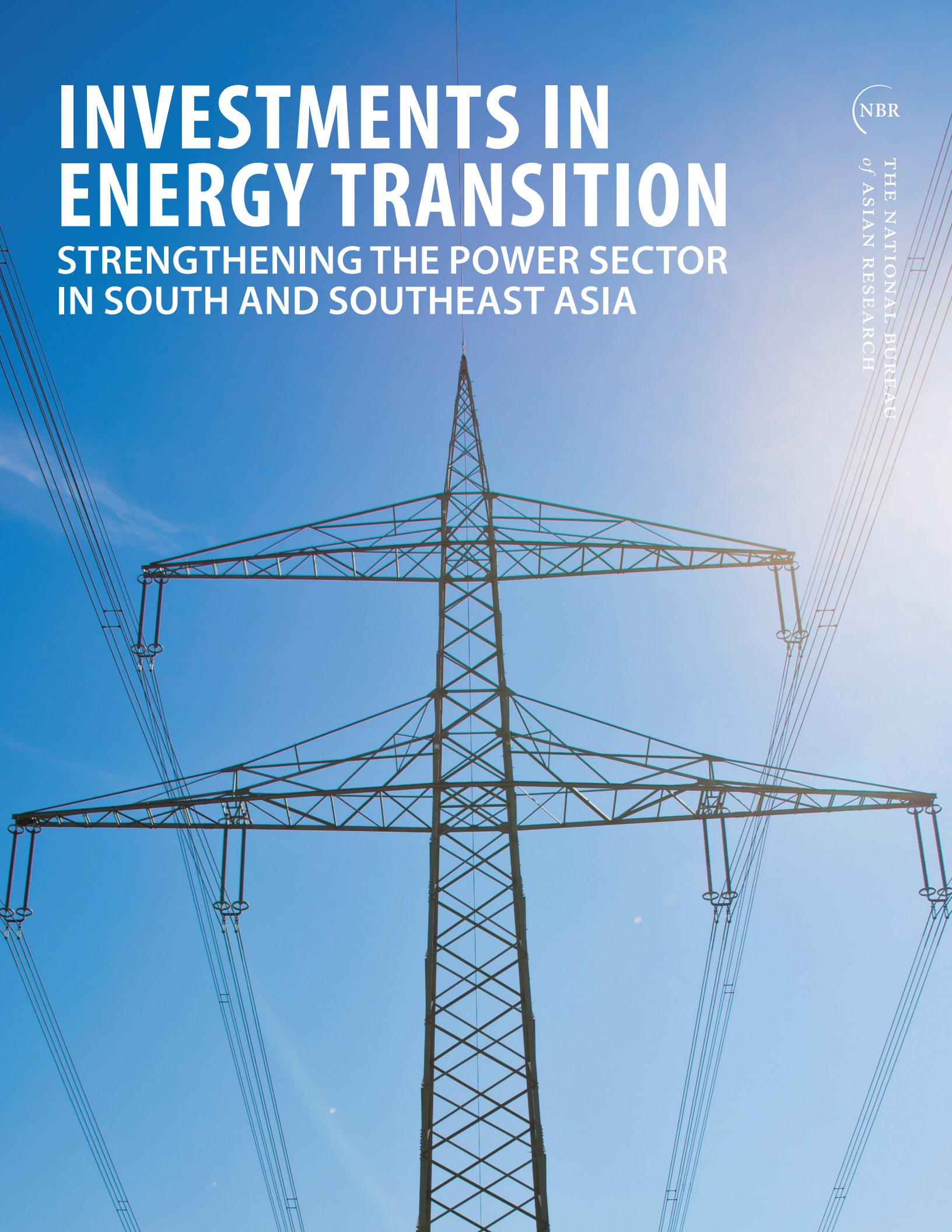


INVESTMENTS IN ENERGY TRANSITION

STRENGTHENING THE POWER SECTOR
IN SOUTH AND SOUTHEAST ASIA

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INVESTMENTS IN ENERGY TRANSITION

*Strengthening the Power Sector
in South and Southeast Asia*

*Clara Gillispie, Ashley Johnson, Thomas Lutken,
and Micah Sindelar*

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— FOREWORD —

Rapid economic development in South and Southeast Asia has been accompanied by surging needs to meet energy demand, improve standards of living across the region, and expand access to electricity. How countries are choosing to meet electricity demand varies, yet this is an increasing concern across the region for policymakers, who are tasked with simultaneously de-carbonizing energy systems and ensuring a reliable power mix. Heightened pressure on existing generation and transmission infrastructure is raising additional questions of how to secure affordable and sustainable investments to maintain grids and build new infrastructure, particularly amid the ongoing economic crisis caused by the Covid-19 pandemic.

With the generous support of the Economic Research Institute for ASEAN and East Asia (ERIA), the National Bureau of Asian Research (NBR) launched the year-long project “Strengthening Emerging Asia’s Power Sector: Needs, Requirements, and Potential Roles for East Asia Summit Engagement” to examine these issues. This report constitutes the final phase of the project and builds on the research and findings from expert interviews and a two-day workshop convened in early 2021. It examines issues of particular importance in emerging economies in Asia, specifically focusing on South and Southeast Asia. Across these subregions, countries are confronting the challenge of addressing rigid energy markets, building resilient and efficient transmission infrastructure, and strengthening policymaking, governance, and technical capacity in the energy sector.

NBR would like to express its immense gratitude to ERIA and the Energy Research Institute Network (ERIN) for their continuing support and dedication to promoting collaborative research that improves regional energy access and security. In particular, Shigeru Kimura and Han Phoumin of ERIA contributed insightful comments on an earlier draft and provided expert guidance throughout the project. Finally, the work of project advisers Mikkal Herberg and Clara Gillispie was instrumental in the successful execution of the project.

Ashley Johnson

Director, Energy and Environmental Affairs, NBR

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Investments in Energy Transition

Strengthening the Power Sector in South and Southeast Asia

*Clara Gillispie, Ashley Johnson, Thomas Lutken,
and Micah Sindelar*

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EXECUTIVE SUMMARY

This report explores key challenges and strategic opportunities for strengthening the power sector in South and Southeast Asia and considers options for greater U.S., Japanese, and East Asia Summit engagement in this process.

MAIN ARGUMENT

Demand for electricity is rising in South and Southeast Asia at one of the fastest rates in the world. Yet questions remain about how regional countries might individually and collectively meet the requirements of growing demand while also navigating complex economic, environmental, and energy security considerations. Success will largely depend on the ability of countries to address unmet infrastructure, human capacity, and investment needs across the region and leverage existing and new opportunities for collaboration at the national, regional, and international levels.

POLICY IMPLICATIONS

- To strengthen human capacity and resources, three challenges will need to be addressed at the individual level: reluctance to change, the inability to acquire new knowledge and skills, and poor retention of trained employees.
- To mitigate localized risks and spur inbound investment in energy infrastructure and production, countries can take numerous steps to improve their market fundamentals. These include adopting a more open trade and investment policy for energy distribution, accelerating low-carbon investments via targeted activities in Covid-19 stimulus packages, and rethinking tax structures to focus on investment in cross-border energy infrastructure.
- Extraregional stakeholders such as the U.S. and Japan and regional forums such as the East Asia Summit can promote bilateral and multilateral coordination through expanded funding for soft loans, debt-swapping initiatives, and an enhanced blended financing scheme (e.g., combining philanthropic and private funds).

South and Southeast Asia are experiencing some of the fastest-growing electricity demand in the world. Between 2016 and 2050, the Institute of Energy Economics, Japan (IEEJ) estimates that electricity consumption in Southeast Asia will grow by roughly 245% to 2,093 terawatt-hours (TWh).¹ Meanwhile, in South Asia, India alone will increase its consumption by 3,992 TWh on its way to becoming an electricity market rivaling the United States in 2050.²

Finding ways to meet this demand is essential to sustaining economic development and improving standards of living in the region. Yet the ways in which countries might seek to address their demand requirements can also raise new market, geopolitical, environmental, and energy security concerns. This report is the product of a project conducted by the National Bureau of Asian Research (NBR) for the Energy Research Institute Network (ERIN) titled “Strengthening Emerging Asia’s Power Sector: Needs, Requirements, and Potential Roles for East Asia Summit Engagement.” Activities in this project were designed to explore key challenges and strategic opportunities for strengthening the outlook for power sectors in South and Southeast Asia with the aim of identifying potential roles for enhanced U.S., Japanese, and East Asia Summit engagement. What are the major risks and obstacles that South and Southeast Asian efforts face? How can stakeholders from a wide range of countries and professional backgrounds work together to catalyze inbound investment, promote market reforms, and heighten collective energy security? Who are the natural and necessary partners in this process?

Section one surveys major trends in regional demand for electricity, noting implications for efforts to strengthen the power sector in South and Southeast Asia. Section two then examines several specific concerns in greater depth, including questions about unmet infrastructure, human capacity, and investment needs. Building on this discussion, section three considers several national and multilateral strategies that align with these concerns and that might be amplified or further refined to better address the priorities of specific countries. The report concludes by considering policy options for new or enhanced East Asia Summit engagement.

South and Southeast Asia’s Growing Demand for Electricity

The projected growth of electricity demand in South and Southeast Asia tracks with the overall economic transformation of these subregions, with greater industrial activity, novel applications in agriculture and transportation, and rising per capita income spurring new consumption.³ However, as **Table 1** shows, drivers behind demand growth vary widely on a country-by-country basis. For some countries, such as India, Cambodia, Laos, and Myanmar, a key factor is the ongoing task of extending basic access to electricity to a sizeable share of the population. The Energy and Resources Institute (TERI) in India has done extensive research and modeling of demand for electricity and has noted that for India, in particular, electrification and transmission across states present an additional challenge when the states are at various stages of development.⁴ Other countries, such as

¹ Institute of Energy Economics, Japan (IEEJ), “IEEJ Outlook 2019,” October 2018, <https://eneken.iecej.or.jp/data/8122.pdf>.

² Ibid.

³ Shigeru Kimura and Han Phoumin, eds., “Energy Outlook and Energy Saving Potential in East Asia 2019,” Economic Research Institute for ASEAN and East Asia (ERIA), https://www.eria.org/uploads/media/0.Energy_Outlook_and_Energy_Saving_Potential_2019.pdf.

⁴ A.K. Saxena et al., “Transitions in Indian Electricity Sector 2017–2030,” TERI, February 2017, 3, <https://www.teriin.org/files/transition-report/mobile/index.html#p=3>.

TABLE 1 Access to electricity (% of population)

	1990			2000			2012			2018
Country	Rural	Urban	National	Rural	Urban	National	Rural	Urban	National	National
Cambodia	5.0	36.6	19.2	9.0	49.9	16.6	18.8	91.3	31.1	91.5
Myanmar	–	–	–	–	–	–	–	–	32.0*	66.3
Laos	39.7	100.0	51.5	40.0	68.7	46.3	54.8	97.9	70.0	97.9
Brunei	56.4	70.5	65.7	61.2	72.7	69.4	67.1	79.0	76.2	100.0
India	38.7	86.5	50.9	48.4	98.6	62.3	69.7	98.2	78.7	95.2
Indonesia	–	–	66.9	–	–	–	–	–	74.0**	98.5
Vietnam	84.5	100.0	87.9	86.6	96.9	89.1	97.7	100.0	99.0	100.0
Philippines	46.4	85.5	65.4	51.9	92.3	71.3	81.5	93.7	87.5	94.8
Malaysia	89.2	97.3	93.2	93.0	98.5	96.4	100.0	100.0	100.0	100.0
Singapore	99.0	100.0	100.0	99.0	100.0	100.0	99.0	100.0	100.0	100.0
Thailand	82.0	75.2	80.0	87.0	72.6	82.5	99.8	100.0	100.0	100.0
Australia	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
China	92.0	100.0	94.2	95.3	100.0	98.0	100.0	100.0	100.0	100.0
South Korea	92.0	95.0	94.2	95.3	98.7	98.0	100.0	100.0	100.0	100.0
Japan	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
New Zealand	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
United States	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: World Bank, “World Development Indicators,” 2021; and Kimura and Han, “Energy Outlook and Energy Saving Potential in East Asia 2019.”

NOTE: Asterisk indicates the number was taken from the presentation of Khin Saint Wint, Renewable Energy Association of Myanmar, 2014. Double asterisk indicates the number was taken from ASEAN Center for Energy, “ASEAN Guideline on Off-grid Rural Electrification Approaches,” 2013.

Indonesia and Vietnam, are closer to or have already achieved universal access to electricity but are nonetheless undergoing robust economic growth or other demographic changes that are adding to total demand requirements.

Meanwhile, the fact that the level of national development, population size, and patterns in consumption vary widely between countries means that not all of these changes equally shape regional outlooks. For example, as of 2020, over 80% of total electricity demand in Southeast Asia came from just four countries: Indonesia, Vietnam, Thailand, and Malaysia. Looking out to 2050, this imbalance is expected to continue, though with Malaysia’s and Thailand’s relative weight diminishing and the Philippines’ growing.⁵ Similar trends can be observed in South Asia, where demand from India dramatically outstrips that of its neighbors (though greater

⁵ Kimura and Han, “Energy Outlook and Energy Saving Potential in East Asia 2019.”

demand requirements from a growing Pakistan and a geographically small yet densely populated Bangladesh are expected by midcentury).⁶

Keeping in mind this level of subregional variation, two general observations about the outlook for power sectors in South and Southeast Asia should be noted at the outset. The first is that for many countries' economies, a first-order challenge remains securing reliable and affordable access to necessary energy supplies. For several countries—particularly in Southeast Asia—this also means grappling with the implications of shifting trade dynamics and becoming a net importer for the first time in history.⁷ The rise of national strategies to achieve carbon neutrality by midcentury also poses new questions for how countries will source their energy and power needs. Such dynamics can create anxieties that, if not well-managed, could further contribute to rising resource nationalism and geopolitical tension.⁸ Moreover, with major cities across the region experiencing rapidly worsening air pollution, many South and Southeast Asian governments are increasingly interested not only in securing more energy supplies but also in revisiting their strategies for managing energy demand and CO₂ emissions.

The second observation is that booming electricity demand has already put immense pressure on existing power grids and transmission infrastructure, at times triggering blackouts in countries such as India, Thailand, and the Philippines.⁹ Research suggests that much of the socioeconomic benefit of electrification depends on the quality of electricity, which underscores the need to improve power infrastructure.¹⁰ While such strains are not exclusive to developing Asia, the Asian Development Bank (ADB) and other stakeholders have long warned that the region is likely to disproportionately experience the worst effects of global climate change. In particular, increasingly frequent droughts can reduce hydroelectric potential, while the destruction caused by earthquakes, cyclones, and other natural disasters can exacerbate existing stresses on power-sector infrastructure.¹¹ Consequently, for many countries in the region, strengthening access to electricity will require not only the construction of new infrastructure but also improvements to the overall sustainability, health, and resilience of existing systems.

Thus, power-generation requirements in the Indo-Pacific raise important economic, environmental, and even geopolitical questions that will need to be addressed by national- and regional-level decision-makers in any comprehensive, long-term development strategy. The next section explores these questions in the context of four key strategic challenges for the region.

⁶ Robert F. Ichord, "Transforming the Power Sector in Developing Countries: Geopolitics, Poverty, and Climate Change in Bangladesh," Atlantic Council, January 9, 2020, <https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/transforming-the-power-sector-in-developing-countries-geopolitics-poverty-and-climate-change-in-bangladesh>.

⁷ While India and increasingly the Association of Southeast Asian Nations (ASEAN) are key drivers of the global expansion in the deployment of renewable energy, the overall level of unmet need in the subregion is such that the International Energy Agency (IEA), ERIA, and other organizations have estimated that demand for virtually all fuels and technologies will still likely grow.

⁸ Clara Gillispie, "U.S.-Australia Energy Cooperation in the Indo-Pacific," National Bureau of Asian Research (NBR), January 10, 2020, <https://www.nbr.org/publication/u-s-australia-energy-cooperation-in-the-indo-pacific>.

⁹ Fan Zhang, *In the Dark: How Much Do Power Sector Distortions Cost South Asia?* (Washington, D.C.: World Bank, 2019), <https://openknowledge.worldbank.org/bitstream/handle/10986/30923/9781464811548.pdf>.

¹⁰ Ujjayant Chakravorty, Martino Pelli, and Beyza Ural Marchand, "Does the Quality of Electricity Matter? Evidence from Rural India," *Journal of Economic Behavior and Organization* 107 (A) (2014): 228–47, <https://www.sciencedirect.com/science/article/pii/S0167268114001164?via%3Dihub>.

¹¹ Asian Development Bank (ADB), *Climate Risk and Adaptation in the Electric Power Sector* (Mandaluyong City: ADB, 2012), <https://www.adb.org/sites/default/files/publication/29889/climate-risks-adaptation-power-sector.pdf>.

Four Key Challenges for National Development Efforts

Achieving the Right Power Mix

As of 2020, coal, natural gas, and hydropower dominate power-generation mixes in much of South and Southeast Asia, with many countries disproportionately reliant on coal.¹² **Table 2** provides a breakdown of the power mix for each East Asia Summit country. In the face of rising energy demand, there are renewed concerns about carbon emissions, climate change, and sustainability, with several countries and regional forums outlining ambitious plans to radically reshape regional power mixes. The members of the Association of Southeast Asian Nations (ASEAN), for example, have agreed to a collective target of generating 23% of the region's primary energy supply from renewable energy sources by 2025. Meanwhile, virtually all East Asia Summit members in South and Southeast Asia have articulated plans to increase their natural gas consumption, either as a means of reducing reliance on less desirable forms of power or as a baseload energy source that helps alleviate concerns about the variability of wind and solar power.

What constitutes the right electricity mix will likely continue to vary by country, depending on national priorities, local conditions, and available resources. Expert participants at a workshop co-convened by NBR and ERIN in early 2021 noted that while major market shifts have had a profound impact on the potential availability and affordability of a range of energy supply options, regional capacity to capitalize on these opportunities is often deeply constrained.¹³

Key challenges in South and Southeast Asia generally and for emerging economies specifically include rigid, opaque, and uncompetitive energy markets, particularly for natural gas and renewables; unresponsive pricing arrangements; and weak policymaking and governance in the energy sector. On the issue of governance, Mikkal Herberg noted at the NBR-ERIN workshop that bureaucratic, state-dominated energy sectors often lack transparency in decision-making. This can undercut signals to investors in the private sector and other domains on the benefits of eschewing investments in dirtier (yet easier and faster to scale) sources in favor of cleaner alternatives that may only be viable under certain legal, regulatory, or market conditions.

Nonetheless, if not well orchestrated, new national policies or reform efforts may invite their own challenges. As a recent NBR report observed, “although some Asian markets have moved toward greater deregulation and liberalization, various rates of reform pose new risks for outside investors.”¹⁴ Dramatic, unexpected changes in price subsidies or other sectoral regulations, for example, may risk overheating markets or cause other unintended effects. To reduce air pollution, Beijing in 2016 mandated a shift toward natural gas use in heating and cooking, which was an important reform for transitioning the country away from coal use. However, the resulting increase in demand was not met with an increase in natural gas supplies. When faced with a cold winter in 2017 and spiking demand for heating fuel, there was a shortage of natural gas, which marked a major failure of social and energy policy. As participants at the NBR-ERIN workshop discussed, stable and reasonable prices are a prerequisite for liquefied natural gas (LNG) to remain competitive with coal. South and Southeast Asian countries have called for international

¹² India, for example, generates roughly 70% of its electricity from coal-fired plants. IEA, “Coal Demand by Region and Scenario, 2018–2040,” <https://www.iea.org/data-and-statistics/charts/coal-demand-by-region-and-scenario-2018-2040>.

¹³ The workshop was part of a larger project conducted by NBR for ERIN titled “Strengthening Emerging Asia’s Power Sector: Needs, Requirements, and Potential Roles for East Asia Summit Engagement.” Hosted in January 2021 over two days, it convened experts from across South and Southeast Asia, as well as from Japan and the United States, to discuss and identify key challenges for power-sector growth.

¹⁴ Mikkal E. Herberg and Ashley Johnson, “Introduction,” in “Powering Southeast Asia: Meeting the Region’s Electricity Needs,” NBR, NBR Special Report, no. 89, December 2020, https://www.nbr.org/wp-content/uploads/pdfs/publications/sr89_poweringsoutheastasia_dec2020.pdf.

TABLE 2 Existing installed energy capacity (% of energy mix)

Country	Coal	Gas	Oil	Hydropower	Small-scale hydropower	Biomass	Geothermal	Renewables	Nuclear	Other
Brunei (2017)	–	99.0	0.5	–	–	–	–	0.5	–	–
Cambodia (2020)	30.2	–	2.5	62.3	–	–	–	3.5	–	1.5
Indonesia (2018)	57.0	29.0	1.6	–	–	–	–	12.4	–	–
Laos (2020)	19.0	–	–	79.0	1.0	1.0	–	–	–	–
Malaysia (2017)	44.0	38.0	1.0	16.0	–	0.5	–	0.5	–	–
Myanmar (2016)	3.0	35.6	1.0	60.3	–	–	–	0.1	–	–
Philippines (2017)	50.0	22.0	4.0	10.0	–	1.0	11.0	1.0	–	1.0
Singapore (2017)	1.3	94.9	0.7	–	–	0.5	–	0.3	–	2.3
Thailand (2018)	18.0	57.0	1.0	5.0	–	–	–	19.0	–	–
Vietnam (2018)	38.0	15.0	–	35.0	6.0	–	–	6.0	–	–
India (2019)	71.0	4.5	0.5	10.9	–	2.9	–	7.3	2.9	–
China (2019)	64.6	3.3	0.1	17.3	–	1.6	–	8.4	4.6	–
Japan (2019)	31.6	33.9	4.8	8.8	–	4.1	0.3	8.2	6.4	1.9
South Korea (2019)	40.3	26.0	2.5	1.2	–	1.8	–	2.7	25.1	0.4
Australia (2019)	58.4	20.0	1.9	6.1	–	1.3	–	12.3	–	–
New Zealand (2019)	5.2	13.0	–	57.2	–	1.4	17.8	5.3	–	0.1
United States (2019)	24.2	37.4	0.8	6.8	–	1.7	0.4	9.2	19.3	0.1

SOURCE: IEA country profiles; “ERIA 2020 Outlooks for Individual Countries”; and “Mekong Infrastructure Tracker.”

NOTE: All values are rounded up. Information for Cambodia, Laos, and Vietnam is installed capacity. This table is based on Courtney Weatherby, “Renewable Energy in Southeast Asia,” in “Powering Southeast Asia,” 16.

cooperation between governments and private firms to stabilize prices, given that regional demand for LNG is expected to increase over the coming decades.

Workshop participants also noted the imperative for countries to prepare their power sectors for “prosumers”—electricity consumers that could also produce their own electricity. Whether from solar panels on homes or batteries in vehicles, electrical grids will need new market rules and management mechanisms to handle the two-way flow of power. As developing Asia improves and expands its electrical power grid, countries should consider the importance of this evolving relationship between the utility and electricity consumers in order to realize all the benefits of a smart and fully integrated grid.

More complicated to address is that some means of improving the region’s energy security may only be viable if several countries move in tandem. Obstacles include ongoing regulatory and technical harmonization issues, which continue to impede greater cross-border trade in electricity. This is not to say that the region is not actively working to overcome these challenges: the Laos-Thailand-Malaysia power interconnection project and several initiatives within the UN Economic and Social Commission for Asia and the Pacific represent success stories that should be viewed as models for deepening regional integration and strengthening shared governance norms. However, success also is defined by how countries and the region as a whole achieve stated targets. In this case, infrastructure is key to both short-term and long-term success.

As countries strive to maximize the role for cleaner and zero-emission energy sources in their power mix, increased reliance on variable wind and solar inputs also raises distinct challenges that should be factored into policy planning. Managing sudden surges or drops in electricity production due to weather events can be a challenge for grid and power plant operators already struggling to maintain consistent power supply (and may even result in higher costs or unintended reliance on inefficient backup power).¹⁵ Although some of these management challenges may need to be addressed with new and more advanced infrastructure (as will be explored later), levels of wind and solar energy penetration that exceed much of what currently exists in the region are possible without significant upgrades to the grid or breakthroughs in battery storage.¹⁶

However, expanding the use of these resources may require greater support for various tools that can strengthen energy policy. For example, improved weather forecasting is needed so that planners can better predict conditions that may affect either overall electricity demand or wind and solar supply. Alongside this tool, actions such as the full implementation of planned and proposed energy efficiency and conservation measures could help reduce and manage overall demand growth.

Supporting High-Quality Infrastructure

Success in achieving the right electricity mix will be closely linked to how well countries across South and Southeast Asia are able to scale up a wide range of associated power-sector infrastructure. High-quality infrastructure is economically viable, reliable, and environmentally sustainable infrastructure that utilizes the best technology available and follows international safety and efficiency standards. Such infrastructure should advance long-term development goals, have minimal environmental impact, and help build capacity.

¹⁵ See Courtney Weatherby, “Renewable Energy in Southeast Asia,” in “Powering Southeast Asia.”

¹⁶ Ibid.

High-quality infrastructure includes more reliable transmission and distribution systems (to enable greater integration of variable energy resources), more advanced thermal-fired power plants (to support cleaner, more efficient consumption of coal and natural gas), and other enabling physical infrastructure (such as receiving terminals, pipelines, transportation, and storage for moving LNG and other supplies to where they are needed). As suggested earlier, in tandem with upgrading existing systems, overall capacity across much of the region will also need to rapidly expand. The International Energy Agency (IEA) estimates that India, for example, will likely see electricity demand increase 5% a year to 2040, doubling overall demand.¹⁷

Yet even though “there is a clear need for resilient energy infrastructure in the region, policy measures and actions undertaken to build high-quality infrastructure have varied from country to country,” as energy specialist Han Phoumin noted in an NBR report.¹⁸ One explanation is that “quality” infrastructure projects are often better positioned to compete against less sustainable alternatives in more liberalized markets, due to their lower barriers to market entry. Consequently, several participants at the NBR-ERIN workshop noted that a range of steps toward market liberalization—such as reducing the monopolies of state-owned enterprises in the power sector, reforming market-distorting subsidies, and ensuring third-party access to distribution networks and other infrastructure—could lower barriers to market entry for quality infrastructure projects.¹⁹

Along these same lines, participants argued that moving to a greener grid also likely requires the introduction of new business models for infrastructure development. Questions of how to appropriately navigate competing goals for the management of land resources can be especially complex. One of the largest risks to breaking ground on new energy projects in Asia is related to land acquisition and property rights. By establishing land trusts, owners can retain their land but lease it to infrastructure companies that are interested in building exploration or transmission projects.

Attracting Critical Investment

In line with realizing the above goals, the ADB estimates that the Asia-Pacific region will require \$1.7 trillion per year in energy infrastructure investments through 2030, with more than half of the total need in the power sector. Moreover, the Economic Research Institute for ASEAN and East Asia (ERIA) projects that investment in ASEAN’s refineries and LNG terminals alone will require as much as \$226 billion and \$28 billion, respectively, between now and 2040.²⁰ For example, for Indonesia to meet its 2025 target for 23% renewables in its energy mix, the country needs an estimated \$13 billion in renewable energy investments per year for the next six years and a total of \$154 billion in the power sector more broadly to meet generation capacity targets.²¹

Bridging the gap between confirmed and necessary investment in regional energy supply and infrastructure has been a long-standing challenge in much of South and Southeast Asia—one that

¹⁷ IEA, “India Energy Outlook 2021,” March 2021, <https://www.iea.org/reports/india-energy-outlook-2021/fuels-and-electricity-in-india#abstract>.

¹⁸ Han Phoumin, “The Need for Quality Infrastructure to Meet Rising Energy Demand in the ASEAN Region,” in “Powering Southeast Asia,” 40.

¹⁹ For further discussion, see Jeanne Choi, “Developing Free and Open Markets: Gas Market Reform in Japan and South Korea,” in “Revolutionizing LNG and Natural Gas in the Indo-Pacific,” NBR, NBR Special Report, no. 81, October 2019, <https://www.nbr.org/publication/developing-free-and-open-markets-gas-market-reform-in-japan-and-south-korea>.

²⁰ Kimura and Han, “Energy Outlook and Energy Saving Potential in East Asia 2019.”

²¹ U.S. International Trade Administration, “Renewable Energy—Indonesia, Market Trends,” <https://www.trade.gov/energy-resource-guide-indonesia-renewable-energy>; and ADB, *Indonesia Energy Sector, Assessment, Strategy, and Road Map: Update* (Mandaluyong City: ADB, 2020), 3, <https://www.adb.org/sites/default/files/institutional-document/666741/indonesia-energy-asr-update.pdf>.

has been further complicated by disruptions brought on by the Covid-19 pandemic. The dramatic reduction of economic activity (and resulting decline in private-sector capital spending) and new demands on public funds for health and social welfare have significantly restricted the funding available to stimulate investment in energy projects. In its October 2020 assessment, the IEA stated that fuel supply investment has been hit the hardest. Upstream oil and gas spending has decreased by 35% overall, while investment from large oil and gas companies has declined by 25%. Additional losses have included a 7% decline in power-generation investment and a 9% decline in energy efficiency improvements, among other areas.²² Such trends have negatively affected the Asian green bond market, in particular, with potential longer-term consequences for when or if planned clean energy projects might be brought online.

Yet, as noted by Herberg, there are still many options available to help bridge the investment gap. Pension funds, insurance companies, large investment funds, sovereign wealth funds, and global energy companies continue to look for bankable energy infrastructure investment opportunities. To that end, governments can take several steps to mitigate localized investment risk and improve their country's market fundamentals. These include adopting a more open trade and investment policy in energy distribution, providing a more favorable environment for institutional investors and bond market players, accelerating low-carbon investments through targeted stimulus packages, and revisiting the tax structure on investment in cross-border energy infrastructure. In addition, fiscal and nonfiscal incentives, such as streamlining licensing processes and providing tax holidays, could be considered to boost the attractiveness of these projects. As IEA concluded in its October 2020 outlook, a focus on value and quick delivery, as well as environmental gains, could provide an opening for heightened utilization of cleaner technologies.²³ However, in order to fully integrate and deploy new technologies into existing energy systems, the right personnel are needed to execute these efforts.

Strengthening Human Capacity

The prior challenges have largely focused on the need for new physical systems, energy supplies, and financial resources. Yet, as the preceding analysis has implied, weak governance over the generation and delivery of electricity is also undercutting South and Southeast Asian countries' development ambitions. As one measure of this impact, the World Bank estimates that distortions in South Asia's power sector are decreasing the subregion's GDP by 4%–7%.²⁴ Human capacity shortfalls also have discouraged more aggressive adoption of renewable energy, thereby undercutting the shift toward clean energy. One study estimates that around 375 million workers globally will need to reshape or improve their skills in the next decade as a result of automation and other technological advances.²⁵ As countries in developing Asia seek to expand and upgrade their power sectors, they must prepare for this coming shift in the labor market. Lags in skill training and other forms of knowledge transfer, for example, have contributed to misconceptions among grid operators about existing means for managing variable energy sources.

²² IEA, "Investment Estimates for 2020 Continue to Point to a Record Slump in Spending," October 23, 2020, <https://www.iea.org/articles/investment-estimates-for-2020-continue-to-point-to-a-record-slump-in-spending>.

²³ IEA, "World Energy Outlook 2020," <https://www.iea.org/reports/world-energy-outlook-2020>.

²⁴ Zhang, *In the Dark*.

²⁵ James Manyika et al., "Jobs Lost, Jobs Gained: What the Future of Work Will Mean for Jobs, Skills, and Wages," McKinsey Global Institute, November 28, 2017, <https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages#>.

Strengthening local and national capacities for managing the power sector is thus critical to how South and Southeast Asia might be able to navigate (and take advantage of) recent market and technological breakthroughs. Energy storage, increased use of digitization, and smart grid technologies hold immense promise for transforming the power grid, but this process must begin at the training and development level. These technologies can only work effectively when operated by well-trained workers and incorporated under the clear direction of policymakers.

As a starting point, government should promote skill training and people-people exchange on a wide range of topics, such as technical information, regulatory best practices, and operational management. Universities play an important role in bridging the gap between the science and policy realms, particularly through public-private partnerships. Successful partnerships can synchronize the research vision of a public university with the viability of a private-sector business and establish trust between partners.

These efforts to improve training and development should be complemented by greater access to and investment in local datasets and technical resources, which provide stakeholders in the power sector with critical decision-making tools. Developing Asia is home to a wide range of economies and a correspondingly wide range of power sector needs. Collaboration and data sharing will be key to realizing all the benefits that regional integration can bring, especially for electricity grids that span international boundaries, such as the proposed ASEAN power grid. Building a generalized, multilateral power market in the region will mean expanded institutional capacity and updated training as much as grid harmonization and other engineering requirements.

In terms of how these activities are executed, acknowledging the human element in capacity development is critical. More specifically, well-designed initiatives must take into account factors such as an individual's or a group's potential resistance to change. Examples include the reluctance of experienced workers to learn new systems and institutional inertia when moving to a market-based power sector. The ability of operators and bureaucrats to acquire new knowledge and prepare for turnover among talented, highly competitive employees is another important factor. Institutional-level programs that focus on shifts in organizational culture and management—for example, that help identify and support new talent and provide opportunities for mentoring—can yield significant, longer-term dividends that go beyond any one area of competency or skill set.

Finally, human capital development needs to be understood as an ongoing process rather than a series of one-off events. Providing initial training is important, but ensuring that knowledge and new techniques are absorbed and implemented requires follow-up actions. The accelerating pace of sector transformation also presents an ever-changing challenge. In the near term, the impetus will largely lie in training those already on the job by focusing on new skills such as the ability to understand systems in real time, route supplies to where they are needed, and better integrate new technical knowledge. In the long term, new technologies will need to be integrated into early education, while larger training sessions should be held to adapt and transition existing skill sets across industries. Countries like the United States and Japan, as well as international organizations, can serve as models of successful modernization, bringing high-level and technical exposure to how these investments would benefit developing Asia.

Promoting Collective Energy Security through Regional Collaboration

While many of the efforts above could be championed by stakeholders operating within a single country, some of the more ambitious plans for strengthening power-sector outlooks may only be viable or reach critical mass when executed in tandem with partners. For example, although an ASEAN power grid could greatly contribute to the region's energy security, it would require several countries to harmonize their technical standards and coordinate various market and policy reforms.

Over the past decade, several new regional and minilateral initiatives in the Indo-Pacific have been established to achieve the above goals. These include nationally championed initiatives that incorporate significant elements focused on energy and infrastructure, such as Japan's and the United States' Indo-Pacific strategies, South Korea's New Southern Policy, and China's Belt and Road Initiative; bilateral efforts, such as the Japan-India Energy Dialogue and the Japan-U.S. Clean Energy Partnership (JUCEP, formerly the Japan-U.S. Strategic Energy Partnership); and minilateral initiatives, such as the Japan-U.S.-Australia Trilateral Infrastructure Partnership and ASEAN's Outlook on the Indo-Pacific. Many of these initiatives have sought to overcome specific obstacles or bottlenecks in power-sector development through support from the public and private sectors to catalyze investment in new supplies, technologies, and infrastructure.²⁶ As of February 2021, Japan has committed \$20 billion in financing for LNG development as part of JUCEP. It also aims to mobilize \$200 billion for the Expanded Partnership for Quality Infrastructure Initiative and increase its relationship with the United States' International Development Finance Corporation.²⁷ The creation of the International Development Finance Corporation expanded funding authority for up to \$60 billion and replaced the Overseas Private Investment Corporation.²⁸

Several initiatives have also focused on promoting and advancing standards that support the development of high-quality infrastructure. Notable among these has been a trilateral initiative supported by the United States, Japan, and Australia known as the Blue Dot Network, which is a "multi-stakeholder initiative...to promote...trusted standards for global infrastructure development in an open and inclusive framework."²⁹ According to the U.S. State Department, the Blue Dot Network "builds on the success of Japan's G-20 leadership in building consensus on the Principles for Quality Infrastructure Investment."³⁰ Although minimal progress has been made thus far, the initiative is open to other countries that similarly prioritize investment in high-quality infrastructure. South Korea is one example of a country whose efforts to achieve carbon neutrality and a circular economy will both better utilize existing infrastructure and resources and identify ways to ensure that new projects meet the criteria for green growth.

Looking to address larger structural challenges with investment in high-quality infrastructure and the expansion of energy access more broadly, the United States and Japan issued a joint statement on the one-year anniversary of the Japan-U.S.-Mekong Power Partnership (JUMPP),

²⁶ Mikal E. Herberg, "High-Quality Infrastructure and the Free and Open Indo-Pacific Vision," in "Powering Southeast Asia."

²⁷ Japan Bank for International Cooperation, "JBIC Signs MOU with U.S. International Development Finance Corporation: Strengthening Cooperation for Promoting Collaborative Project between Japan and United States in a Wide Range of Regions and Sectors," January 14, 2021, <https://www.jbic.go.jp/en/information/press/press-2020/0114-014177.html>.

²⁸ U.S. International Development Finance Corporation, "U.S. International Development Finance Corporation Begins Operations," January 2, 2020, <https://www.dfc.gov/media/press-releases/us-international-development-finance-corporation-begins-operations>.

²⁹ Herberg, "High-Quality Infrastructure and the Free and Open Indo-Pacific Vision."

³⁰ U.S. Department of State, "Blue Dot Network," <https://www.state.gov/blue-dot-network>.

in which they pledged their continued support for cross-border power trade and emphasized the importance of optimizing the use of regional energy resources. This commitment could prove critical to the success of renewables and LNG in the region.³¹ Meanwhile, the two countries have jointly held workshops in various parts of Southeast Asia over the course of the past three years, including workshops on energy infrastructure in Ho Chi Minh City in December 2018 and on LNG in Jakarta in March 2019.³² Alongside these events, they have established people-to-people exchange programs, academic scholarships (such as those convened by the Japan International Cooperation Agency), and other mentoring opportunities (such as NBR's Asia EDGE fellowship program) to support the next generation of energy security specialists in South and Southeast Asia.

Japan's free and open Indo-Pacific concept has positively contributed to efforts to increase digital connectivity, build infrastructure, and improve energy security in South and Southeast Asia through several means (including via cooperation with the United States and Australia). Yet more can be done by both Japan and the United States to amplify existing regionally led frameworks within these initiatives in order to better respond to regional interests.

ASEAN, for example, is crafting a strategy to embrace new technologies and modernize energy systems in line with accelerating actions on climate change, which could be amplified by the Biden and Suga administrations. Meanwhile, several countries (including Indonesia and Thailand) have detailed additional priorities for strengthening bilateral and multilateral coordination to develop the power sector within Southeast Asia. These include multilateral funding for soft loans, bilateral investment schemes, debt-swapping initiatives, and a blended financing scheme (e.g., utilizing both philanthropic and private funding). In terms of capacity building, the ASEAN Declaration on Human Resources Development provides one template for moving forward. The document emphasizes vocational and educational skills for technology development and adaptation, charts pathways for more inclusive education and employment opportunities, and matches existing and potential skill sets to growing areas of need through public-private partnerships.³³

Beyond ASEAN, the East Asia Summit is another tool for bringing together stakeholders from countries across the region to share best practices for stimulating reforms and mitigating impacts on vulnerable communities. Other regional forums that could play a constructive role in this process are the East Asia Summit's Energy Cooperation Task Force and ERIN, both of which have regularly operated in similar roles.

Conclusion

The success of efforts to strengthen outlooks for the power sector in South and Southeast Asia will ultimately depend on three key conditions: (1) expanding intraregional capacity to leverage and mobilize large amounts of capital, (2) improving national- and regional-level energy policymaking and sector-management tools, and (3) reducing barriers to greater regional trade and integration. The third condition is critical for enabling individual countries to better take

³¹ "Japan-U.S. Joint Ministerial Statement on Japan-U.S.-Mekong Power Partnership (JUMPP)," U.S. Department of State, September 2020, <https://www.state.gov/japan-u-s-joint-ministerial-statement-on-japan-u-s-mekong-power-partnership-jumpp>.

³² Ministry of Foreign Affairs (Japan), "Factsheet: Recent Efforts of Japan and the United States in Energy, Digital and Infrastructure Sectors toward Achieving a 'Free and Open Indo-Pacific,'" <https://www.mofa.go.jp/files/000482895.pdf>.

³³ For the full declaration, see ASEAN, *ASEAN Declaration on Human Resources Development for the Changing World of Work and Its Roadmap* (Jakarta: ASEAN Secretariat, 2019), https://asean.org/storage/ASEAN-Declaration-on-Human-Resources-Development-for-the-Changing-World-of-Work-and-its-Roadmap_Final_19Feb2021.pdf.

advantage of existing supply diversification and achieve a balanced power mix that does not rely solely on fossil fuels.

Progress toward meeting each of these conditions could be significantly accelerated via greater engagement through the East Asia Summit. For the first and third conditions, in particular, success will likely depend on the pace of energy market reform. This presents a challenge for policymakers, as many reforms will require considerable social and political capital. Consequently, the East Asia Summit can play a key role in helping amplify, support, and champion ongoing reform efforts both by directly engaging with individual countries and by supporting multilateral coordination on sequenced reforms. This includes support for targeted reforms, such as reducing or eliminating fuel subsidies, as well as for larger reforms, such as ending state-backed monopolies, curbing industry and government corruption, and improving overall market transparency.³⁴ Ongoing East Asia Summit initiatives to liberalize markets, discourage the politicization of energy, and strengthen regional energy architecture to reduce any one country's exposure to price or supply shocks should also be reinforced.

A key challenge will be coordinating such efforts to navigate on-the-ground realities and address specific needs and priorities identified by decision-makers in South and Southeast Asia. Regarding U.S. approaches, Nikos Tsafos notes that effective policies have included “a standardized checklist—a ‘gold standard’—that projects must meet in order to secure private investment or U.S. economic support.”³⁵ Early statements and executive orders by the Biden administration seem to suggest a different and potentially more challenging approach to promote green growth and climate mitigation as they relate to investment in fossil fuels. For example, the American Jobs Plan prioritizes infrastructure investment in climate-friendly transportation alternatives and builds community resilience through more green spaces and programs for waste reduction.³⁶ An executive order on January 20 more explicitly limited domestic development of fossil fuels by pausing new oil and gas development and leases on federal lands.³⁷

Although such standards and policies are important, in practice they often exclude countries from participating in initiatives or receiving support. As Tsafos argues, technical assistance can help a country meet that gold standard, but a more flexible approach could free up more capital and come closer to meeting the on-the-ground needs in South and Southeast Asia. In the United States, the Biden administration's recommitment to global efforts to combat climate change and achieve sustainable energy access has encouraged new public and private opportunities for collaboration on development of clean energy supplies. Moving forward, better integrating national priorities into regional and international strategies and initiatives will ensure that standards for investment in energy and power-sector projects align with what is both desirable and feasible.

³⁴ Gillispie, “U.S.-Australia Energy Cooperation in the Indo-Pacific.”

³⁵ Tsafos, “The Outlook for Power Generation in Southeast Asia and the Geopolitics of the Indo-Pacific,” in “Powering Southeast Asia,” 11.

³⁶ “Fact Sheet: The American Jobs Plan,” White House, March 31, 2021, <https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/31/fact-sheet-the-american-jobs-plan>.

³⁷ “Executive Order on Protection Public Health and the Environment and Restoring Science to Tackle the Climate Crisis,” White House, January 20, 2021, <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-protecting-public-health-and-environment-and-restoring-science-to-tackle-climate-crisis>.



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