

CHAPTER I

INTRODUCTION

1.1 Problem Identification

The planet has reached a turning point in the fight against climate change, as the energy sector accounts for more than 70 % of global CO₂ emissions (IEA, 2023). The changes in temperature and rainfall events are called climate change. Also, the extreme weather changes from human activities are climate change. Due to Climate Change the life on Earth is in danger. Global warming shows itself through more frequent and severe extreme weather events. The most obvious phenomenon due to global warming is the melting of ice (Gil & Bernardo, 2020). Rising temperatures of Earth caused by greenhouse gases (GHGs), preventing heat from escaping the atmosphere, is called global warming. Gases like CO₂, methane (CH₄), and nitrous oxide (N₂O) intensify the natural greenhouse effect of the Earth. The impacts will become more severe if no intervention takes place, including worsening sea level rise and extreme weather.

CO₂ emissions, which make up 76% of GHG emissions caused by humans, are the leading driver of global warming. (IPCC, 2023). As a result, the concentration of greenhouse gases in the atmosphere increased from 280 ppm in the pre-industrial age to more than 420 ppm now. Moreover, the increase in the level of carbon dioxide is due to the increase in industrialisation, the burning of fossil fuels, and deforestation. Due to soaring carbon dioxide levels, the planet's average temperature has seen a rise of 1.1 degrees Celsius. The temperature may jump between 2.7 and 4.4 °C by 2100, resulting in a permanent impact if reduction is not achieved. To deal with global warming, renewable energy (NRE) like solar, wind, hydro, geothermal, etc., is a key strategy for this purpose. This is also explained in the study by Abbas et al. (2022) development of renewable energy resources has become essential for combating climate change, reducing greenhouse gas emissions, and preserving the environment.

The ASEAN countries have experienced rapid economic growth and urbanization, as well as other transformations in industrialization, resulting in

increased energy demand and environmental challenges, including air pollution and carbon emissions (The ASEAN Secretariat, 2017). The dependence on fossil fuel imports in the ASEAN Area makes them vulnerable to price volatility. Meanwhile, China, at the same time, the world's largest carbon emitter, is also advanced in renewable energy investment domestically and globally. The ASEAN countries, which depend on fossil fuels to meet their energy needs, contribute significant greenhouse gas emissions. More than half of electricity generation in Indonesia, Vietnam, and the Philippines is generated from coal, which shows that in some countries in ASEAN, coal is dominant. ASEAN produced more CO₂ than any other region in 2020. Despite accounting for merely 2% of global emissions. But the world learnt of climate change and its environmental consequences due to the transition to renewable energy sources.

Indonesia, the most populous ASEAN country, faces similar challenges to other ASEAN nations. Economic growth has led to higher energy demand, increasing reliance on fossil fuels, non-renewable and environmentally harmful. Since these resources are finite, Indonesia must transition to renewable energy for sustainable development. Investing in renewables helps protect nature by lowering industrial waste and carbon emissions.

Table 1. 1 Energy Investment in Asia Pacific 2015-2021 Total (billion \$2019)

Energy Investment	2015	2016	2017	2018	2019	2020	2021
Fossil fuels	250	212	198	196	215	172	191
Low-carbon fuels	2	2	2	2	2	1	3
Renewables	143	153	162	165	178	200	187
Nonrenewable (coal, gas, oil, and nuclear)	99	91	83	77	74	64	63

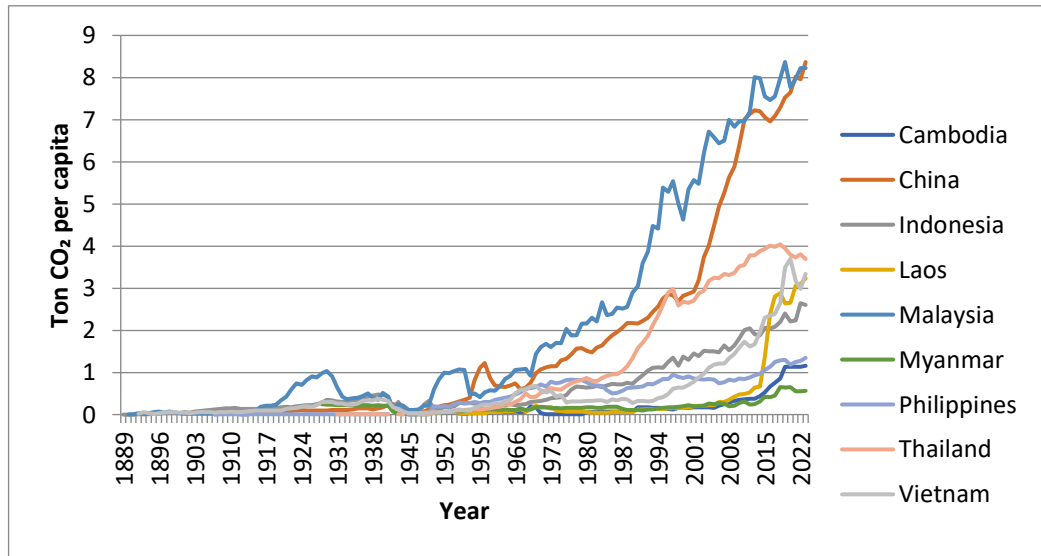
Source: International Energy Agency

According to International Energy Agency (IEA) data on energy investment in the Asia Pacific, investments in renewable energy have increased by 30.8% over time. However, the overall amount of investment remains low compared to fossil fuels. Investment in fossil fuels decreased from 2015 to 2018, then increased in 2019. In 2020, the investment in fossil fuels decreased due to the COVID-19

pandemic, but increased in 2021. This is directly proportional to the high carbon emissions in Asia. In contrast, non-renewable investment has been lower than renewable investment from 2015 to 2021, and the number of non-renewable investments has decreased consistently. This shows that the Asia Pacific region is focused on renewable energy being a more long-term energy supply and a more environmentally friendly alternative. This supports the 2015 Paris Agreement. Even though renewable energy investment was up, the Investment in low-carbon fuels is at the low end. Despite low carbon fuels seeing little to no uptick in uptake in the Asia Pacific, the report found that 178 renewable energy investments in 2000 jumped to 200 in 2018. The Asia Pacific still depends heavily on oil and gas as its main energy source. People invested less in coal, oil, and gas, along with global efforts to decarbonize. Energy security may depend on switching to renewables.

With respect to demand for energy, the International Energy Agency has estimated that ASEAN Energy Demand will increase by 60% by 2040 (IEA, 2023). This growth in energy demand has relied on coal and fossil fuels. This reliance makes ASEAN the fourth-largest CO₂ emissions bloc. ASEAN countries also have large renewable energy resources such as solar, wind, hydro, and biomass. These resources can act as substitutes in place of conventional energy resources. Adoption of renewables will address environmental concerns, improve energy security, and create diversified economic opportunities.

Indonesia, Thailand, Vietnam, Philippines, Laos, Brazil, China and Turkey (ASEAN+3) are at the center of their future economic and environmental development, including rapid future economic growth and fossil fuels dependency. As these countries work to boost their economies, they must cut carbon emissions to fight climate change. Investing in renewable energy and cutting carbon emissions is key to Lafarge's sustainable development in this region. Yet, from 1990 to 2021, the levels of carbon emissions in the ASEAN+3 countries witnessed an increase, which indicates the never-ending dependence on nonrenewable sources, even though the transitions to clean energy have become the grand project to achieve a sustainable environment.



Source: Our World in Data, processed 2025

Figure 1. 1: Carbon dioxide (CO₂) emission tons per capita

According to the data above, China shows an increase in CO₂ emissions per capita since the 2000. China is experiencing rapid economic growth and heading toward industrialization. China is experiencing rapid economic growth and heading toward industrialization. In the case of Malaysia, emissions are rising like in China but here they are much more stable. Thailand, Vietnam, Laos, and Indonesia are among the countries where CO₂ witnessed an increase, especially after the 1990s. The Philippines, Cambodia, and Myanmar have low emission rates, which means they are less industrialized or make less use of carbon-based energy. Since 2000, the amount of CO₂ emissions in the ASEAN+3 countries has increased. That is why we have to start investing more money in things like solar energy and wind energy to replace coal. More money must be put on the table to ensure success in the climate part of the Paris Agreement. The purpose of this agreement is to prevent the rise in global temperature above a certain limit of 2°C (Jian & Afshan, 2023).

ASEAN countries succeed in developing renewable energy through various measures and initiatives currently being implemented. The APAEC's goal is to enhance energy security and sustainability by raising the worth of RE in the general energy mix. Over the course of the APAEC, the shares of RE in the total energy mix and the total electrical generation, as well as fossil fuel and GHG emissions intensity, will all be raised. Aside from this, national policies have been adopted by member

states to promote investments in renewable energy, such as mechanisms for feed-in tariffs, tax incentives, and renewable energy certificates. These initiatives have caught the eye of local as well as International investors, thereby encouraging the expansion of the renewable energy industry.

China has forayed into the global lead for investments in renewable energy, much more than the ASEAN countries. Domestic pollution and demand for clean energy have resulted in overwhelming pressure on China. And the country's renewable energy generation and emissions goals can really help to set the example for other countries in ASEAN. China has a lot of expertise in building out renewable energy. So they could actually help their neighbors as they set these policies and help them figure out how to finance these types of projects. Brazil exemplifies this now, because renewables generate 89% of electricity there (EMBER, 2023). Turkey also has ambitions and aims for renewable power to generate 64.7% of electricity (Mondaq, 2025). Furthermore, ASEAN is to reduce carbon emissions due to rising growth and energy demand. The non-ASEAN countries in this article may also contribute to the promotion of renewable energy investment in ASEAN.

Due to economies that rely on fossil fuels for economic growth having difficulty transitioning to renewable energy, it is important to investigate to investing in renewable energy helps cut carbon emissions in ASEAN+3 economies. Renewable energy investment cuts carbon emissions, makes new jobs, and spurs local economies in ASEAN+3 economies. They also promote affordable energy access, particularly in rural areas, through abundant renewable energy sources. The ASEAN+3 countries will make a green economy move closer to hitting sustainable development goals and push back climate change. This study should help gauge the additional contribution investments make in the path towards sustainable energy. With the region struggling with economic growth and climate change, moving towards renewables is critical. The ASEAN+3 countries can utilize renewable resources to attain a more sustainable and resilient economy.

1.2 Problem Formulation

1. What is the impact of green investment on carbon emissions in ASEAN+3 countries?

2. What is the impact of economic growth on carbon emissions in ASEAN+3 countries?

1.3 Research Objective

1. Analyze the impact of renewable energy investments on carbon emissions reductions in ASEAN+3 countries.
2. Analyze the impact of economic growth on carbon emissions reductions in ASEAN+3 countries.

1.4 Research Benefit

The benefits of this research are divided into two categories: theoretical and practical usefulness.

1. Theoretical Benefits

- a. On behalf of academics. Providing references on the influence of renewable energy investment in reducing carbon emissions in ASEAN+3 countries in the period 2000-2020.
- b. For researchers, it is hoped that this research will increase their insights and become a reference source of theories and disciplines obtained while in college.

2. Practical Benefits

This research is intended to provide insights into environmental issues, act as a reference, and offer constructive suggestions to increase public awareness about increasing carbon emissions in ASEAN+3, especially in Indonesia, which has an impact on global temperature rise. Increased awareness can drive efforts to transition to a low-carbon economy by promoting the adoption of renewable energy and other environmentally friendly technologies in daily life.