Received: 29 November 2023 | Revised: 7 March 2024 | Accepted: 14 March 2024

DOI: 10.1002/app5.390

POLICY FORUM

ASIA & THE PACIFIC POLICY STUDIES | Australian National University

Insider perspectives on Southeast Asia's clean energy transition

Thang Nam Do

Crawford School of Public Policy, Australian National University, Canberra, Australian Capital Territory, Australia

Correspondence
Thang Nam Do.
Email: thang.do@anu.edu.au

Funding information
Australian National University

Abstract

This paper offers essential insights into Southeast Asia's transition to clean energy, a cornerstone for global climate objectives. Based on 27 interviews with regional energy and climate experts conducted between September 2022 and October 2023, the research distils key factors into 3Ds: Demanding, Doable, and Dependent. Highlighting these aspects would foster readiness, persuade stakeholders, and secure international support, all of which are pivotal for advancing the energy transition towards net-zero emissions in Southeast Asia.

KEYWORDS
clean energy, climate, energy transition, international cooperation, Southeast Asia

1 | INTRODUCTION

Advancing Southeast Asia's transition to clean energy is not only a regional imperative but also a crucial step towards achieving global climate targets. With approximately 679 million people, the region is experiencing a significant increase in energy demand, projected to triple by 2050 (ACE, 2022; IMF, 2023). In 2021, its energy emissions reached about 1.9 billion tons of CO_2, accounting for about 6% of global emissions, behind only to China and India in Asia (Energy Institute, 2023). This is especially concerning as the region is among the most vulnerable to climate change which incurs an annual cost of about 2.2% of the region's Gross Domestic

Products (Kompas et al., 2018). Countries like Myanmar, the Philippines, and Thailand rank among the top ten most at-risk globally (German Watch, 2021) and in 2022, Indonesia, Laos, and Vietnam were among the top 30 air-polluted countries (IQAir, 2023).

While the transition to clean energy is imperative, the adoption of renewable energy in Southeast Asia appears insufficient. It is projected to reach only 14.4% of Total Primary Energy Supply by 2025, falling short of the 23% target (ACE, 2022). Accelerating the energy transition is paramount to achieving net-zero emission targets.

Previous studies have typically concentrated on specific aspects of technology, social factors, or the economics of Southeast Asia's energy transition (e.g., Aleluia et al., 2022; Bai et al., 2023; Erdiwansyah et al., 2019; Gu et al., 2023; Vakulchuk et al., 2023). Some studies have discussed unique challenges faced by individual countries (e.g., Do et al., 2022; Guild, 2019; Le et al., 2023; Setyawati, 2020; Urban et al., 2018; Vaka et al., 2020). However, there have been relatively few studies employing in-depth interviews with regional policy practitioners to explore strategies for accelerating the energy transition. This gap is particularly pronounced in the post-COP26 era, as most Southeast Asian countries, alongside over 140 countries worldwide, made important commitments to net zero emissions by the mid-century (Net Zero Tracker, 2023).

This article explores effective strategies for boosting the transition to clean energy in Southeast Asia, leveraging insights from in-depth interviews with experts. It offers insights for individuals interested in understanding key features of the energy transition in the region.

Between September 2022 and October 2023, I conducted interviews with 27 mid-career government personnel, including 6 experts from Indonesia, 5 from Laos, 5 from the Philippines, 5 from Thailand, and 6 from Vietnam. While there is no rigid rule for determining the number of interviews in qualitative research, a common guideline suggests a minimum of 20 (Schreier, 2018). The number of participants from each country aimed to ensure a balanced representation, considering the availability and willingness of respondents to participate.

These countries were chosen due to their pivotal roles in emissions reduction and advancing the energy transition in the region. Indonesia, Thailand, and Vietnam are the three largest emitters in Southeast Asia, while Vietnam, Thailand, and the Philippines lead the region in solar and wind power generation (Ember, 2023; Energy Institute, 2023). Laos stands as the largest electricity exporter in the region (ACE, 2022).

The interviewed experts represented various government agencies, spanning climate, mineral resources, energy, economic development, infrastructure, and finance. Utilising purposive and snowball sampling techniques, as outlined in Parker et al. (2019), the interviewees were selected based on their expertise, and they were encouraged to introduce additional potential interviewees. Initial contacts were made with experts who had recently participated in climate and energy events across Southeast Asia.

During the interviews, participants were asked to elaborate on the aspects of the energy transition they believed were crucial for enhancing it in their respective countries. Points mentioned by over 50% of the respondents were analysed. Confidentiality was maintained with respects to the respondents' names and affiliations. Findings were reported in an aggregated manner and supplemented by a desk review of literature.

The results reveal that in the experts' views, energy transition in Southeast Asia is highly demanding with sizable upfront costs. Key recommendations to expedite the transition include acknowledging its obstacles to set proper expectations and prepare accordingly, facilitating the exchange of best practices to gain confidence about its achievability, and enhancing international support. In the subsequent sections, I will delve into the three fundamental aspects:

challenges, achievability, and interdependence. I propose that integrating these three aspects into a three pillar model—demanding, doable, and dependent—(Figure 1) would signify crucial elements for expediting Southeast Asia's energy transition.

2 | DEMANDING—NO EASY PATH FOR ENERGY TRANSITION

2.1 | Hurdles and socioeconomic concerns

The interviewed experts unanimously highlighted significant hurdles in the energy transition, primarily concerning potential negative socioeconomic impacts. They expressed concerns about potential energy supply disruptions amid a rapid 5% annual increase in electricity demand (ACE, 2022). For example, quickly phasing out coal power may lead to power shortages and escalating electricity prices in the short term.

Energy transition is resource intensive. Southeast Asia would need to invest USD 27 billion in renewable energy every year to achieve the target of 23% renewables in the primary energy supply by 2025 (Vakulchuk et al., 2023). The region has the youngest coal power fleet in the world, with an average plant age of about 12 years in 2022 (Demoral et al., 2022). Retiring these coal power facilities would require over US$277 billion, or 13% of Southeast Asia's Gross Domestic Products in 2022, given that it costs at least $1.9 billion to retire one gigawatt of coal power and replace it with clean energy (Global Energy Monitor, 2023; IMF, 2023; World Bank, 2023).

Furthermore, as some interviewees argued, the countries must consider opportunity costs—the price of forgoing potential resource allocation for other vital infrastructure investments, such as hospitals, schools, or roads. Balancing these competing priorities poses challenges, especially in resource-scarce developing Southeast Asia.

Another challenge is the absence of incentives for public servants to champion the energy transition. Incomplete regulations risk a smooth transition (Bai et al., 2023). Some interviewees observed that public servants might face penalties if the transition causes consequences such as power shortages. Championing the energy transition would require public servants to bear

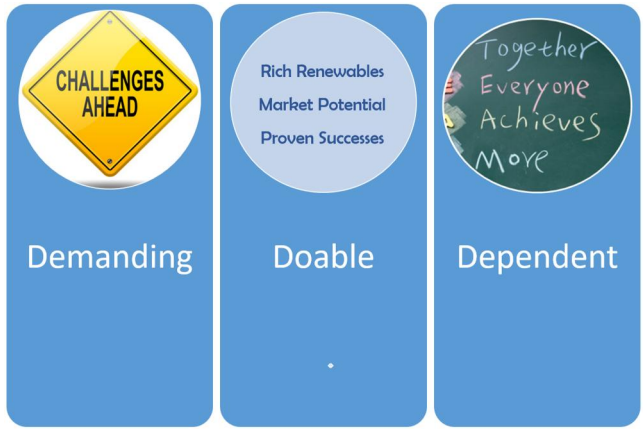

FIGURE 1 Core elements of Southeast Asia's energy transition. *Source*: The author.

immediate, tangible, private costs, while the benefits, such as environmental gains, are distant, intangible, and public (Do & Burke, 2023). Consequently, they are unwilling to pioneer.

The reluctance to change is real. As an expert quoted one low-income Hanoi suburban household mother's candid sharing, 'If I stop burning charcoal for food, my family will starve sooner than suffer from charcoal pollution.' For policymakers, the security of electricity supply outweighs its fuel source concerns, with economic growth taking precedence over environmental objectives in some cases. For the energy transition to gain traction, it must align with economic growth.

My interviewees tended to believe that some environmentalists might not fully appreciate the challenges of the transition. These environmental advocates often prioritise environmental protection above all else, a stance that is widely regarded as commendable. However, balancing these objectives can be more complex in practice. These advocates may not always need to consider competing priorities, such as economic development or the potential job losses associated with closing coal power plants, for example. They often are not directly accountable to specific constituents. The views of these environmentalists have contributed to a conception that the transition to clean energy is straightforward and have occasionally called for what some see as unrealistic targets.

2.2 | Overcoming the obstacles

In the experts' views, recognising the challenges associated with the energy transition is essential. It provides a realistic perspective for setting targets and constructing action plans, ensuring that stakeholders have the right expectations before embarking on a lengthy and resource-intensive journey. The interviewees stressed that rushing the transition could be counterproductive. For example, prematurely closing coal power plants without adequate clean energy alternatives in place may lead to power shortages and economic instability. In that case, too much pain can hamper gain.

Acknowledging the challenges paves the way for collaborative efforts among government, industry, and the public, with each stakeholder playing a vital role. The interviewed experts believed that electricity consumers would need to be willing to support government policies that may involve temporary increases in energy prices. Industries, in turn, should be prepared to absorb some of these elevated energy costs. Governments face the challenging task of balancing economic growth, energy security, and environmental objectives (Erdiwansyah et al., 2019). On the global stage, the international community could better acknowledge the unique challenges faced by regions like Southeast Asia and other developing nations, offering support to aid in their transition efforts (Aleluia et al., 2022; Bai et al., 2023).

Furthermore, identifying obstacles is essential for devising effective solutions. Addressing the risk of power shortages, the countries could prioritise the expansion of renewable energy sources before phasing out coal power plants (World Bank, 2023). Emphasising economic opportunities such as the creation of solar, wind, and battery industries could garner political support for the transition (Burke & Do, 2021). The implementation of a carbon tax or an emission trading scheme would enable fossil fuel industries to adapt their business strategies for the transition (Resosudarmo et al., 2023). In addition, improving regulations and offering incentive mechanisms would encourage public servants to drive the energy transition without the fear of punitive measures for any setbacks (Do & Burke, 2023). Importantly, the solutions need to consider low-income and affected communities (McCauley & Pettigrew, 2023).

3 | DOABLE—WITH THE RIGHT POLICIES

Over half of the interviewees believed that Southeast Asia could shift to clean energy more rapidly, aiming for net-zero emissions.

3.1 | Abundant renewable energy potential

Southeast Asia has remarkable renewable energy potential (Figure 2). It has an estimated 31 terawatts of solar and wind capacity, which is two orders of magnitude greater than its electricity generation in 2021 (ACE, 2022; Lee et al., 2020). Solar energy is widespread, and offshore wind potential is promising in Vietnam and the Philippines. Indonesia, Myanmar, and Laos possess significant hydropower resources, with vast geothermal potential in Indonesia (IRENA & ACE, 2022). The region also has sizeable off-river pumped hydro energy storage potential to facilitate solar and wind adoption (Lu et al., 2021). Their modelling suggests that Southeast Asian countries could achieve a 97% share of solar and wind energy in the electricity mix at competitive costs of $US 55–115 per megawatt-hour.

The interviewees, particularly those from Thailand and Vietnam, were optimistic about the role of technology. They believed that region could realise the renewable potential, thanks to significant cost reductions in solar and wind technologies. Solar and wind technologies have seen substantial reductions in costs, with solar costs decreasing by 90% and wind costs by 50% since 2010 (IRENA & ACE, 2022).

3.2 | Emerging role in the global clean energy market

Southeast Asia's burgeoning population and economic growth position it as a key player in the global clean energy market (Bai et al., 2023). Demand for electric vehicles (EVs) is surging, with countries such as Thailand, Indonesia, Singapore, and Vietnam setting ambitious EV targets (Schröder et al., 2021). Corporate demand for clean energy is on the rise, with an increasing

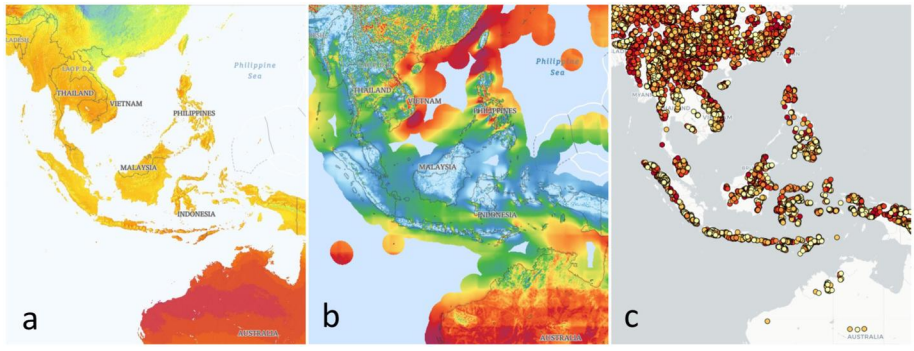

FIGURE 2 Renewable energy resources in Southeast Asia: (a) Global horizontal irradiance as denoted by the blue-yellow-orange-red colour scheme (low to high solar radiation); (b) Mean wind speed at 150 m height with the excellent wind energy resources (>8 m/s) highlighted in red; (c) Potential sites for off-river pumped hydro, classified into A (dark red), B (red), C (orange), D (yellow) and E (light yellow) based on the construction costs (low to high). *Source*: Lu et al. (2021).

number of multinational and domestic companies actively pursuing a greater share of renewable electricity in their energy portfolios (Aleluia et al., 2022).

The region could also contribute to the clean energy supply chain. It is a major global solar photovoltaic manufacturer, second only to China, holding approximately 11% of the global market share in 2021, with Vietnam, Malaysia, and Thailand playing significant roles (IEA, 2022). Southeast Asia possesses the essential resources needed to develop vital industries that facilitate the transition to clean energy. Indonesia and the Philippines boast substantial nickel reserves, while Myanmar and Vietnam are rich in rare earth elements (IRENA & ACE, 2022). The interviewees were highly hopeful about these economic opportunities in clean energy.

3.3 | Evidence of initial success

Evidence of initial success lies within the region. Vietnam stands as an inspiring example of rapid solar and wind energy adoption. Since 2019, Vietnam has become a leader in the region, with solar and wind accounting for 13% of its electricity mix in 2022, up from nearly zero in 2017 (Figure 3). This remarkable progress is attributed to generous feed-in tariffs and a conducive environment for solar and wind investments (Do et al., 2021, 2022).

Another example of the role of policy in promoting clean energy is seen in Thailand's EVs. In 2015, the government introduced the Thailand Integrated Energy Blueprint, targeting 1.2 million EVs by 2036. In 2021, Thailand further committed to exclusively selling zero-emission vehicles from 2035. Key enabling policies, such as subsidising charging station investments and offering tax incentives, have substantially boosted EV adoption (Wattana & Wattana, 2022).

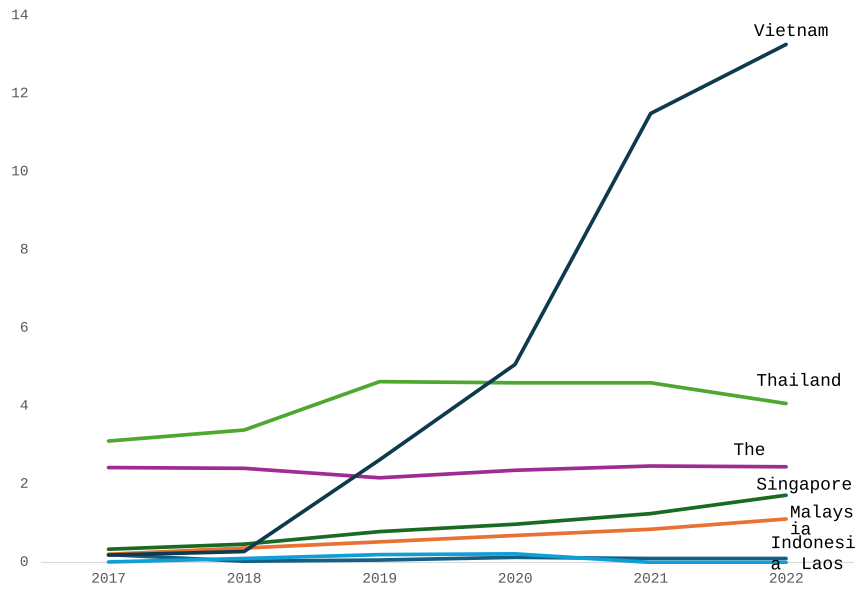

FIGURE 3 Solar and wind share in total electricity generation in some Southeast Asian economies, 2017–2022 (in %). *Source*: Ember (2023); Energy Institute (2023).

Thailand now leads the region with 218,000 registrations of EVs in 2022 (Figure 4). The examples of Thailand and Vietnam demonstrate that the transition can expedite with the right policies in place.

4 | DEPENDENT—ACHIEVING MORE TOGETHER

While the countries can implement domestic policies to make initial progress, they need international support to rapidly advance towards net-zero emissions. Over 89% of the interviewees stressed the importance of recognising the interdependence of the energy transition. They believe that addressing global climate issues and achieving a successful energy transition requires international cooperation. Southeast Asia's success is closely tied to receiving international support. A common sentiment among the experts was, 'We need financial and technical support.'

The experts were particularly interested in learning from Indonesia and Vietnam's participation in the Just Energy Transition Partnership (JETP) led by international partners including the European Union, the UK, the US, Japan, Germany, France, Italy, Canada, Denmark, and Norway. Under the JETP, Indonesia and Vietnam are eligible for $US 20 billion and $US 15.5 billion, respectively, in the next 3 to 5 years to expedite their decarbonisation, focussing on the electricity sector. Some interviewees view the JETP as a potential model for international cooperation. This is contingent on its focus on enhancing clean energy adoption before phasing out coal power and ensuring that recipient countries receive sufficient concessional support.

Sharing best practices can effectively demonstrate the feasibility of the energy transition. During my interviews, 89% of the respondents showed interest in learning from the experiences of other countries. They emphasised that by understanding the challenges faced by these nations, they can gain a greater sense of confidence in the transition's success. Importantly, this reassurance stems from the realisation that they are not alone in navigating the challenges.

Capacity building is highly valued. The experts appreciate initiatives such as the masterclass for Vietnamese Members of Parliament, which was conducted within the cooperative framework of Australia and Vietnam. Capacity-building efforts could extend to a broader range of

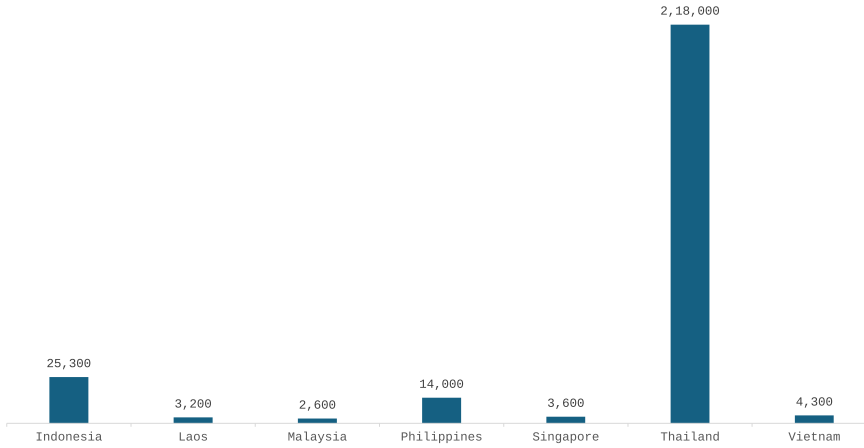

FIGURE 4 Electric vehicle registrations in key Southeast Asian economies, 2022. *Source*: Utama et al. (2023).

stakeholders, including mid-career government officials, industries, and civil society, as observed in the Energy Transition Partnership for Southeast Asia (ETP, 2023). These training programs have also facilitated the creation of regional networks for further knowledge and expertise exchange.

Other opportunities for collaboration abound. Southeast Asian countries could expedite the development of the ASEAN Power Grid which has significant economic advantages (Do et al., 2023; Lu et al., 2021), with a specific focus on bilateral cross-border electricity trade between now and 2030 (Do & Burke, 2023). The Laos-Thailand-Malaysia-Singapore Power Integration Project can provide lessons for expanding multilateral cross-border electricity trade (ACE, 2022). Countries could learn from Singapore and the Philippines in reforming electricity markets to enable greater uptake of renewable energy. Indonesia can offer its experience in implementing an emission trading scheme (Resosudarmo et al., 2023). Southeast Asia has the potential to offer promising examples of international green economy collaborations (Aisbett et al., 2023).

International cooperation becomes even more critical with the introduction of climate-related trade measures, such as the European Union's carbon border adjustment mechanism (CBAM). About two thirds of the respondents expressed a keen interest in understanding the connections between the energy transition and CBAM. They have concerns about the potential impacts of CBAM, its evolution, associated uncertainties, and generally agree on the necessity of accelerating the energy transition to mitigate these impacts. In their views, under all circumstances, the principles of the United Nations Framework Convention for Climate Change, particularly the 'common but differentiated responsibility and respective capacity principle,' must be upheld to ensure the fairness of the energy transition.

5 | CONCLUSIONS

Based on insights gathered from regional policy practitioners, I have developed a model that clarifies the key elements for advancing Southeast Asia's energy transition. This model encompasses the three critical dimensions of the energy transition: its challenges, achievability, and interdependence. Recognising the obstacles allows countries to better prepare for the transition, while highlighting its feasibility, particularly through the success stories of other nations, fosters trust. Furthermore, emphasising the interconnected nature of this transition underscores the significance of international cooperation. Collectively, these factors promote preparedness, convince stakeholders, and facilitate the acquisition of essential support, all of which play a vital role in advancing the energy transition in Southeast Asia. While this approach is not exhaustive, it serves as a starting point for further exploration of strategies to enhance the energy transition in the region and beyond.

ACKNOWLEDGEMENTS

The author acknowledges the Australian National University *Zero-Carbon Energy for the Asia-Pacific* research initiative for support and thanks the interviewees for their contributions and reviewers for their comments.

Open access publishing facilitated by Australian National University, as part of the Wiley - Australian National University agreement via the Council of Australian University Librarians.

CONFLICT OF INTEREST STATEMENT

The author confirms that they have no conflicts of interest when preparing this paper.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

ORCID

Thang Nam Do https://orcid.org/0000-0002-9039-8117

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How to cite this article: Do, T. N. (2024). Insider perspectives on Southeast Asia's clean energy transition. *Asia & the Pacific Policy Studies*, e390. https://doi.org/10.1002/app5.390