growth, and TFEC in the COVID-19 scenario returns to the original upward trend, as it does in BAU.

Figure 1.3. Total Final Energy Consumption of Eight ASEAN Countries, COVID-19 Scenario, 2018–2023

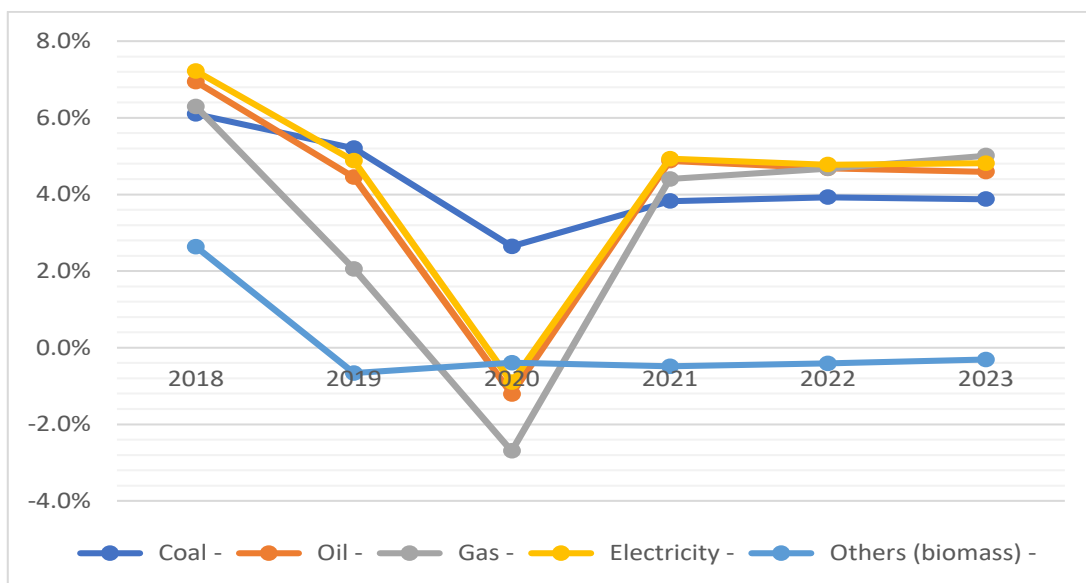


ASEAN = Association of Southeast Asian Nations, COVID-19 = coronavirus disease, Lao PDR = Lao People's Democratic Republic, TFEC = total final energy consumption.

Source: Author.

Damage to oil (-1.2%) and electricity (-0.9%) is serious in 2020. Consumption of gas decreases greatly, but only extremely small amounts are used and mainly for feedstock of fertilizer in Indonesia.

Figure 1.4. COVID-19's Impact by Energy Source

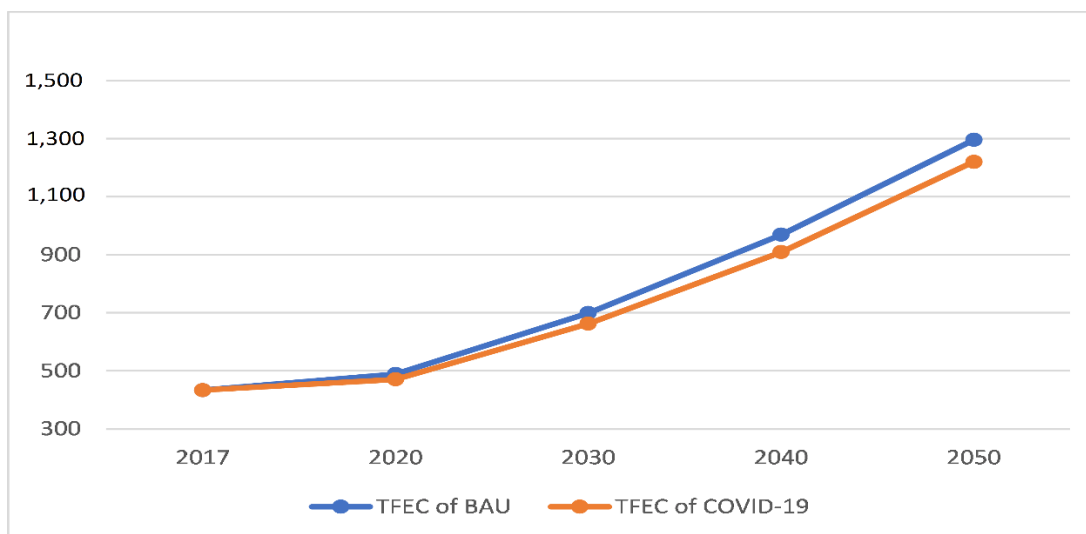


COVID-19 = coronavirus disease.
Source: Author.

4.2. Long-term Impact

TFEC in the COVID-19 scenario is lower than in BAU in 2020–2050 (Figure 1.4). Some countries, such as Malaysia and Thailand, assume higher GDP growth rate than BAU because of an economic rebound in 2021–2030. However, their GDP growth assumptions are lower than in BAU in 2030–2050. The difference between the COVID-19 and BAU scenarios is about 4%. After COVID-19, therefore, TFEC of the ASEAN 8 returns to BAU trends.

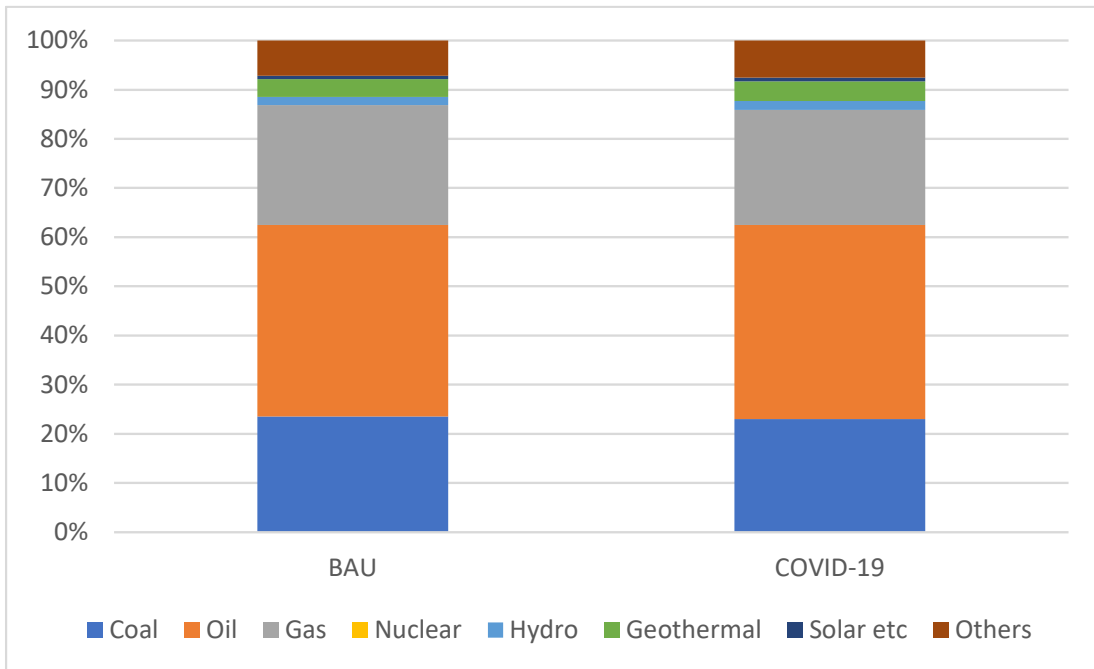
Figure 1.5. Total Final Energy Consumption, Business-as-Usual vs. COVID-19 Scenarios, 2017–2050



BAU = business as usual, COVID-19 = coronavirus disease, TFEC = total final energy consumption.
Source: Author.

The share of the ASEAN 8 in total primary energy supply in 2050 is the same in the BAU and COVID-19 scenarios. The COVID-19 scenario changes BAU's GDP and crude oil price assumptions, so the share of fossil oil in the COVID-19 scenario is 86%, the same as in BAU.

Figure 1.6. Share of Eight ASEAN Countries in Total Primary Energy Supply, Business-as-Usual vs. COVID-19 Scenarios, 2050



ASEAN = Association of Southeast Asian Nations, BAU = business as usual, COVID-19 = coronavirus disease.
Source: Author.

5. Key Findings and Recommendations

5.1. Key Findings

The following are the key findings:

- (i) Oil and electricity are the main energy sources in final energy consumption and highly correlated with GDP as an overall economic activity indicator. Oil and electricity consumption in 2020 decreases because of the economic recession resulting from the COVID-19 pandemic. The amount of coal and gas in final energy consumption, however, is so small that it has no correlation with GDP.
- (ii) Six of the ASEAN 8 assume negative GDP growth in 2020, but only two countries show negative TFEC growth. One reason is the structure of the energy demand formulas used in the EAS energy outlook. They consist of the following variables: GDP, relative energy prices, and lag (-1). When the lag coefficient is significant, economic recession does not directly reduce oil and electricity consumption. A crude oil price assumption slightly lower than in BAU mitigates energy consumption reduction.

- (iii) We used an econometrics approach to analyse the impact on energy consumption during the economic recession caused by the COVID-19 pandemic, but the approach might not be appropriate for analysing economic shock. ASEAN countries might release their 2020 official energy balance tables around June–July 2022. Then we may compare actual energy consumption to the model results.

5.2. Recommendations

According to the results of the trial analysis to measure COVID-19 pandemic impacts on energy consumption in ASEAN, using econometric energy outlook models, the COVID-19 pandemic clearly has a negative impact on energy consumption because of the economic recession. After energy consumption in the COVID-19 scenario spikes because of the economic rebound, it gradually catches up with energy consumption trends in BAU. As a result, the fossil fuel share in 2050 is still be more than 80%. Countries must, therefore, promote energy efficiency and conservation and deploy affordable renewable energy such as hydropower, geothermal, and solar photovoltaic sources. A coal-to-gas policy is an option for ASEAN countries to mitigate CO₂ emissions, making an integrated liquid national gas supply chain, such as the Trans-ASEAN Gas Pipeline, indispensable.