Green and Low-carbon Transition of ASEAN Member States under the BRI Framework

-- Potentials and Opportunities

Executive Summary

“一带一路”绿色发展国际联盟
BRIGC
BRI International Green Development Coalition

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Executive Summary

I. Background and Goals

As Covid-19 is still raging across the globe, member states of the Association of Southeast Asian Nations (ASEAN), in the face of tortuous recovery of the world economy and climate crisis, are now in a critical period of economic development and industrial transformation and upgrading. ASEAN made a joint statement before COP26 that they have achieved an energy intensity reduction of 21%,[1]surpassing its aspirational target set in 2018, and calling upon developed countries for cooperation . According to the *ASEAN Plan of Action on Energy Cooperation (APAEC) 2016-2025 Phase II: 2021-2025*, the ASEAN member states will deliver an energy intensity reduction target of 32% by 2025 based on the 2005 level[2]. On Renewable Energy (RE), ASEAN will aim to achieve its aspirational targets of 23% share of RE in Total Primary Energy Supply (TPES) and 35% share of RE in installed power capacity, which faces a large gap in funds, technology, and energy infrastructure.

Home to one of the world's largest solar photovoltaic (PV) and wind power market, China's PV installation accounted for 48.7% of the global market[3]. The country's installed capacity of PV and wind power both lead the world. China and ASEAN's cooperation in green and low-carbon transition is at a historical juncture of huge opportunity. In the *Action Plan for Carbon Dioxide Peaking Before 2030* issued by the Chinese government, the overall planning of the work required to make the Belt and Road Initiative (BRI) a green initiative, and to strengthen cooperation with other participants on green infrastructure, green energy, and green finance. China will make overseas projects more environmentally sustainable throughthe development of a BRI energy partnership characterized by green development and inclusiveness, and expand the export of new energy technology and products. The role of cooperation platforms such as the BRI International Green Development Coalition and the *Green Investment Principles* will be brought into full play.

China and ASEAN are made to be partners in their green and low-carbon energy transition. Since the adoption of the *ASEAN-China Strategy on Environmental Cooperation* in 2009, the two sides have established mature policy dialogue mechanisms in the field of environment and climate, making practical cooperation happen in response to climate change, capacity building on biodiversity protection, and many other aspects. According to the latest *Framework of ASEAN-China Environmental Cooperation Strategy and Action Plan 2021-2025,* the two sides will maintain closer ties in this field.

Moreover, at the 76th Session of the United Nations General Assembly, China stated that it will step up support for other developing countries in developing green and low-carbon energy, and will not build new coal-fired power projects abroad. It shows that China's focus on investment and financing overseas will

[1] https://asean.org/wp-content/uploads/2021/10/10.-ASEAN-Joint-Statement-to-COP26.pdf

[2] ASEAN Centre for Energy (ACE). 2020. (2021-2025) ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025 Phase II. Available at https://aseanenergy.org/asean-plan-of-action-and-energy-cooperation-apaec-phase-ii-2021-2025/

[3] https://irena.org/-/media/Files/IRENA/Agency/Publication/2019/Nov/IRENA_Future_of_Solar_PV_2019.pdf

shift. China and ASEAN have become each other's largest trading partners. China's investment in and cooperation with ASEAN in RE will inevitably be strengthened. However, ASEAN member states are different in resource endowment, economic development, and industrial structure, and the two sides are not consistent in their optimal transformation paths and focal points. Thus, it is in an urgent need to carry out studies to determine the key areas and direction for the two sides' next-stage cooperation.

II. The Status-quo of ASEAN's Green and Low-carbon Development

Located at the crossroads of Asia and Oceania, the Pacific and Indian Oceans, southeast of Asia, the ASEAN region has a unique geographical advantage in pursuing economic and social development. As their economy and population continued to grow in recent years, the carbon emissions of the ten ASEAN member states by energy sources continued to rise, increasing from 693 MtCO2 in 2000 to 1,608 MtCO2 in 2019[4]. ASEAN's future economic growth, if no robust mitigation actions are taken, would bring huge amounts of greenhouse gas emissions. With carbon neutrality becoming a global trend, it is well noted that ASEAN member states have upgraded their National Determined Contribution (NDCs) in 2021, by considering common but dfferentiated responsibility and respective capability. which are not ambitious enough . Currently, nearly half of all ASEAN member states still have yet to commit to coal exit, making ASEAN's low-carbon transition all the more urgent .

Committed Timetable of ASEAN Member States for Carbon Peaking & Neutrality

Country	Carbon Peak	Carbon Neutrality
Brunei Darussalam		
Cambodia		
Indonesia	2030	2060
Lao PDR		2050
Malaysia		2050
Myanmar	2030	
the Philippines	2030	
Singapore	2030	To halve emissions from its peak by 2050, with a view to achieving net-zero emissions as soon as viable in the second half of the century.
Thailand	2030	2065
Vietnam		2050

Source:
NDCs and Long-Term Low-Emissions Development Strategy (LEDS) of ASEAN Member States

[4] IEA. 2020. Data and statistics. https://www.iea.org/data-and-statistics/data-browser?country=-MASEAN&fuel=CO2%20emissions&indicator=CO2BySource

III. ASEAN-China Cooperation in Green and Low-carbon Energy Transition and the BRI Framework

As China announces that it will step up support for other developing countries in developing green and low-carbon energy, and will not build new coal-fired power projects abroad, green and low-carbon energy cooperation will play a more important role in the BRI cooperation. A report of the World Economic Forum[5] believes that the BRI plays a leading role in boosting economic growth and avoiding the carbon lock-in effect in emerging and developing economies, by accelerating the construction of low-carbon infrastructure.

There is a huge potential for energy cooperation between China and the BRI participating countries. In recent years, China's power enterprises have made steady progress in foreign investment since 2010, with the steady advancement of "going global" and the implementation of the BRI. According to the National Bureau of Statistics, in 2020, the foreign investment flow in the fields of electricity, heat, gas, water production, and water supply reached USD 2.78 billion, a year-on-year increase of 10.3%. By the end of 2020, the stock of China's foreign direct investment (FDI) in these areas amounted to USD 39 billion. In 2019, Chinese-funded enterprises signed 318 power projects in the BRI participating countries, recording 56.5% of the total overseas power projects, with the project value of USD 32.28 billion, accounting for 68.4%.[6]

China has significant advantages in developing RE cooperation with the BRI participating countries. As the world's largest manufacturer of solar panels, wind turbines, batteries, and electric vehicles, China also boasts rich experience in and great potential for green and low-carbon cooperation with ASEAN member states. According to an IEA report,[7] China remains the leader of renewable electricity capacity between 2021 and 2026, which is forecast to increase by nearly 8 million kW, accounting for 43% of the global growth. With its commitment to calling off new coal-fired power projects abroad, China will make full use of its edges in RE, to further consolidate and propel the low-carbon transition process for the BRI countries. China's overseas energy investment and cooperation right now are mainly conducted through overseas project contracting, in which equity investment is playing an increasingly important role.

[5] WEF_Advancing_the_Green_Development_of_the_Belt_and_Road_Initiative_(2022)

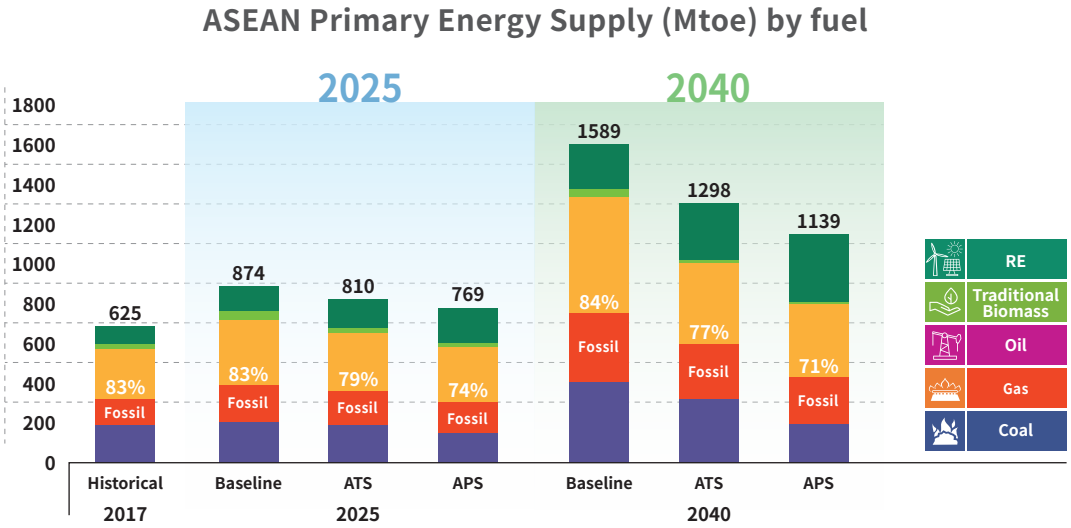
[6] SINOSURE. The Handbook of Country Risk 2021. Beijing: China Financial & Economic Publishing House, September 2021.

[7] IEA (2021), World Energy Outlook 2021, IEA, Paris https://www.iea.org/reports/world-energy-outlook-2021

IV. Key Issues Concerning ASEAN's Green and Low-carbon Transition

ASEAN's transition in RE has long attracted attention from all parties. Previous studies pointed out that generally, ASEAN member states are highly dependent on fossil fuels, and most of them continue to lack fully transparent land permitting procedures for RE development. Barriers can also be found in lengthy permitting processes, unsteady incentives, and unclear grid regulations.

The 6th ASEAN Energy Outlook (AEO6) predicted that by 2040, ASEAN's energy demand would increase by 146% compared to 2017. Fueling the rising demand, the region's TPES in 2040 will be 2.5 times higher than in 2017, with no policy intervention. After accounting for the aspirational targets stated in the APAEC blueprint, ASEAN's TPES by 2040 is estimated to be 1,139 Mtoe, in which fossil fuels would make up 71% of the total supply[8].



Notes:

- Baseline Scenario is the business as usual without any policy intervention

- ASEAN Target Scenario (ATS) is taking consideration the national targets of RE and energy efficiency

- APAEC Target Scenario (APS) is taking into account the regional target stated in the APAEC

Source: AOE6

[8] ASEAN Centre for Energy (ACE). 2020. The 6th ASEAN Energy Outlook. Report. Available at https://aseanenergy.org/the-6th-asean-energy-outlook/

Four major problems or challenges were found in ASEAN's development of regional energy cooperation, including funds, policies, technologies, and barriers on international cooperation. ASEAN focuses on seven programme areas in the APAEC, namely ASEAN Power Grid, Trans-ASEAN Gas Pipeline, Coal and Clean Coal Technology, Energy Efficiency and Conservation, RE, Regional Energy Policy and Planning, and Civilian Nuclear Energy. Moreover, it is noted that ASEAN has high demand for fossil energy, such as coal, at the current stage.

In addition to financing, ASEAN faces unique geographical conditions featuring lofty mountains, dense rivers, and jungles, thus placing higher requirements and challenges for its power technologies from generation to transmission. The level of smart grid, meanwhile, varied among member states. A weak power system will affect the stability of operation and scale of transactions of ASEAN's interconnection. Most ASEAN member states still gave priority to filling the gap in power infrastructure. To integrate RE into their development plans and increase its proportion in primary energy, members of this region will need science-based supporting policies from policymakers, as well as energy development plans conducted in the light of local conditions.

To this end, this report will analyze the characteristics of 10 ASEAN member states in four categories: (1) **Indonesia,** far greater economic volume and emission scale than other countries; (2) **Vietnam, Thailand, Malaysia, and the Philippines,** relatively sound economic development with large potential for rising emissions and national strategies; (3) **Myanmar, Cambodia, and Lao PDR**, relatively slow or moderate in the economy with potential for RE development; and (4) **Singapore and Brunei,** small in size but developed in the economy, playing an exemplary role in clean energy technology and green finance.

1. Indonesia

Indonesia's economic size, population, and total emissions far exceeded those of other ASEAN member states. If the transition successfully achieved, Indonesia has the largest potential for emission reduction. The country still faces a large capital gap to realize coal exit and grid improvements is needed to the deployment of RE power generation.

The continuous development of coal-fired power plants poses a major challenge to Indonesia's greenhouse gas emission reduction goals. The short, medium and long-term plans for coal phase-down in the power sector are still unclear. A interconnected grid has not yet been formed among the islands of Indonesia and areas with abundant renewable resources resulting to limitation in capacity that can deliver clean electricity to areas with large demand. This acts as a barrier for the rapid development of RE. On May 27, 2021, Indonesia announced that it would phase out its coal-fired power generation. Strong political determination and policy support in reducing emissions shown by Indonesia, though, the target cannot be achieved overnight. For the next step, Indonesia needs to give play to the market mechanism, to stimulate the development of RE and low-carbon industries.

First, to expand the scale of financing in the energy transition by exploring the establishment of a carbon market. In November 2021, the Law on Harmonization of Tax Regulations Indonesia (HPP Law) was regulated, allowing a pilot carbon emission trading. Through the HPP Law, the government provides a tax on carbon in the steam power plant (PLTU) sector and coal sector. The fare is a minimum of Rp. 30,000 (about USD 2) per kilogram of carbon dioxide equivalent (CO_2e)[9]. The terms related to the carbon tax will be enforced on April 1, 2022. Once implemented, Indonesia's carbon tax system will have a

[9] The Law on Harmonization of Tax Regulations Indonesia (UU HPP) https://www.double-m.co/en/the-law-on-harmonization-of-tax-regulations-indonesia-uu-hpp/

positive impact on the transformation of the electricity market and the development of RE, bringing funds to the energy transition. Market measures such as carbon tax, also need to be continuously improved and fine-tuned in practices, to avoid an indirect burden for the living cost of residents and impacts on the level of economic green recovery. Indonesia's carbon tax and China's carbon trading market construction are two different carbon pricing paths, but both require estimation and verification of carbon emissions of all industries. The two sides could launch experience exchanges in this field, to improve their respective mechanisms.

Second, to strengthen the connectivity of grid infrastructure and to improve the capacity of RE consumption. Rich in RE resources, Indonesia is blessed with abundant geothermal, biomass, hydropower, and solar PV, yet the utilization rate is not high.. A study of IESR, Indonesia's think tank, shows that achieving zero carbon emissions in the Indonesian energy system by 2050 is technically and economically feasible, while its PV installed capacity is required to improve by a large margin[10]. Indonesia should strengthen the construction of grid infrastructure, especially the level of provincial power connectivity and energy storage, to improve the consumption and installed capacity of RE.

2. Malaysia, the Philippines ,Thailand, and Vietnam

Among Southeast Asian countries, Malaysia, the Philippines ,Thailand, and Vietnam developed relatively well in economy and policy and practice foundations for RE. However, they are all encountering the common issues in the green and low-carbon transition, trapped by the middle-income status and challenged by sustainable development transformation. The four countries were equipped with national strategies and aspirational to develop RE while facing a reality that coal power taking up a large share; secondly, strict restrictions on foreign investment to take part in the energy sector, limiting to the financing of domestic RE industry.

In 2020, Vietnam overtook Thailand and emerged as the leader in solar electricity adoption in the ASEAN area, with a total capacity of PV more than 16.5 GW . Vietnam proposes a possibly higher target of solar capacity in its latest national power development plan (PDP8), which was postponed a few times and is said to lower the level of reduction due to internal issues.11

Thailand boasts huge potential for PV development, whose edge in the automotive industry is expected to be transformed into terminal electrification such as new-energy vehicles (NEVs). However, the power of Thailand relies heavily on imports, in an urgent need to improve its local RE mixes such as PV and biomass.

With RE occupying around 17%, Malaysia is rich in renewable resources, mainly hydropower, solar, and biomass. In 2019, Malaysia released its blueprint of the electricity supply industry 2.0 (MESI2.0), which intended to promote more independent enterprises to enter the power sector, but the shareholding of foreign-invested electric power projects is restricted to a maximum of 49%. The Philippines also enjoys a potential for geothermal, wind, and PV power resources, and active in promoting RE development.

[10] IESR, Agora Energiewende, LUT University. (2021). Deep decarbonization of Indonesia's energy system: A pathway to zero emissions by 2050. Institute for Essential Services Reform (IESR) Deep decarbonization of Indonesia's energy system: A Pathway to zero emissions by 2050 - IESR

[11] Thang., et al. Vietnam's solar and wind power success: Policy implications for other ASEAN member states. Energy for Sustainable Development, 2021(65):1-11, https://doi.org/10.1016/j.esd.2021.09.002.

For the next step, actions are suggested to be taken centering on the following aspects:

First, to further strengthen the top design of power investment environment, providing more external financial support for coal exit and energy transition. The economic prospects of the above-mentioned four countries are promising, with a solid foundation for attracting international funds, but the capital needed for the decarbonization of the power system is huge. It is advised to introduce or implement the feed-in tariff (FIT), renewable portfolio standards (RPS), and Net Metering, to relax restrictions on the proportion of equity investment in power projects, and draw in carbon trading and green bond financial instruments, etc. Fuel subsidies on the use of coal, oil and natural gas for power generation shall be removed, since it competes with the economic feasibility of proposed RE projects. In this way, the energy investment environment would be further improved, the vitality of market financing stimulated, and the funding gap filled up. Policy and standard connectivity should be strengthened within the region, with the coverage of the smart grid improved and the resilience enhanced through regional electricity trading.

Second, to step up the supporting facilities of PV, wind power, and other RE projects and storage, to contribute to the NDC targets. With clear RE strategies, the four countries put in place policies concerning PV and wind power that enjoyed immense potential. Looking forward, the scale and speed of developing PV and wind power should be boosted. In building supporting facilities, the grid's ability to absorb RE should be improved, gradually reducing the proportion of fossil fuels in primary energy, and promoting relevant countries to achieve their NDC targets.

3. Cambodia, Lao PDR , and Myanmar

Cambodia, and Lao PDR, and Myanmar are all in the lower reaches of the Mekong River, lagging behind in economic development and simple in industrial structures. Rich in hydropower, wind, and solar resources, the three countries did not show any features of high energy consumption or emissions. Problems, however, were found in their process of green and low-carbon transition: (1) the economy is underdeveloped, with the population scattering more in remote rural areas, featuring low urbanization and electrification rates; (2) environmental laws and regulations are not mature, along with the capital market falling behind and inferior local financial market; and (3) the public is weak in addressing climate change and lack of understanding of RE.

Some areas in the above three countries are experiencing a lack of electricity or no electricity at all. A low rate of electrification will lead to the use of fuels such as firewood and charcoal to meet daily-life needs. In expanding RE investments, the three countries also faced challenges from macroeconomic requirements, regulatory policies, and financing shortages. According to the *Country Risk Rating of Overseas Investment from China (2020)*, issued by the Institute of World Economics and Politics (IWEP), the Chinese Academy of Social Sciences (CASS), Cambodia and Lao PDR were both rated relatively high risk, large sovereign wealth funds, poor sovereign debt sustainability and high levels of sovereign credit risk. Safety accidents occurred at hydropower stations in Lao PDR, which reduced local people's acceptance of this area.

For the next step, it is suggested that the three countries prioritize actions in the following two areas:

First, to promote the construction of grid infrastructure and develop off-grid power generation to improve the accessibility of electricity.

Myanmar currently is short of power supply, with around 68% electricity access rate in 2019[12]. The rural areas, taking a large share of the population, in the three countries are distant from the power grid. Power shortage is one of the most critical problems. For example, the rural population of Myanmar accounts for

70%. By expanding the existing grid and adding medium and low-voltage distribution networks, more towns and households can be connected to grid electricity. And the off-grid electrification systems should be built, including solar systems and micro-grids, to supply power for rural communities.

Second, to formulate RE policies to achieve green and low-carbon energy transition at lower costs.

Myanmar and Lao PDR boast huge potential in the development of hydropower and PV. However, hydropower is susceptible to seasons, which are volatile and easy to be affected by the environment. The current penetration rate of solar PV is low, lack of strategic layout, and clear development direction. In the future, it is advised to specify goals of RE development, with vigorous efforts being deployed on PV, biomass, and water conservancy. International cooperation should be strengthened and incorporated into ASEAN's energy network, to increase the penetration rate of RE in various sectors, in order to achieve an "overtaking". In developing RE, countries could carry out energy transactions with other ASEAN members, providing a driving force for economic development and green and low-carbon transition.

4. Brunei Darussalam and Singapore

Lack of RE resources endowment is an outstanding issue in Singapore and Brunei's process of the green transition. However, the two countries, economically advanced, are able to lead ASEAN's green transition as demonstrators and green finance centers. With small populations and land areas, Singapore and Brunei enjoyed a high level of economic growth and boasted a high Human Development Index (HDI). Situated in the tropics, they are abundant in solar energy, but lack of RE resources such as hydropower, wind, and geothermal. Although there is little investment potential in RE projects, the two countries, small-sized but high-quality, could serve as important financial hubs and bridges in ASEAN, to boost the development of the region's green projects.

For the next step, it is suggested that both countries prioritize actions in the following two areas:

First, to play a demonstration role and to establish a RE power system.

The current power generation structure of Singapore and Brunei is dominated by natural gas, which accounted for more than 95%. Limited by their own resources, the two countries lack the endowments of wind, hydropower, thermal, or tidal energy, only with rich solar resources enabling the development of rooftop photovoltaics to conserve land. Mature in waste-to-energy technology, Singapore could play an exemplary role for other ASEAN members, to conduct a RE power system that combines PV and waste incineration plants.

Second, to give full play to the role as financial centers, strengthening regional and international green finance cooperation.

It's one of the key areas that ASEAN would focus on RE strategy in the future to strengthen regional and international cooperation. Both Singapore and Brunei developed well in the financial industry in the ASEAN region. Singapore, in particular, as one of Asia's financial centers, saw an early evolution of the financial industry, playing an important role in the development of ASEAN's green finance. Singapore could also act as a benchmark given that they have been a prioneer in carbon tax deployment in the region.The two countries should give full play to the role of financial sectors, to lesser the restrictions on RE investment in ASEAN as a whole, attract more international funds to join ASEAN's RE market, and help ASEAN member states achieve their NDCs and green and low-carbon transition.

[12] https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=MM