

The Role of the ASEAN Center for Energy (ACE) in Indonesia's Energy Transition Efforts

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Abstract:

The issue of climate change is becoming increasingly complex due to dependence on fossil fuels, which also threatens the economy and energy security. Accelerating the energy transition in Indonesia is important considering the continued dominance of fossil fuels. The ASEAN Center for Energy is here to assist Indonesia, as an ASEAN member country, in speeding up this transition. The purpose of this research is to describe Indonesia's energy situation and explain ACE's contribution to the country's energy transition efforts from 2023 to 2024. This research uses a qualitative method with a phenomenological approach and a constructivist perspective. The theory applied in this research is Michael N. Barnett and Martha Finnemore's theory of international organizations as independent actors. The findings indicate that the ASEAN Center for Energy provides various forms of support for Indonesia's energy transition, including developing a regional energy blueprint, conducting feasibility studies on development programs, raising public awareness, and promoting energy efficiency.

Introduction

One of the current problems facing the Earth's condition is the increase in the Earth's surface temperature. Based on data from the National Centers for Environmental Information, 2023 was the hottest year since global records began in 1850, with a significant difference in calculations (National Centers for Environmental Information, 2023). One of the factors causing global warming that causes climate change is carbon emissions that produce air pollution. According to the CO₂ Human Emissions page, the source of carbon emissions is human activities such as the combustion of fossil fuels (coal, gas, and petroleum), which produces CO₂ in the air with a contribution of 87% (PGN LNG Indonesia, 2023). Fossil energy, which is generally used for energy for electricity, the industrial sector, and transportation, produces carbon dioxide and other greenhouse



gases that are released into the air, thereby increasing the greenhouse effect (Winanda, 2019).

Carbon emissions in Southeast Asia are relatively high because countries in the region are undergoing rapid industrialization, which requires significant energy consumption. Fossil fuels accounted for 75% of the region's total energy supply in 2019, with Thailand, Malaysia, and Indonesia the largest consumers of fossil fuels in ASEAN (International Energy Agency, 2022). We expect fossil fuels to dominate ASEAN's power generation by 2023, with coal accounting for approximately 74% of the total. This high dependence on fossil fuels is expected to increase ASEAN's carbon emissions by 6.6%, resulting in 718 million tons of CO₂ in that year (Setyawati & Nadhila, 2024).

Indonesia ranks among the top 10 largest carbon-emitting countries in the world in the energy sector throughout 2023, with emissions reaching 701.4 million tons of carbon dioxide equivalent (Energy Institute, 2024). As the region's largest economy, Indonesia faces pressure to reduce reliance on fossil fuels and shift toward a green economy. However, challenges such as a funding gap, limited infrastructure access, weak government policies, and heavy dependence on coal-fired power—now a key part of the national energy sector—hinder progress. Despite these obstacles, Indonesia has significant potential in renewable energy sources like solar and wind (Zaky, 2024).

Given the climate change challenges caused by fossil fuel use threatening Southeast Asia, ASEAN must consider accelerating the energy transition and sustainability efforts. ASEAN's energy transition initiatives are part of the ASEAN Economic Community (AEC) framework. The ASEAN Center for Energy (ACE), established on January 1, 1999, actively works in the energy sector. ACE is responsible for advancing energy integration plans throughout the ASEAN region. It provides data and expertise to ensure energy policies and initiatives promote environmental sustainability while supporting regional economic growth. ACE functions as a knowledge hub, a forum for energy sector leaders, and a facilitator of international collaboration (Kementerian ESDM, 2019).

ACE has three important roles in fulfilling its mandate as ASEAN's energy hub. First, ACE acts as a catalyst that strengthens ASEAN Energy Cooperation by providing a platform for sharing, policy consultation, best practices, and capacity building. Second, ACE serves as a knowledge hub by providing a repository of knowledge and services for AMS through data management, publication, and dissemination. Third, ACE serves as a

research institution, namely assisting AMS in research and identifying practical and specific solutions related to policies, legal or regulatory frameworks, technologies, and innovative solutions (ASEAN Centre for Energy, n.d.).

Indonesia has a fairly important position in the ASEAN Center for Energy, as evidenced by the Indonesian Ministry of Energy and Mineral Resources (ESDM)'s position as host of ACE. ACE contributes significantly to Indonesia's energy transition efforts by facilitating various collaboration opportunities, pursuing several projects, and supporting the Indonesian government's energy transition policies. As an energy hub in ASEAN, ACE also frequently publishes developments on Indonesia's energy transition and provides a forum for discussions with experts.

Literature Review

Injy Johnstone's article adds to the literature on energy transitions in ASEAN by focusing on normative governance and the dynamics of policy diffusion, rather than solely on technical or economic aspects. It explains the mechanisms for implementing clean energy norms through interagency processes. ACE, as a policy catalyst in the region, plays a vital role in the energy transition governance process, particularly through APAEC, subsector networks, and analytical products (Johnstone, 2024). An article by Achmad Puariesthaufani, Rahmat P. Hadi Wibowo, and Choirul Anam explains energy challenges in Southeast Asia and how energy transition policies through the use of renewable energy are implemented in each ASEAN country. While regional policies have been established, the article does not provide an in-depth analysis of their effectiveness at the national level (Puariesthaufani, Wibowo, & Anam, 2023).

The main limitation of the literature is the limited discussion of the role of ACE specifically in Indonesia, such as how far ACE policies or programs help Indonesia accelerate its energy transition, the impact of ASEAN coordination on Indonesian stakeholders such as PT PLN and the Ministry of Energy and Mineral Resources, or the resulting policy outputs. This study analyzes the role of the ASEAN Center for Energy (ACE) in Indonesia's energy transition efforts, with a focus on the period from 2023 to 2024. The purpose of this study is to describe the energy conditions and energy transition in Indonesia and explain ACE's contribution to Indonesia in its energy transition efforts.

Methods

This research uses a qualitative method with a single-variable phenomenological approach. According to the Indonesian Ministry of Research, Technology, and Higher

Education in the Research Design Module, qualitative research methods are research procedures that utilize descriptive data. Qualitative methods are used to analyze and explain social dynamics, events, or phenomena, and individual or group perceptions. They begin by establishing fundamental assumptions and thinking guidelines. Afterward, researchers use the data collected in the study to interpret it (Khakimah, 2023). The data collection techniques in this study used interview techniques and document analysis obtained from books, journals, websites, and official documents, including reports and laws, and regulations.

This research uses the theory of international organizations from Michael N. Barnett and Martha Finnemore in their work entitled "The Politics, Power, and Pathologies of International Organizations," which argues that international organizations can be independent actors. This is because international organizations possess autonomy and legal-rational authority, thus empowering them to be independent of their founding states. The independence of international organizations is characterized by ownership, power, or the power derived from the formation of a bureaucracy as the driving force of an organization through two things: the legitimacy of their rational-legal authority and control over technical expertise and information. In this way, international organizations can implement rules, legality, and procedures to achieve their goals and influence the state actors who founded them and other actors (Barnett & Finnemore, 1999).

In line with this theory, the ASEAN Center for Energy (ACE) is also an international organization that has acted as an independent actor in the Southeast Asian region. Based on interviews with the ACE Sustainable and Renewable Energy Department, ACE is not influenced by external parties or actors outside the ASEAN region. ACE also does not favor one or two member countries but rather represents all member countries. ACE is a key actor in the energy transition in Southeast Asia, so its actions can influence the behavior of its member countries.

Results and Discussion

a. Indonesia's Energy Condition

1. Energy Mix in Indonesia

A country's energy situation can generally be identified through its national energy mix, which presents the composition of prevailing energy types. The energy mix is the composition of primary energy sources, including a combination of fossil fuels (coal, oil,

and natural gas) and renewable energy sources, in terms of usage and supply. The national energy mix reflects the proportion of energy sources used to meet a country's energy needs. The current state of Indonesia's national energy mix can be seen based on the most recent annual data for 2023 and 2024.

Figure 1. National Energy Mix



(Source: Kementerian ESDM, 2024)

The figure above shows that the national energy mix in 2023 will be dominated by fossil fuels, with coal contributing the largest percentage, oil second, natural gas third, and New and Renewable Energy (NRE) the lowest. This coal composition has decreased slightly from the previous year's 42.38%, but the decline is still relatively small, indicating Indonesia's continued dependence on fossil fuels.

The national energy mix in 2023 is considered to be below target. This is particularly true for the national energy mix, which is only 13.9%, compared to the previously stated 17.87%. This is due to several factors, including rising fossil fuel prices, technical constraints, and cost constraints. In 2023, the government is still working to catch up on the delay in achieving this target (Ministry of Energy and Mineral Resources of Indonesia, 2024).

Figure 2. National Energy Mix as of June 2024



CNBC Indonesia reported the data in the image above based on a statement by Yuliot Tanjung (Deputy Minister of Energy and Mineral Resources of Indonesia) on December 12, 2024, at an event, Downstream Oil and Gas Conference, Expo, & Awards 2024, at the Intercontinental Jakarta (CNBC Indonesia, 2024). The energy mix for the first half of 2024 shows that coal still holds the highest ranking, while other energy sources maintain the same ranking as last year.

The share of renewable energy (RE) in the first half of 2024 increased compared to last year, albeit by only 0.84%. It then increased at the end of the year, with the share of RE in the national energy mix reaching 14.68% (still a projected figure), but still far from the target of 19.5%. This is preliminary data, as the 2024 figures will be finalized the following year, along with the publication of the Handbook of Energy & Economic Statistics of Indonesia 2024 (DITJEN EBTKE, 2025).

Achieving a national energy mix is one of the goals of energy management. According to the National Energy Policy (KEN) and the National Energy General Plan (RUEN), each primary energy source has a target for achieving its energy mix by 2025. These targets include a minimum share of 30% for coal, less than 25% for oil, a minimum of 22% for natural gas, and a minimum of 23% for renewable energy. The national energy mix, which has shown a steadily increasing role for renewable energy (NRE) in recent years, has not had a significant impact on achieving the National Energy Development (KEN) targets. This is due to the continued high consumption of other fuels. Furthermore, it's important to remember that fossil fuel production data is still being reconciled, so the realized value of the NRE mix is not yet final (DITJEN EBTKE, 2025).

2. The Problem of Dependence on Fossil Fuels

Currently, energy is the sector that contributes the most to greenhouse gas emissions in Indonesia. This is due to the high use of fossil fuels in power plants, the industrial sector, and transportation. While high energy use can boost the economy, it must be accompanied by environmental conservation (Riska et.al, 2021). Coal contributes 44% of total global carbon dioxide emissions (Greenpeace Indonesia, 2015). A coal-fired power plant, such as a 500-megawatt coal-fired power plant, can produce an average of 3.7 million tons of CO₂ emissions, equivalent to cutting down 161 million trees (Pristiandaru, 2024).

Coal processing activities can also cause water pollution. The waters surrounding

coal-fired power plants can be contaminated with hazardous substances such as mercury, lead, arsenic, and heavy metals (Pristiandaru, 2024). Furthermore, coal also contributes to air pollution. Dozens of coal-fired power plants operating in Indonesia produce millions of tons of air pollution annually. Coal-fired power plants release pollutants that contribute to acid rain and PM2.5 pollution, namely nitrogen oxides (NO_x) and sulfur dioxide (SO₂) (Greenpeace Indonesia, 2015). Coal-fired power plants can also pollute the soil due to solid waste FABA (*Fly Ash* and *Bottom Ash*), which is dangerous and toxic to living things if not managed properly (Pristiandaru, 2024).

Environmental damage can also be caused by petroleum activities, even from the earliest stages of petroleum exploitation. For example, land clearing for mining has destroyed flora and fauna habitats through deforestation and drainage of river basins. The raw materials and energy used in petroleum processing can produce carbon dioxide, carbon monoxide, nitrogen oxides, sulfur, and water vapor, which can contribute to carbon emissions that threaten climate change. In addition, oil spills cause marine pollution and affect its ecosystem due to the results of tanker operations, ship maintenance, repairs, mid-sea loading and unloading terminals, demolition, bilge water, and even the most frequent tanker accidents or collisions (Rahmayanti, Rahmah, & Larashati, 2021).

Petroleum consumption in Indonesia also causes air pollution problems. Petroleum produces products consumed by the public as fuel (such as gasoline, diesel, kerosene, aviation fuel) and as a gas source for LPG (liquefied petroleum gas). *Liquefied Petroleum Gas*, and other types (Haryata, 2019). Fuel dominates transportation and even industrial needs, but its combustion produces exhaust gases, which become emissions (Ghaniyyu & Husnita, 2021).

Natural gas, or natural gas is often viewed as a lower-emission energy source than coal and oil. However, natural gas is not always environmentally friendly, as its production and distribution have been shown to cause environmental damage. Production activities can produce gases that can pollute the air, including carbon monoxide (CO), carbon dioxide (CO₂), hydrogen sulfide (H₂S), and hydrocarbons. Furthermore, the distribution of natural gas also produces emissions of CO₂, CH₄, N₂O, SO_x, and NO_x, which contribute to greenhouse gas emissions into the atmosphere (Imansyah, 2022).

The production and distribution of natural gas can cause water and soil pollution.

Water pollution during production is caused, among other things, by produced water from oil wells, which contains polluting compounds. Leaks during natural gas distribution can pollute rivers due to oil spills. Oil spills on the ground surface due to leaks in production facilities also have the potential to contaminate the soil (Imansyah, 2022).

Indonesia's dependence on fossil fuels can threaten economic growth. Rising energy prices, particularly fuel prices, can increase production costs, leading to higher prices for products and services. Consequently, inflation increases, and people's purchasing power is affected. This can disrupt business sustainability and the country's economic growth (Waruwu, 2023).

Indonesia's dependence on imported fossil fuels, particularly oil and gas, places it in a state of uncertainty. The dynamics of global volatility make the energy sector highly vulnerable to fluctuations in commodity prices. Disruptions in producing countries will impact processes from upstream to downstream, leading to energy market volatility. A concrete example of how volatile the energy market can be is Russia's military invasion of Ukraine in 2022, a global oil and gas exporter. As a result, oil and gas prices soared to over US\$100 per barrel, and coal prices also climbed above US\$200 per ton (Sidik, 2022).

Ultimately, Indonesia felt the impact of the energy commodity price hike. As a result, fossil-fueled electricity rates and retail purchases of petroleum-derived products became increasingly expensive. The government was forced to provide price subsidies to help the public and curb the rate of energy price increases, aiming to maintain price stability and prevent a significant spike in inflation. However, this effort placed significant pressure on state finances due to the significant budget requirements (Sidik, 2022).

3. Indonesia's New and Renewable Energy Potential

To realize the energy transition, Indonesia needs to assess its available renewable energy potential. Utilizing renewable energy in Indonesia can also help address environmental and economic challenges. The advantages of renewable energy include its availability in Indonesia, its availability is free, it produces less waste, it is not affected by rising fuel prices, and it does not impact global temperatures (Tulong et al, 2021).

Indonesia has abundant renewable energy potential, including hydropower, geothermal energy, bioenergy, solar energy, wind energy, ocean energy, and nuclear energy. Hydropower has a potential of 94,449 MW, of which 75,091 MW is utilized for hydroelectric power plants (PLTA), and the remainder for micro-hydropower plants (PLTM) and micro-hydropower plants (PLTMH). Of this total potential, utilization was

only 6.4%, or 5,976.03 MW, as of 2019 (Taufiqurrahman & Windarta, 2020). Geothermal potential is 29 GWe and reserves reach around 28,579 MWe (Hakim et.al, 2022). Then the potential for biomass bioenergy sources is 56.97 GW (electricity equivalent) (Kementerian ESDM, 2023). Indonesia's solar energy potential is 3,294.4 GW. Wind energy potential is divided into two categories: *onshore* (land) of 60 GW and offshore (offshore) 94 GW (National Energy Council, 2022). Indonesia's marine energy has the potential of 43 GW in Ocean Thermal Power Plants (PLTPL), 17.98 GW in Ocean Current Power Plants (PLTAL), and 1.9 GW in Ocean Wave Power Plants (PLTGL) (National Energy Council, 2024). Indonesia is also developing an initial nuclear capacity of 320 MW by 2035, which could increase to 9 GW by 2060 (ASEAN Center for Energy, 2024)

b. Energy Transition in Indonesia

1. Government Policy on Energy Transition

The use of renewable energy in Indonesia must be supported by government policies to maximize its potential. This is because renewable energy utilization in Indonesia remains low, despite its substantial resource potential. This low utilization is due to factors such as inadequate infrastructure, inadequate regulatory support, and minimal investment. Indonesia has established various policies to support renewable energy utilization.

The following are government policies related to the energy transition:

- a) Law No. 30 of 2007 on Energy.
- b) Government Regulation No. 79 of 2014 on National Energy Policy (KEN), which regulates the contribution of energy sources in the national energy mix.
- c) The target share of new and renewable energy (NRE) in the national energy mix is set at a minimum of 23% by 2025 and 31% by 2050, based on Government Regulation No. 79 of 2014 on National Energy Policy (KEN).
- d) The blueprint to follow up on this target is outlined in the National Energy General Plan (RUEN) under Presidential Regulation No. 22 of 2017.
- e) Presidential Regulation No. 4 of 2016 on the Acceleration of Electricity Infrastructure Development, Article 14 Paragraph (2), stipulates that to support NRE utilization, both the central and regional governments may provide various forms of support, including fiscal incentives (tax reductions and import facilitation for equipment), licensing and non-licensing assistance, setting purchase prices for electricity from each type of NRE source, the establishment of energy supply enterprises to sell

electricity to PT PLN (Persero), as well as subsidies.

- f) Government Regulation instead of Law (PERPPU) No. 2 of 2022 on Job Creation aims to attract investors by simplifying and streamlining regulations.
- g) Presidential Regulation No. 4 of 2016 on the Acceleration of Electricity Infrastructure Development, as amended by Presidential Regulation No. 14 of 2017.
- h) Presidential Regulation No. 112 of 2022 on the Acceleration of Renewable Energy Development for Electricity Supply.
- i) OJK Regulation No. 14 of 2023 on Carbon Trading through the Carbon Exchange.
- j) Minister of Energy and Mineral Resources Regulation No. 2 of 2024 on Rooftop Solar Power Plants Connected to the Electricity Network of Business License Holders for Public Electricity Supply.

The latest developments in government policy regarding the use of renewable energy indicate several changes. The changes in question are in the target for the NRE mix in the national energy mix, which was originally 23% in 2025. Based on the Draft Government Regulation (RPP) on the National Energy Policy (KEN), this 23% NRE mix target can only be achieved between 2030 and 2045 with a target proportion of 46%. This shows that the abundant NRE potential has not been optimally utilized despite the Indonesian government having issued various policies. To achieve the unmet target, the government is trying to encourage a significant increase in the NRE mix in the next year (Wuryandani, 2025). New and renewable energy policies need to be refined to provide a legal and regulatory umbrella for renewable energy by ratifying the Renewable Energy Bill to create a climate for sustainable and equitable renewable energy development (Direktorat Jenderal EBTKE, n.d).

2. The Reality of Energy Transition in Indonesia

For at least the past nine years, Indonesia's renewable energy targets have never been achieved. Throughout 2024, Indonesia's energy transition progress stalled. The government lowered the target for achieving renewable energy by 2025 through a revision of the National Energy Policy from 23 percent to 17-19%. Policy aspects and the political situation are still considered low within the framework of the energy transition, despite progress in low-carbon technology. This is considered quite contradictory to the government's bold statements conveying its commitments in international forums, such as President Prabowo's statement at the G20 Summit in Brazil that "Indonesia will stop using fossil fuels within the next 15 years (by 2040)." Therefore, all levels of government

should act to help realize this ideal (IESR, 2024).

Based on *Outlook Indonesia's Energy Transition in 2025*: Several signs indicate that Indonesia's energy transition is indeed hampered. In the industrial sector, energy use will increase by 9% in 2023, with coal dominating 56.9%, resulting in emissions of 460 MtCO₂e. At the same time, decarbonization is hampered by fossil fuel subsidies. In the transportation sector, 55% of emissions in 2023 will be contributed by cars, and the promotion of public transportation and electric vehicles has been inadequate. In the household and commercial sectors, emissions will also increase along with increasing electricity demand (80% dependent on fossil fuels), putting pressure on state finances to the tune of IDR 83 trillion in 2024 for LPG subsidies. The electricity sector is also dominated by fossil fuels, at 81%, with 287 MtCO₂e emissions produced. *Captive Power* 21 GW capacity plant also produces 27% of the emissions, necessitating better monitoring and planning. The delay in PLN's RUPTL (Renewable Energy and Natural Resources Development Plan), which planned to add 13.3 GW of renewable energy projects, could dampen investor interest (IESR, 2025).

The government's commitment to a just energy transition is inconsistent with other policy directions. During President Joko Widodo's administration, the energy transition was frequently mentioned in various presidential speeches until the end of his term. President Jokowi left a legacy related to the energy transition, one of which is the funding scheme from the *Just Energy Transition Partnership* (JETP) at the G20 Summit in Bali in 2022. In the same year, Presidential Regulation No. 112 of 2022 concerning the Acceleration of Renewable Energy Development for Electricity Supply was also issued. At first glance, Presidential Regulation 112/2022 appears to favor renewable energy, which aligns with JETP. However, on the other hand, it can be interpreted as a legal umbrella to protect the sustainability of the coal business through Integrated Power Plants (PPUs) in industrial areas (*Captive Power*). Document *Comprehensive Investment and Policy Plan* (CIPP) JETP does not take into account the PPU's at all (Forest Digest, 2024).

In his speech, ahead of the 79th Indonesian Independence Day, President Jokowi stated that "a just energy transition produces renewable energy at affordable prices and is easily accessible to the public." For renewable energy to be accessible and affordable, power plants must be close to the community. However, a look at the CIPP JETP document reveals no investment plans for community-based renewable energy development, but rather large-scale development, in other words, centralization. This centralization of

energy is the cause of high energy prices and inaccessibility for the public. The JETP scheme is also based on foreign debt, so directing large-scale development can be more profitable for JETP donors (Forest Digest, 2024).

Early in President Prabowo's administration, the energy transition commitment also aligns with other decisions. Instead, Prabowo took steps to downstream coal, nuclear, gas, and carbon capture (CCS/CCUS) technology, as stipulated in Presidential Decree No. 1/2025 concerning the Task Force for the Acceleration of Downstreaming and National Energy Security. This downstreaming has created new problems, such as the downstreaming of nickel for electric vehicle batteries, which has led to deforestation in mining areas, damaged surrounding ecosystems, and generated emissions from coal-fired smelters. Furthermore, the plan for early retirement of coal-fired power plants (PLTUs) is inconsistent, initially emphasizing a complete shutdown, but has shifted to a gradual reduction in capacity. *Co-firing biomass* in coal-fired power plants can also be considered a false solution because it can still prolong dependence on coal (Forest Watch Indonesia, 2025).

Indonesia's energy transition is, in fact, at a crossroads between global ambitions and existing realities. *Greenpeace Indonesia* faces an urgent transition away from fossil fuels due to the increasing realities of climate change. Meanwhile, the complex reality is that technological offers from developed countries, geopolitical pressures, and the tug-of-war of domestic political and economic interests make the transition very easily derailed. Indonesia still relies on foreign investment as the primary source of funding for the energy transition, often leaving it merely a market in the dynamics of the energy transition (Greenpeace, 2025).

Indonesia should be able to defend its national interests, particularly social justice and energy sovereignty. It cannot rely solely on external aid, and therefore, it still needs political will from the government itself. It requires decisiveness and courage to reject false solutions, shut down aging fossil-fueled power plants, and prioritize regulations favoring clean energy. Furthermore, energy governance also needs to be improved to protect renewable energy investments from the influence of mere short-term interests (Greenpeace, 2025).

The energy transition argument is closely related to sustainability. This includes developing countries like Indonesia. At first glance, this seems like a noble intention, created by the global regime. However, this low-carbon sustainability narrative only

resonates with citizens of developed economies, which constitute less than 16 percent of the world's population. Discussions about whether energy should produce low or zero carbon emissions are even beyond the capacity of developing countries, as they are still facing the fundamental challenge of ensuring food security for their families (Wirjawan, 2024).

According to Gita Wirjana in his work entitled "*The Paradox of Sustainability*," Achieving carbon neutrality by 2050, as set at various global summits, is likely difficult for developing countries to achieve. Each country has varying capabilities to achieve this global target, and it remains difficult to ensure adequate energy access for its citizens. There should be a differentiation between developed and developing countries based on electrification levels. Implementing renewable energy in developing countries requires greater effort, particularly in terms of technology and cost (Wirjawan, 2024). Implementing renewable energy projects often adds new problems, such as deforestation of forests and land for bioenergy or land conversion for mining, and even social conflict.

c. ACE's Role as an Independent Actor in Indonesia's Energy Transition Efforts

ACE plays a crucial role in energy transition efforts in ASEAN member countries, including Indonesia. ACE helps Indonesia accelerate the integration of various aspects of the energy transition. From 2023 to 2024, ACE fulfilled its role as an independent actor in implementing various programs.

1. ACE Develops APAEC Phase II: 2021-2025 as a Blueprint

ACE, together with the ASEAN secretariat, the ASEAN Specialized Energy Agency and Sub-sector Network, as well as the drafting committee, has succeeded in drafting APAEC as *a blueprint for regional* cooperation for the energy sector in the context of implementing the ASEAN Economic Community (AEC). According to an interview with the ACE SRE Department, APAEC is a guiding policy document used as a reference for promoting multilateral cooperation in the energy sector. The period from 2023 to 2024 falls within APAEC. *Phase II 2021-2025*, which was ratified at the 38th ASEAN Energy Ministers' Meeting (AMEM) on November 19, 2020. APAEC Phase II: 2021-2025 has the following main strategies from its 7 program areas (ASEAN Center for Energy, 2020).

a. ASEAN Power Grid

Key strategies: expanding multilateral electricity trade in the region, strengthening grid resilience and modernization, and promoting the integration of clean and renewable energy.

b. Trans-ASEAN Gas Pipeline

Key strategy: pursuing the development of a common gas market for ASEAN by increasing connectivity and accessibility of gas and LNG (Liquefied Natural Gas).

c. Coal and Clean Coal Technology

Key strategy: optimizing the role of clean coal technology in facilitating the transition to low-emission and sustainable development.

d. Energy Efficiency and Conservation

Key strategy: reduce energy intensity by 32% by 2025 based on 2005 levels and encourage further efforts on energy efficiency and conservation, especially in the transport and industrial sectors.

e. Renewable Energy

Key strategy: targeting an increase in renewable energy use to 23% in the ASEAN energy mix by 2025, including increasing installed renewable energy capacity to 35%.

f. Regional Energy Policy and Planning

Key strategy: promote improved policy and planning in the energy sector to accelerate the transition and enhance energy security in the region.

g. Civilian Nuclear Energy

Main strategy: improving human resource capabilities in the field of nuclear science and technology for power generation.

In the program area *ASEAN Power Grid*(APG), in the Indonesian region, there are four planned electricity interconnection routes, namely Sumatra - Peninsular Malaysia, Kalimantan - Sabah, Sumatra - Singapore, and the Internal Indonesia Route, and the interconnection route that has been implemented is Kalimantan - Sarawak since 2015. The implementing agency in the APG program on these routes is PT PLN (Persero), *Tenaga Nasional Berhad* (TNB), *Electricity Sdn Bhd*(SESB), and SP Group (*Singapore Power*) according to their respective paths. The implementation of the APG will have a profound impact on the capacity and share of renewable energy, social, environmental, and economic aspects (ACE & HAPUA, 2024).

In the program area *Trans ASEAN Gas Pipeline* (TAGP), connecting existing and planned gas pipeline infrastructure across ASEAN. TAGP is a "bridge" to a cleaner energy system. Although natural gas is a fossil fuel, it has lower carbon emissions than coal or oil. By expanding gas infrastructure like TAGP, Indonesia, as an ASEAN country, can reduce

emissions intensity while building renewable energy capacity. To date, TAGP has connected six AMS through 13 pipelines totaling 3,631 km (Manaloe et.al, 2025).

As for the area program, Coal and *Clean Coal Technology* (CCT) is also a strategy for the low-carbon energy and economic transition. As a developing country, Indonesia still relies on coal, but is required to use clean coal technology due to pressing energy needs, economic development, and environmental conditions. Therefore, Indonesia is also committed to the program. *Coal dan Clean Coal Technology* (CCT) with the implementation of co-firing in PLTU with a biomass mixture to minimize carbon emissions (ASEAN Centre for Energy, 2025).

Energy Efficiency and Conservation is an area program within APAEC. It is seen as the most cost-effective way to improve energy security, address climate change, and enhance competitiveness. It is important to recognize that ASEAN countries still rely heavily on fossil fuels. This area program was implemented to address limited global fossil fuel reserves and unstable energy prices. AMS, including Indonesia, has followed policies designed to diversify the national energy mix and utilize energy sources efficiently, such as energy efficiency in the industrial, transportation, and electronic sectors, as part of efforts to achieve the target of reducing energy intensity by 32% by 2025 (ANTARA, 2023).

Next in the program area, Renewable Energy, Indonesia is also targeting the share of renewable energy in its national energy mix as stipulated in APAEC.*Phase II 2021-2025*. During the 2023 period, Indonesia's renewable energy mix target was still 23% by 2025. However, over time, this target changed, as in 2024, the renewable energy share in the national energy mix was only 14.68% of the target of 19.5%. Therefore, the Ministry of Energy and Mineral Resources lowered the renewable energy mix target in the national primary energy mix to 17-20% by 2025 (Wuryandani, 2025).

In the program area *Regional Energy Policy and Planning* (REPP) is to integrate national energy policies into a regional framework. The resulting energy plans and policies are then developed individually by ASEAN member countries. Indonesia implements this through harmonization of national policies with ASEAN energy policy directions, participation in regional interconnection projects (APG and TAGP), and contributions to joint energy planning, such *ASEAN Energy Outlook*.

As for the area program *Civilian Nuclear Energy* is one of ASEAN's new energy initiatives, still under review. ACE assists ASEAN Member States (ASEAN), including

Indonesia, in building nuclear energy capabilities, public understanding of nuclear power generation, and regional cooperation in the nuclear sector (ASEAN Center for Energy, n.d).

2. ACE Leads Feasibility Study for Indonesia-Malaysia Cross-Border Power Interconnections Project

This project is an implementation of one of the area programs of APAEC. *Phase II: 2021-2025*, namely *ASEAN Power Grid*, which has been confirmed on AEBF 2023 and AMEM-41. As an initiative originating from *the ASEAN Interconnection Masterplan Study (AIMS) III Phases 1 and 2*, which are the result of a collaboration between ACE and the ASEAN Heads of Utilities/Electric Power Authority (HAPUA). AIMS III identified 18 potential cross-border pathways with an estimated capacity of up to 33 GW of electricity interconnection. In this collaboration, ACE spearheaded a feasibility study on the operationalization of cross-border interconnection in Southeast Asia, with a clear focus on integrating renewable energy (ASEAN Center for Energy, 2023).

Project *Indonesia – Malaysia Cross-Border Power Interconnections*. This route covers two routes. The first route connects the Indonesian island of Sumatra with the Malaysian Peninsula. The second route connects Kalimantan, Indonesia, with Sabah, Malaysia.

In the first track, ACE is collaborating with PT PLN (Persero) and Tenaga Nasional Berhad (TNB) to develop a feasibility study for an interconnection line between the Indonesian island of Sumatra and Peninsular Malaysia. This project connects submarine transboundary power lines and is the first of its kind in the region to strengthen interconnectivity and sustainable energy security. The study focuses on increasing investment in the facilities needed to support policy development and implementation (ASEAN Center for Energy, 2023). This grid-to-grid interconnection connects Sumatra from the 500 kV substation in Perawang to Telok Gong Malaka via an HVDC overhead transmission line (for land transmission) and an HVDC submarine cable (to cross the Strait of Malacca) (ACE & HAPUA, 2024).

Meanwhile, on the second track, ACE together with PT PLN (Persero) and Sabah *Electricity Sdn Bhd* (SESB) collaborated on a feasibility study with the aim of achieving Sustainable Energy Security Interconnectivity in the Brunei Darussalam, Indonesia, Malaysia, and the Philippines (BIMP) region. According Chief *Executive Officer* of SESB, Ir. To Ts. Mohd Yaakob Jaafar, this MoU is beneficial for the sustainability and future energy security of Kalimantan Island and promises resource sharing from Kalimantan's abundant

hydropower access. The project will be connected via the Sebatik/Nunukan Substation in Indonesia and the Kalabakan Substation in Malaysia.

In 2024, this collaboration underwent further development. PT PLN received a grant from the *United States Trade and Development Agency*(USTDA) of 2 million USD or 31 billion rupiah (PT PLN, 2024). This grant agreement represents a partnership with significant potential to expand the economic development of Indonesia and Malaysia by connecting partners with technical and technological solutions offered by U.S. industry. USTDA will assess the feasibility of these two interconnection pathways, with the Washington, D.C.-based consulting firm, *Delphi International* will implementing *This* project was coordinated with TNB and SESB. ACE contributed to supporting this project by involving stakeholders in Malaysia and Indonesia (USTDA, 2024)

3. ACE Holds ASEAN Green Transport Rally 2023

ACE, together with the Indonesian Ministry of Energy and Mineral Resources, held the *ASEAN Green Transport Rally* as a form of energy transition campaign in the transportation sector. *ASEAN Green Transport Rally 2023* (ASEAN GTR 2023) is an environmentally friendly fuel vehicle convoy event that starts from Jakarta on August 20, 2023, and ends in Bali on August 24, 2023. This event is an innovation to raise public awareness of sustainable mobility options. As proof that ACE actively contributes and focuses on sustainable transportation in the ASEAN region, including Indonesia, to ensure a stable energy supply, energy security, and lower prices in the transportation sector.

ASEAN GTR 2023 aims to identify the potential environmental and economic benefits of various types of cars that use sustainable technology. Because Indonesia is a Biofuel (BBN) developing country, by implementing a mandatory 35% biodiesel (B35) program. In this convoy several car units are participating, consisting of a Toyota Hilux that uses B40 fuel (1 unit), a Hyundai Ioniq car (2 units), a Mitsubishi Pajero Sport (1 unit), a Mercedes Eq car (1 unit), a Toyota Kijang Innova (1 unit), a Wuling Almaz Hybrid car (two units), and a Suzuki Ertiga Hybrid (1 unit). The convoy will stop temporarily in Surabaya for the implementation of *Transport Talkshow* Then, the final leg of the journey continues to Bali. ASEAN GTR 2023 also serves as a form of support for Indonesia's chairmanship of the 2023 ASEAN Summit by integrating it into the 2023 AEBF in Bali (ESDM, 2023)

4. ACE Supports Innovative Mechanisms for Industrial Energy Efficiency Financing in Indonesia

Indonesia is facing a growing industrial sector, resulting in increasing energy demand. If not managed appropriately, this increase could hinder progress in the national energy transition and lead to higher carbon emissions, which could also contribute to regional carbon emissions. To reduce energy consumption in Indonesia's industrial sector, ACE is working to support energy efficiency.

ACE supports an innovative mechanism for financing industrial energy efficiency in Indonesia that can then be replicated in other ASEAN member countries. This mechanism involves collaboration with various parties, including: *Green Climate Fund (GCF)*, *Korea Development Bank (KDB)*, *Korea Energy Agency (KEA)*, the Indonesian Ministry of Energy and Mineral Resources, the Indonesian Ministry of Finance, and local financial institutions such as *PTIndonesia Infrastructure Finance(IIF)*, *PT Sarana Multi Infrastruktur (SMI)*, *PT Bank KEB Hana*, *PT Industrial Bank of Korea*, *PT Bank KB Bukopin*, *PT Bank Shinhan Indonesia*, and *PT Bank Woori Saudara Indonesia 1906 Tbk (ASEAN Center for Energy, n.d)*.

Three components will be achieved through this program, namely:

1. **Energy Efficiency Financing:** This component aims to facilitate the financing of energy efficiency projects by local financial institutions. The GCF provides credit guarantees to mitigate the risks faced by financial institutions when lending to these projects. The total funding provided reaches USD 100 million.
2. **De-risking Mechanism;** In this component, ACE plays a role in strengthening Indonesia's capacity to implement energy-saving insurance (Energy Saving Insurance/ESI) and financing structures through energy service companies (ESCOs). ACE conducted consultations with key stakeholders and capacity-building workshops.
3. **Technical Assistance for Market Readiness;** ACE is also responsible for enhancing the capacity of local financial institutions to understand energy efficiency projects, including project evaluation and energy audits. ACE also provides technical guidance to industry players and develops the energy efficiency regulatory framework.

Conclusion

Indonesia's energy transition efforts are facing obstacles, as evidenced by the steadily increasing share of fossil fuels in the national energy mix, reaching 80% and continuing to dominate each year. This is despite the country possessing abundant renewable energy potential. Renewable energy sources such as solar, wind, hydro, geothermal, bioenergy, and ocean energy should be optimally utilized. Therefore, a serious commitment supported by government policy, knowledge, financing, and technological capabilities is needed.

From 2023 to 2024, the ASEAN Center for Energy made significant contributions in supporting Indonesia as an AMS to accelerate the energy transition. ACE's role as an independent actor has been demonstrated in various energy transition efforts in Indonesia. ACE developed and implemented *blueprint* regional energy, thus influencing the direction of Indonesia's energy cooperation policy in the region. ACE is also currently undergoing a feasibility study project. *ASEAN Power Grid* In Indonesia, namely on the islands of Sumatra and Kalimantan, which will be connected to Malaysia. Before the 2023 AEBF, ACE also held the *ASEAN Green Transport Rally* from Jakarta to Bali as a campaign to raise public awareness of the need to use environmentally friendly vehicles. To promote energy efficiency, ACE has a project that supports innovative energy efficiency financing in the Indonesian industrial sector, partnering with various national and international parties.

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