

CHAPTER I

INTRODUCTION

A. Background

The economy plays a significant role as a central topic within a nation. It cannot be denied that a country with a sound economic structure can create prosperity for its society. The government aims to achieve that goal by enhancing economic activities that lead to economic growth. This fundamental factor holds significance, especially in developing countries. In addition to focusing on economic growth, the state must exist by promoting sustainable development.

The Association of Southeast Asian Nations (ASEAN) is experiencing the same thing as an emerging economic and developing region. ASEAN's consistent economic growth with high cumulative GDP has attracted global attention to its economic market. Projected to grow to USD 4.800 billion, with average annual growth reaching almost 5% until 2026, this region will become the fifth largest economy behind large countries namely the US, China, Japan, and Germany (ASEAN, 2022).

Table 1. 1
GDP in 2020, Member of ASEAN-6

Country	GDP, current prices (Billions of U.S. Dollars) in 2020
Indonesia	1.06 thousand
Thailand	500.53
Philippines	361.75
Singapore	348.39
Vietnam	346.31
Malaysia	337.61

Sources: IMF, 2023

Table 1. 1 shows those are the six biggest GDPs among other ASEAN members in 2020. With 1.06 thousand billion U.S. dollars, Indonesia is a leading country followed by Thailand with 500 billion U.S. dollars, Philippines with 361 billion U.S. dollars, Singapore with 348 billion U.S. dollars, Vietnam with 346 billion U.S. dollars, and the least is Malaysia with 337 billion U.S. dollars. Even though it is still be categorized as a developing country, the annual growth of this region representative was relatively high. Presenting a good record and growing rapidly in recent years, its success can be attributed to several driving factors. One of the essential keys is the advancement of industrial sectors within ASEAN member states (AMS).

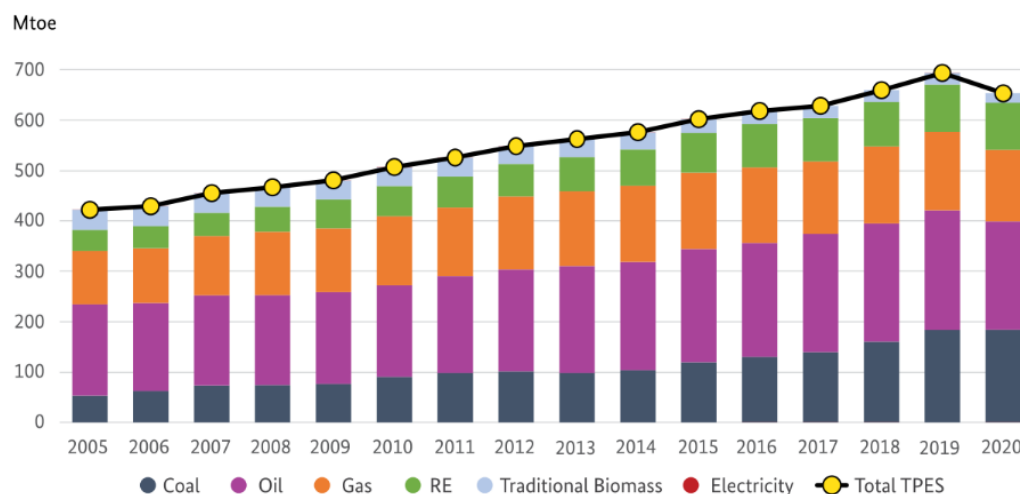
Industrialization not only contributes to economic development, but conversely, it also impacts the massive increase in urbanization. Urbanization, which is based on social factors such as economics, culture, basic facilities, and a better standard of living, is also triggered by the growth of this industrial sector, thereby providing opportunities or creating new jobs (Thanaporn et al., 2022). Developments in the industrial sector, followed by other sectors such as services and commercial, certainly require more workers. For this reason, economic progress, and industrialization impact higher levels of urbanization.

ASEAN stands as the global third-largest labor force after India and China, with a collective population exceeding 600 million individuals. At the same time, 31 cities exceeded one million and achieved nearly half of the entire populace, where approximately 49.5% of residents live in the cityside (ASEAN, 2022). Moreover, the rise of urbanization worldwide has drawn attention to its rapid

increase in Asia, 64%, and Africa, anticipated to reach 56% of the urban population by the middle of this century. People's Republic of China (PRC), followed by Bangladesh, India, Indonesia, Thailand, and Vietnam, will be projected as the most significant decrease in rural population.

Apart from the massive development, industrialization and urbanization also pose challenges to national economic development. Numerous effects occur, such as urban production, mobility, transportation, infrastructure, urban density, and private household consumption. Moreover, the emergence of these two phenomena leads to an economical operation center within an urban and metropolitan zone that promotes efficient gains in output level. Consequently, this transformation requires shifting from non-energy-based agriculture to becoming more energy-dependent in manufacturing or industrial processes (Ming, 2014). Thus, energy plays a crucial role; it encompasses economic growth that involves both consumption and production aspects.

Currently, ASEAN depends heavily on fossil fuels, with projections indicate that approximately the world's primary energy supply in 2025 will be fulfilled around 80% by fossil fuels. Therefore, the significant dependence on energy derived from non-renewable, combined with the diminishing of domestic reserves from that resource, is expected to necessitate increased imports of fossil fuels by ASEAN member states (Dinh et al., 2021).



Sources: Southeast Asia Energy Outlook, 2022

Figure 1.1
ASEAN Total Primary Energy Supply, 2005-2020

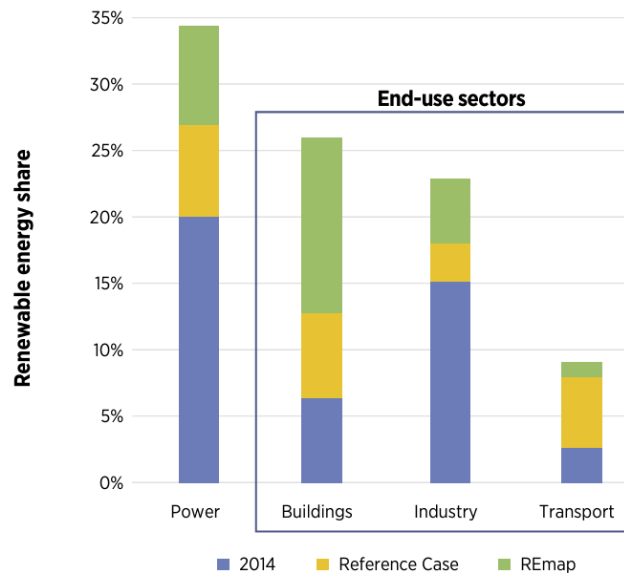
Responding to growing demand, ASEAN total primary energy supply (TPES) has sharply increased. The TPES in 2020 reached 654 Mtoe, approximately 1.5 times the 2005 level as seen in Figure 1.1. Fossil fuels dominated the region's energy mix, which accounted for about 83% in 2020, as compared to 14.2% renewables (excluding traditional biomass). With an increasing reliance on fossil fuel imports, the ASEAN region could face serious energy security challenges, as the availability of energy sources at an affordable price could be jeopardized. Fuel markets have proven to be highly volatile and sensitive to crises, such as global pandemics and geopolitical conflicts.

The transition from agriculture to industrialization in the region has emerged as a driving factor for global economic growth and energy demand. Industry retains its position as the most energy-intensive sector, closely followed by transportation. ASEAN has set an ambitious target of achieving 23% of its

primary energy from modern and sustainable renewable sources by 2025. This goal requires a substantial two-and-a-half-fold growth in the share of modern renewable energy compared to 2014. Concurrently, power generation is expected to double by 2025, and overall energy demand will sign an almost 50% increase. The ASEAN region's population is projected to rise from approximately 615 million in 2014 to 715 million by 2025. With the economy anticipated to grow at a rate exceeding 5% per year, there will be a rapid surge in energy demand. Forecasts indicate a 4% annual growth in energy demand until 2025, resulting in a 50% increase over 2014 levels. Notably, electricity demand is expected to double between 2014 and 2025 (ASEAN, 2022).

The region lacks sufficient fossil fuel resources to fulfill its escalating energy needs, leading to a heightened reliance on imported fossil fuels, thereby raising crucial energy security concerns. While the demand for electricity production is anticipated to grow at the immediate rate, there will also be a rapid increase in fuel demand for industry and transportation. Although most of the energy demand is expected to be satisfied by fossil fuels, there is also a projected noteworthy expansion in the use of hydropower, geothermal power, and certain forms of modern bioenergy for heating and cooking. The distribution of renewable energy utilization exhibits notable variations across countries and sectors, deviating widely from the regional target of 23%. This broad range can be attributed to differing resource endowments, distinct levels, and growth rates of energy demand, and varying starting points based on current levels. Throughout the ASEAN region,

the power sector claims the largest share, succeeded by buildings, industry, and transportation.



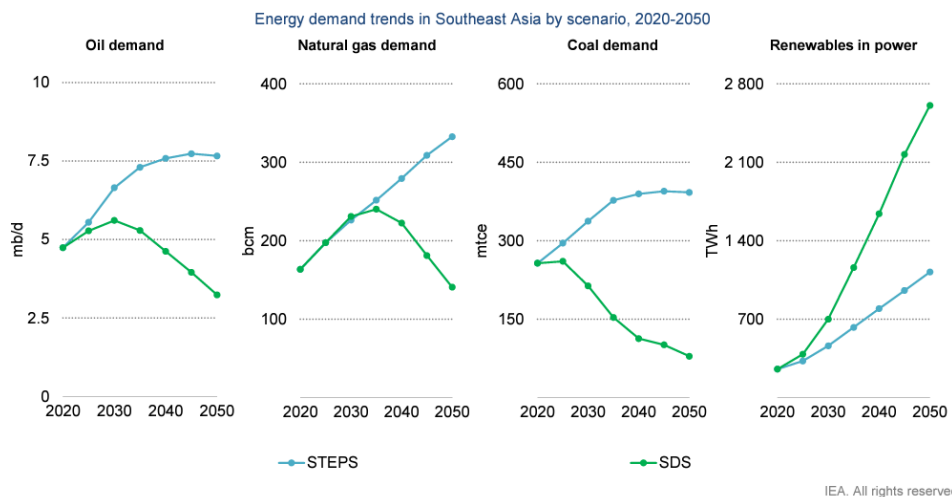
Sources: Southeast Asia Energy Outlook, 2022

Figure 1. 2
End-use sector in renewable energy share

In the industrial sector, there is projected to be a more than 60% increase in energy demand by 2025. The expected rise in the share of renewables is minimal, reaching only 15%-18% in the Renewable Energy map. The RE map indicates unexploited potential in the expanded utilization of bioenergy for process heat generation and in the combined production of power and heat. Additionally, solar thermal technology can play a role in supporting lower-temperature industrial processes. The industrial sector presents opportunities for self-generation of power, such as through solar PV or bioenergy. Simultaneously, factors such as higher income levels, increased urbanization, and the growth of energy-intensive

industries contribute to a substantial per capita rise in energy demand. Consequently, the total power generation will need to double in the next decade.

Addressing the escalating demand for energy in a cost-effective and sustainable manner will emerge as a key focus. The target set by ASEAN to achieve a 23% share of renewable energy by 2025 reflects the region's commitment to maximizing its abundant indigenous renewable resources, paving the way for a more sustainable energy supply across each nation. Attaining this objective necessitates a collaborative regional strategy and cannot be accomplished through isolated efforts by individual countries. Consequently, it is crucial to comprehend the implications of this target for each nation, identify their respective contributions, and concurrently acknowledge the collective regional endeavors essential for success (IRENA & ACE, 2022)



Sources: Southeast Asia Energy Outlook, 2022

Figure 1.3
Energy demand trends of ASEAN by scenario on 2020-2050

Figure 1.3 shows the future projection based on previous trends in energy demand. Although the dependence on oil, gas, and coal is still increasing, the trend of renewable energy is consistently increasing far beyond. As the reliance on energy has led to extremely high energy consumption, the country needs effective energy utilization to drive its development. Therefore, guaranteeing energy access can promote sustainable economic development yet to address the energy security issue.

In the Qur'an, it has been mentioned in verse Quran Surah Ibrahim verse 33, it is explained,

وَسَخَّرَ لَكُمُ الشَّمْسَ وَالْقَمَرَ دَائِبَيْنِ وَسَخَّرَ لَكُمُ اللَّيْلَ وَالنَّهَارَ

“And He subjected for you the sun and the moon, continuous [in orbit], and subjected for you the night and the day. And He hath made subject to you the sun and the moon, both diligently pursuing their courses; and the night and the day hath he (also) made subject to you.”

In this verse, it is about the sun which can be interpreted as solar energy which is able to support human and production activities. It is implied that the verse above indicates the nature has been given many resources to be utilized and fulfill the need of human in a good way.

The willingness to advance renewable energy deployment comes with a diverse socioeconomic advantage. Numerous countries in the region recognize the potential to establish a renewable energy ecosystem that could boost income, generate employment opportunities, contribute to industrial progression, and enhance the quality of life (Qamruzzaman & Karim, 2023). The expansion of urban areas and industrialization offer a substantial opportunity for the increased adoption of renewable energy resources. Urban centers, characterized by their high

population density, advanced infrastructure, and well-established transmission systems, are compatible with the continuous integration of renewable energy technologies. Therefore, the synergy between urban areas and industrialization, strengthened by the rising urbanization rates, can contribute to the growing demand for renewable energy.

As urbanization and industrialization continue to grow in developing economies, their influence on energy consumption is becoming more pronounced. Certain economic concerns highlight the vulnerability of energy markets, emphasizing the fragility and unsustainability of the current global energy system (World Energy Outlook, 2022). In response to the ongoing crisis, governments are implementing both short-term measures to protect consumers and longer-term strategies. Some are aiming to enhance or diversify their oil and gas supplies, while others are hastening structural changes. The world is currently grappling with an unprecedented and complex global energy crisis, significantly impacting households, businesses, and entire economies. This has led to various immediate responses from governments and sparked a deeper discussion on strategies to prevent such disruptions in the future. Without adequate attention, these issues have the potential to hinder or increase the cost of energy transitions.

The challenge lies in meeting the expanding energy demand while concurrently strengthening energy security. Although indigenous fossil fuel resources are distributed unevenly throughout the region, a commonality among all countries is the abundant availability of various types of renewable energy resources. Increasing the utilization of these resources can address the region's

growing energy needs and curb the escalation in fossil fuel consumption. This approach will enhance the security of energy supply, mitigating risks to human health, the environment, and the climate. Evaluations conducted at the country, regional, and sectoral levels illustrate how renewables can play a crucial role in addressing energy security challenges, thereby contributing to a more sustainable and resilient energy future. Thus, this study examines **“THE EFFECT OF URBANIZATION, INDUSTRIALIZATION, AND ECONOMIC GROWTH ON RENEWABLE ENERGY CONSUMPTION IN ASEAN-6 (INDONESIA, THAILAND, PHILIPPINES, MALAYSIA, SINGAPORE, AND VIETNAM) 1994-2020”**

B. Research Question

Based on the given analysis of the effect of urbanization, industrialization, and economic growth on renewable energy consumption in ASEAN-6, the research questions are as follows:

1. How does urbanization affect renewable energy consumption in ASEAN-6 in the short and long term?
2. How does industrialization affect renewable energy consumption in ASEAN-6 in the short and long term?
3. How does economic growth affect renewable energy consumption in ASEAN-6 in the short and long term?

C. Research Objective

This study aims to:

1. Analyze the effect of urbanization on renewable energy consumption in ASEAN-6 in the short and long term.
2. Analyze the effect of industrialization on renewable energy consumption in ASEAN-6 in the short and long term.
3. Analyze the effect of economic growth on renewable energy consumption in ASEAN-6 in the short and long term.

D. Research Benefit

This study is expected to be beneficial for:

1. The author hopes it can be beneficial to sharpen critical and scientific thinking responding to the research topic.
2. The readers hope it can provide insight, knowledge, and reference to the actual relationship data among variables in the short and long term.
3. Policymakers hope it can give additional information and reference material in making policies related to the research topic.