Association of Southeast Asian Nations

Accelerating the Transition to Renewable Energy in Southeast Asia

Research Report

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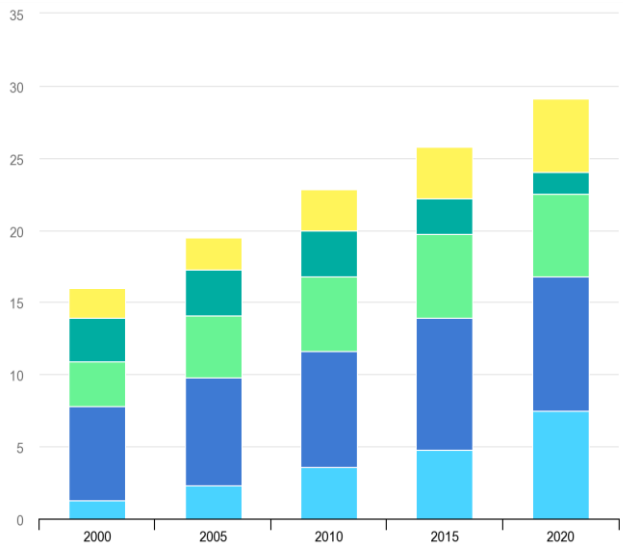
Introduction

One of the most significant contributors to climate change is the use of non-renewable energy sources, which are mostly fossil fuels; when burned, they release carbon compounds that are dangerous for life on the planet and contribute to global warming (greenhouse gases). That means the transition to renewable energy is crucial in any intergovernmental organisation's effort to impede climate change.

In the past few years, the economies of the ASEAN Member States (AMS) have developed greatly, as has their energy demand, though there continue to be pronounced differences between different countries. Although the use of modern renewables has more than doubled, they still account for a small percentage of the total primary energy supply in the area, where coal's growth has been unparalleled. Moreover, greenhouse gas emissions have been increasing extremely fast in the region—more than in most places on the planet—and pose a major threat to its citizens. Amidst the COVID-19 pandemic, the renewable energy sector fortunately showed a lot of resilience, and the AMS carried out important projects regarding renewable energy.



The countries of Southeast Asia have already set numerous goals in order to reach net-zero emissions, a process that demands that the transition to renewable energy be as quick as possible; it's now high time for the AMS to collaborate and develop apposite strategies in order to realise those goals in time or even earlier, thus contributing to the protection of life on our planet.

Light blue: Coal
Blue: Oil
Light green: Natural gas
Green: Traditional use of biomass
Yellow: Renewables

IEA, Total primary energy supply by fuel in Southeast Asia, 2000-2020, IEA, Paris

Definition of Key Terms

Carbon capture, utilisation and storage technology (CCUS)

The CCUS is based on the idea of capturing carbon dioxide that is released from fuel combustion or other industrial activities before it ever gets into the air. After the gas is captured, it is compressed and stored deep underground or further processed. This technology is said to be possibly able to help reach greenhouse gas mitigation goals without having to give up fossil fuels, however, there are only 16 plants worldwide with this technology and the amount of energy required to separate the CO2 makes it expensive.

Power Purchase Agreement (PPA)

It is a "long-term electricity supply agreement" that "defines the amount of electricity to be supplied, negotiated prices, accounting, and penalties for non-compliance".

Critical minerals

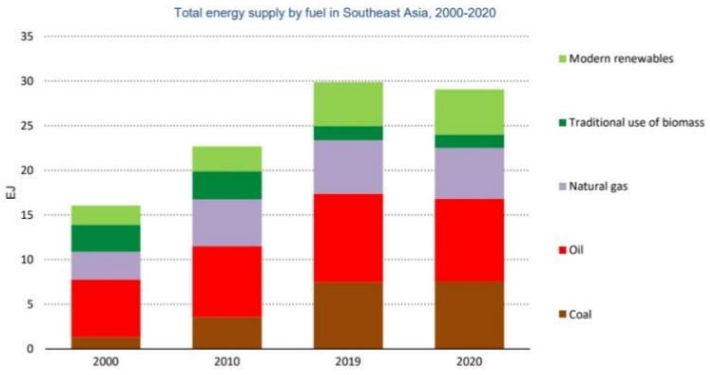
As stated by the American Geosciences Institute, "critical minerals are mineral resources that are essential to the economy and whose supply may be disrupted." Today many of these minerals are metals and rare earth elements, which have importance to the technological sectors.

Paris Agreement Goals

As defined by the United Nations Framework Convention on Climate Change (UNFCCC), "the Paris Agreement's central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius."

General Overview

Since the industrial boom in the 1960s, Southeast Asia has become one of the centres of global energy development. According to the Southeast Asia Energy Outlook established by the International Energy Agency (IEA), almost all Southeast Asian economies have doubled in size since 2000 and will keep expanding rapidly.



The economic growth caused an increase in energy demand, even though there are great country-by-country variations in energy use, which by far has been met by

fossil fuel-fired power plants, primarily oil and coal. According to the Stated Policies Scenario (STEPS), which is defined in "Possible Solutions", the energy sources will not change to meet the further increasing demand leading to a near 35% increase in carbon dioxide emissions. The rising carbon dioxide and other greenhouse gases pose a real danger to living creatures since these gases retain more heat near the planet's surface than necessary. Due to the circumstances, Southeast Asia is at risk of rising sea levels, droughts, heat waves and unpredictable weather. According to the United Nations Convention to Combat Desertification "over the past century, the highest total number of humans affected by drought were in Asia", while Tropical cyclones have also been intensifying in the past decade due to the warming climate systems. As stated in the *Changing Impacts of Tropical Cyclones on East and Southeast Asian Inland Regions in the Past and a Globally Warmed Future Climate* paper published in Frontiers in Earth Science by the end of the 21st century the intensity of tropical cyclones could increase by 6% (2 km/h) and could last almost 5 hours longer. Realising this, governments have set out long-term plans and "six Southeast Asian countries announced net zero emissions and carbon neutrality targets".

https://iea.blob.core.windows.net/assets/e5d9b7ff-559b-4dc3-8faa-42381f80ce2e/SoutheastAsiaEnergyOutlook2022.pdf

Despite the ambitious goals, Southeast Asia is still expanding coal- and gas-fired power generation, meaning phasing out the usage of these fuels is one of the most important steps the region has to achieve to start the transition, nevertheless, according to a paper published at Climate Analytics, the region saw an increase of 12 per cent in coal-fired power generation in 2019. Since then, the Philippines announced a new moratorium which could take up to 10 GW of planned coal capacity out of its pipeline; although since their power plants are relatively new, transitioning before the end of their lifetime poses a challenge. Phasing out could be best supported by divesting from non-renewable and investing in renewable energy however, there are nations with barriers which could keep investors from funding renewable pathways; for example, in Indonesia, state-owned enterprises control the majority of power generation, and it does not provide a level playing field for renewable energy in the market.

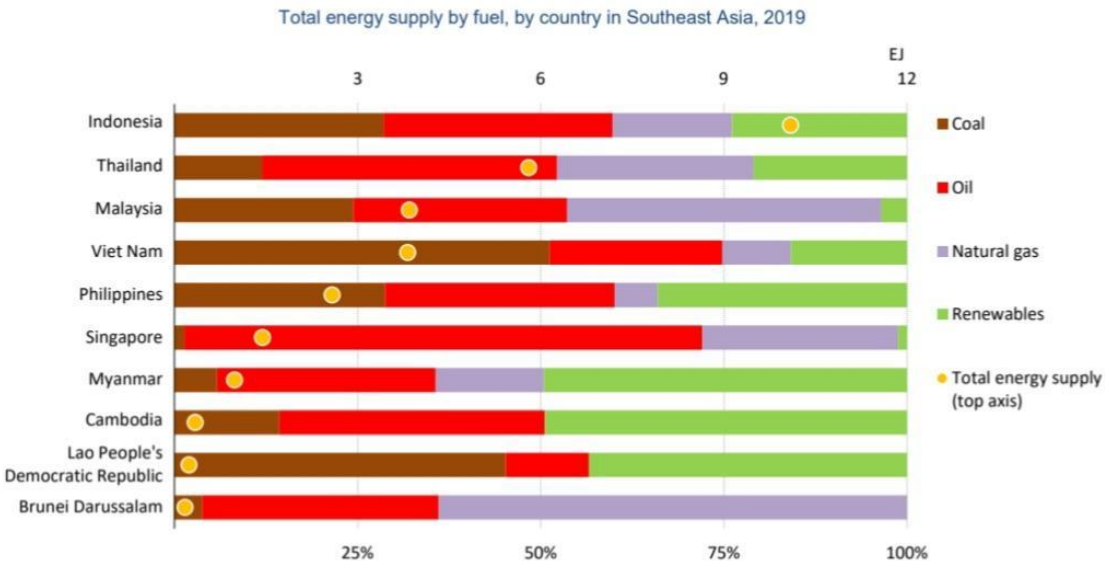
Surprisingly, in spite of the continual investment in fossil fuels, renewable energy, mainly solar and wind power, is on the rise, but this is still not enough to reach the Paris Agreement goals. Some countries also have promoted carbon capture and storage, as a means to achieve greenhouse gas mitigation goals; currently, there are at least seven large-scale projects in planning in Southeast Asia. Unfortunately, the price of carbon capture and storage has not come down, while the cost of renewable energy storage technologies has been dropping rapidly, which makes the latter a more cost-effective choice for governments and investors.

Power flexibility is a major issue in Southeast Asia regarding the deployment of wind and solar power. With the projected share of renewables increasing from 2% in 2020 to 18% in 2030, there will be a need for flexibility, even more so than generation growth. This required flexibility could be provided by the coal and gas-fired power

plants, still, the existing PPA contracts for them, for example, in Thailand, have no reason to act flexibly and are projected to only decrease by 10% by 2030.

The natural resources in Southeast Asia could play a vital role in clean energy supply chains since they possess critical mineral resources; Myanmar by itself accounts for 13% of rare earth element production worldwide. These rare earth elements can be used to manufacture solar PV modules, in which Malaysia and Vietnam are already members of the world's top three largest manufacturers. If the Southeast Asian region could further develop value chains for critical element industries their revenue could grow almost 2.5 times by 2050, which is nearly 60 billion dollars. Nonetheless, the investment in mineral exploration has decreased in recent years and "the region's share of global mineral exploration budget has halved since 2012"; this trend has to recover in order to achieve the full potential of the region.

It should also be stated that the policies in Southeast Asian nations, as well as the resources of their energy generation, vary widely and there is a need for a comprehensive collaboration between states.



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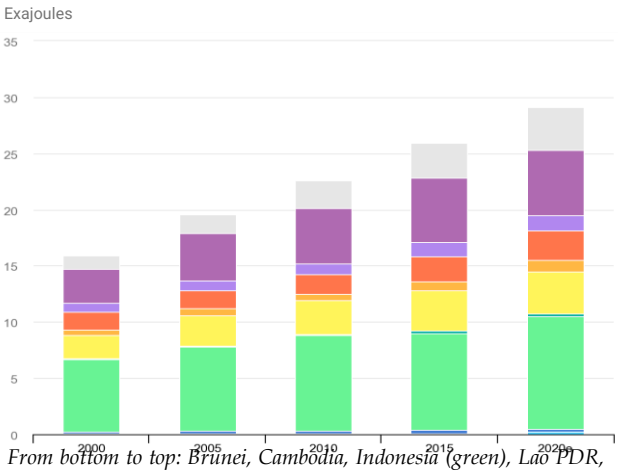
Major Parties Involved

Vietnam

ASEAN has set a goal of 35% renewables share in ASEAN installed power capacity by 2025, which translates to approximately 35–40 gigawatts (GW) of renewable energy capacity being added, and Vietnam is expected to lead the region with at least 13 GW of installations. Vietnam also represented 34% of the region's total installed renewable energy capacity in 2019 — the largest share among the AMS. In 2018, renewable energy accounted for 23.5% of its total final energy consumption (TFEC) and 24% of its total primary energy supply (TPES). Vietnam's main renewable sources are hydro, biofuels and waste, while solar and wind are extremely limited.

Indonesia

Indonesia is developing rapidly, and so is its energy demand, which is expected to increase by 80% between 2015 and 2030. It also has the largest share of the region's TPES, providing approximately one-third of the total primary energy among the AMS, so changes in Indonesia's renewables share can cause significant changes in the entire region. Renewables only represented 22% of the country's TPES (2.280.387 out of 10.466.599 TJ) as of 2018, while they account for 20.9 % of its TFEC.



From bottom to top: Brunei, Cambodia, Indonesia (green), Lao PDR, Malaysia (yellow), Myanmar, Philippines, Singapore, Thailand, Viet Nam

Total primary energy supply by country in Southeast Asia, 2000-2020

Malaysia

Malaysia is a country where a large hold of Southeast Asia's fossil fuel resources can be found, so tackling the situation effectively there would greatly benefit the entire region. As of 2018, renewable energy only made up 4% of the country's TPES and 5.3% of its TFEC. It has, however, an abundance of renewable energy sources that can be developed and utilised, including solar, hydro, bioenergy and geothermal; Malaysia's Sustainable Energy Development Authority (SEDA) claims that Malaysia has established strong mechanisms for managing renewable energy.

International Energy Agency (IEA)

Action regarding the transition to renewable energy requires a proper understanding of the issue, which is exactly why the data and analyses that the IEA provides are of vital importance. The IEA is at the centre of global dialogue and debate on energy and works with governments and other organisations to secure a sustainable future. More specifically, one of its many important collaborations is with the ASEAN, which began in 2011. Since then, the IEA has become an official Dialogue Partner of the ASEAN and has been participating in the annual ASEAN Ministers of Energy meeting. The

IEA's studies regarding the ASEAN's energy challenges constitute a powerful tool for anybody wishing to understand the ways in which the transition to renewable energy must be carried out.

Thailand

Thailand's environmental impact has improved remarkably in the past few years due to the country's increasing commitment to renewable energy, and it is expected to become a paragon for the region when it comes to renewable energy growth. With renewable energy accounting for 20% of the country's TPES and 23.7% of its TFEC as of 2018, Thailand has set a target whereby renewable energy will make up 30% of its TFEC BY 2036. Thailand's renewable energy consumption heavily relies on biofuels and waste.

Timeline of Events

1960s	Rapid industrial growth starts in Southeast Asia
1967	ASEAN is established on 8 August in Bangkok, Thailand
1997	The Kyoto Protocol was adopted on 11 December to help operationalise UNFCCC by pledging industrialised countries to set individual targets to limit and reduce greenhouse gas emissions. Since its adoption it has been signed by all ASEAN Member States.
2011	ASEAN begins formal cooperation with International Energy Agency
2015	Paris Agreement Goals are adopted
2015	ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025 Phase I is established
2016	Paris Agreement Goals enter into force
2020	ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025 Phase II is established
2021	The 26th UN Climate Change Conference of the Parties (COP26) was held on 13 November in Glasgow to which the ASEAN Member States created a joint statement on climate change.

Previous Attempts to Solve the Issue

ASEAN Plan of Action for Energy Cooperation (APAEC)

Initiated in 1999, the APAEC is a series of guiding policy documents developed by the ASEAN Centre for Energy (ACE) with the aim of promoting multilateral energy cooperation within the AMS. Each stage of the plan works as the blueprint for cooperation within ASEAN and with Dialogue Partners and International Organizations in all energy-related matters. It has been covering numerous Programme Areas with slight alterations between the different stages; the current Programme Areas are the following seven:

1) The ASEAN Power Grid;
2) The Trans-ASEAN Gas Pipeline;
3) Coal and Clean Coal Technology;
4) Energy Efficiency and Conservation, i.e. finding ways to use less energy to achieve the same result—something extremely important when it comes to sustainable development;
5) Renewable Energy;
6) Regional Energy Policy and Planning;
7) Civilian Nuclear Energy.

Regarding renewable energy, policies expanding the variety and use of indigenous energy sources while decreasing oil consumption and the negative impacts of fossil fuel use have been followed by each AMS at the national level. More recently, an overflow of foreign direct investments (FDIs) and an increase in ASEAN's cooperation with its dialogue partners (DPs) and with international organizations (IOs) have helped ASEAN make progress toward its targets. APAEC currently has the following strategies regarding RE:

- Increasing the RE share in the ASEAN Energy Mix to 23% by 2025;
- Raising awareness of the role of RE;
- Enhancing research and development (R&D) networks on the development and utilisation of RE technology within ASEAN;
- Promoting RE financing schemes;
- Increasing biofuels.

Other Projects by the ASEAN Centre for Energy (ACE)

The work of ACE is critical to the sustainable development of the AMS and, as such, needs to be considered in any attempt to resolve the issue of ASEAN's energy transition. First of all, ACE plays an exceptionally significant role in providing information about the development of energy matters in ASEAN, through projects

such as the ASEAN Energy Database System (AEDS), the ASEAN Nuclear Energy Portal and the ASEAN Energy Business Forum (AEBF), which brings us to the next achievement of ACE, which is an increase in collaboration between governments and governmental organizations, businesses and researchers. Other projects through which this is achieved are the ASEAN Researchers Network on Energy and Climate Change (ARNECC) and the ASEAN International Conference on Energy and Environment (AICEE). Moreover, the ASEAN Energy Awards are an excellent opportunity for businesses and individuals to contribute to sustainable development by promoting clean coal technology, energy efficiency and RE development!
Another project worth noticing is the ASEAN Climate Change and Energy Project (ACCEPT), a collaborative project between ACE and the Norwegian Institute for International Affairs (NUPI). Its goal is to enhance consistency between ASEAN's climate and energy policies—thus making the development of the energy sector more sustainable and climate-friendly—by doing research and serving as an advisor to the AMS, helping develop policies at both the national and regional level.

Possible Solutions

To accelerate the transition to renewable energy, setting aspirational goals and striving to achieve them is vital. The AMS have already developed numerous goals, and now it's high time for policies that will realise them as fast as possible.

First of all, governments and companies need to start divesting from the production and use of fossil fuels and investing in renewables, which also means policies and programs realising the reduction of greenhouse gas (GHG) emissions. Although most of the AMS have stated such targets, they haven't yet been formulated in detailed plans or strategies, such as Nationally Determined Contributions (NDCs); these types of plans are critical in realising the transition as rapidly and effectively as possible.

The IEA has studied three scenarios regarding worldwide energy development: the Stated Policies Scenario (STEPS), the Sustainable Development Scenario (SDS) and the Net Zero Emissions by 2050 Scenario (NZE Scenario). The Stated Policies Scenario is consistent with the AMS' current policy settings and essentially presents the outcome of no changes in these policies; the SDS delivers on the target of the Paris Agreement to keep the temperature "well below 2°C", as well as other goals regarding energy access and air pollution, and is in line with the currently announced climate aspirations of the AMS; the NZE Scenario presents a roadmap for the energy sector to reach net zero CO2 emissions by 2050, potentially limiting the rise in global average temperatures to 1.5°C.

Developing policies consistent with the Sustainable Development Scenario is urgent because that's the only way the AMS will realise their goals. That also shows how beneficial collaboration with organisations such as the IEA is to the work of

governments. Moreover, being fast is critical; if ASEAN achieves the SDS targets quickly, they're going to be much closer to reaching NZE, a process that will be much easier if the AMS can do it collectively. That brings us to another point, which is collaboration and collectivity. ASEAN needs to work as one, and the AMS need to aid one another in order to reach their goals sooner. There are significant differences between the AMS regarding energy, with renewables accounting for half of the total energy consumption in some countries and 5% in others. Therefore, the AMS must help each other reach their national goals, as well as collaborate to achieve ASEAN's regional targets.

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