

Powering progress in Southeast Asia's renewables development

Southeast Asia needs to speed up renewable energy capacity additions to reach its ambitious net-zero goals. Trailblazing project developers have laid a path to success for investors.

By Vishal Agarwal, Antonio Castellano, Rahul Gupta, and Ricardo Reina



Southeast Asian countries are committed to decarbonizing their economies and reaching net zero in the coming decades. Between them, they aim to achieve net-zero emissions between 2050 and 2060.¹ This transformation will, by necessity, include a strong deployment of renewables. However, the boldness of these goals does not yet reflect in annual capacity additions. Economies in the region will have to drastically accelerate their renewables capacity to reach this goal on time. The region, therefore, is on the cusp of an important step change—and significant efforts can bring about this transformation.

Multiple factors, such as regulatory support mechanisms, grid investments, innovative service offerings, or technology developments, could go a long way to unlock the acceleration of renewable energy capacity additions. Some countries in the region—such as Malaysia, Singapore, and Thailand—have recognized the challenge and the opportunity and are proactively launching renewables-focused support programs. Others, such as Indonesia, the Philippines, and Vietnam are driving important integrated planning efforts to help ensure that deploying renewables does not compromise affordability and security of supply. Beyond these critical factors, there are also unique dynamics at play in the current market landscape. Renewables developers that are savvy enough to understand these dynamics and learn from early movers that have already succeeded in this arena could seize untapped opportunities.

In this article, we first highlight both the immense potential of renewables in Southeast Asia as well as various fundamental differences between its economies and others that are already further along the journey, such as those of the European Union and the United States. Solutions for Southeast Asian economies could do well if they are locally tailored. Second, we will shine a light on some insights and lessons learned from the experiences of developers that have played a role in accelerating and expanding the use of renewable energy in the region so far. Against this backdrop, we conclude by describing how renewable energy developers in Southeast Asia can further apply these lessons so their strategies are adapted to unique local needs, and so they can unlock opportunities and ultimately contribute to achieving the region's net-zero aspirations. Finally, it is important to mention that there are other key matters such as shifts in energy policies, grid investments, and regulatory or market mechanisms (which are also critical to enable renewables to scale in Southeast Asia) that are beyond the scope of this article but have been widely discussed in the discourse on this topic.



¹ "Growing ambition underpins ASEAN's net-zero targets," Energy Asia, 2023.

When Southeast Asia catches up, immense opportunities await

Southeast Asia has significant renewables potential to the tune of 16 terawatts (TW) of solar energy and 1 TW of wind (Exhibit 1).² Yet, over the past five years, the region has attracted the second-lowest level of investment in solar photovoltaic (PV) and wind power (second only to sub-Saharan Africa).³ This is largely due to policy uncertainty, limiting the opportunity for new greenfield projects and raising developers' risks resulting in a higher cost of capital, which negatively affects the competitiveness of renewables compared with fossil fuel-based power generation.

To achieve net-zero goals, annual renewable capacity additions must increase seven to 12 times for solar and onshore wind power in the region versus the 2018 to 2021 average,⁴ to about 36 GW per annum for solar PV and around 12 GW per annum for onshore wind for the period of 2030 to 2050 (Exhibit 2).⁵ Comparing these numbers to the regional governments' plans and targets by 2030, we expect most of this acceleration in renewable capacity additions to come post 2030. This long-dated transition poses a series of questions around the feasibility of the acceleration in the next decades and overall achievement of power sector decarbonization.

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² *Renewable energy outlook for ASEAN: Towards a regional energy transition* (second edition), International Renewable Energy Agency (IRENA), Abu Dhabi and Association of South East Asian Nations (ASEAN) Centre for Energy (ACE), Jakarta, 2022.

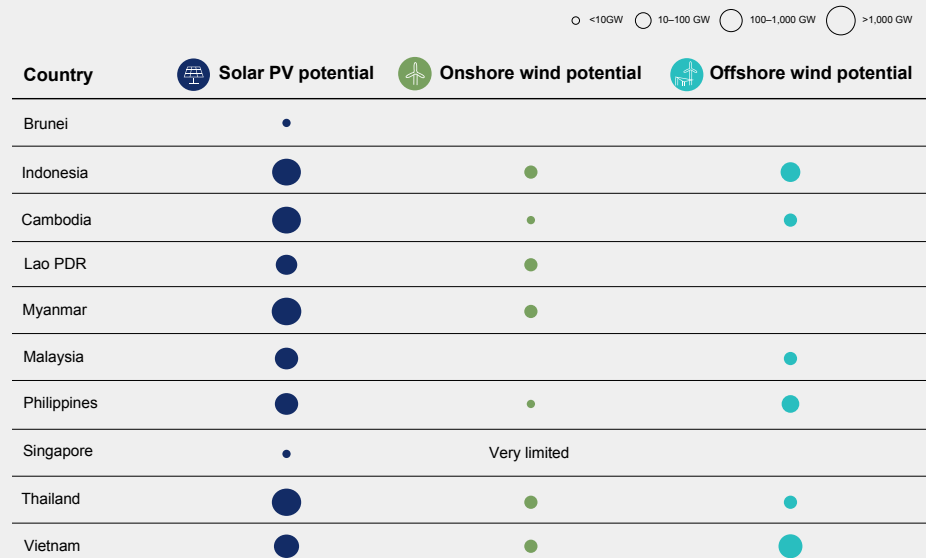
³ *ASEAN renewables: Opportunities and challenges*, International Energy Agency and Imperial College London, March 2023.

⁴ "Enerdata from Department Of Energy, Kementerian Energi dan Sumber Daya Mineral, International Renewable Energy Agency, and National Statistical Office," Enerdata, October 25, 2023.

⁵ "Global Energy Perspective 2023: Achieved Commitment Scenario," McKinsey, October 18, 2023.

Exhibit 1

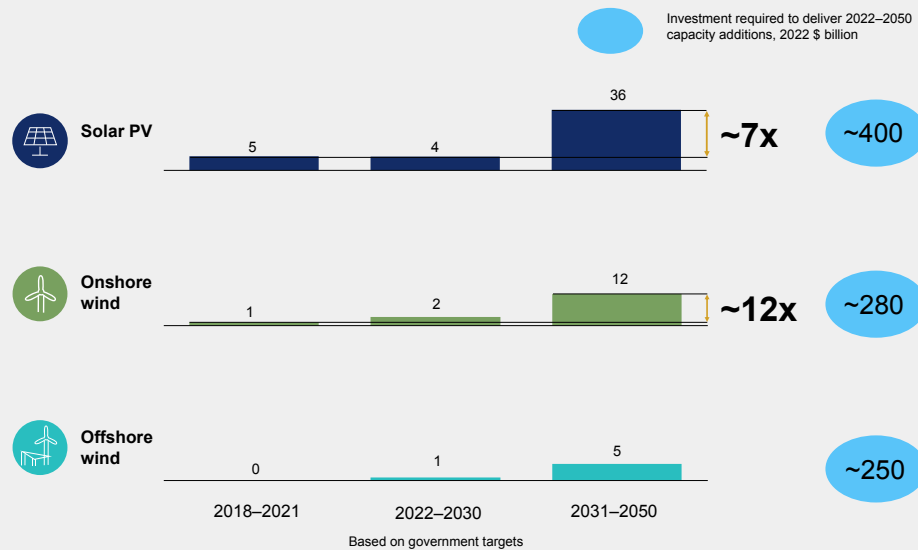
Southeast Asia's resources offer great renewables opportunities.



Source: Renewable Energy Outlook, IRENA, 2022

Exhibit 2

Average yearly capacity additions of renewable technologies in Southeast Asia. Gigawatts



Source: Government targets utilized for capacity additions (2022–2030) in Philippines Energy Plan 9 (2022–2040), Thailand (POP 2018 revision 1), Indonesia (RUPTL 2022–2030), Vietnam (POP 8 [15 May 2023]), decision 500/QDTT updated 15 May 2023, Malaysia (SEDA), and Singapore; Global Energy Perspective 2023: Achieved commitments scenario, McKinsey, October 2023.

Recognizing the untapped opportunities, some Southeast Asian countries have already designed programs to support the development of renewables. While some countries in the region have developed targeted programs (see section, “Examples of regional renewable aspirations and programs”), these plans have not translated into capacity additions at scale. There are several reasons for this.

First, Southeast Asia's markets only recently started adding renewables capacity at scale. As a result, they significantly lag other regions' markets. Non-firm renewable energy penetration, which includes solar and wind power, but excludes hydropower, was approximately 5 percent in 2022. This is similar to levels achieved by European countries such as Germany, Portugal, and Spain in 2003 to 2006.⁶

Furthermore, Southeast Asian countries have historically capitalized on their coal and gas endowments to produce cheap power from subsidized fossil fuels—with subsidies amounting up to 2.7 percent of GDP in a market such as Indonesia, for example.⁷ As a result, the region has among the youngest coal-based power-generation fleets in the world.⁸ Its power sector has nearly twice the emissions intensity of the European

Union and is 37 percent higher than that of the United States.⁹ Efforts to retire coal plants early in Southeast Asia are already under way and initiatives to accelerate this transition are being introduced—but will take a considerable amount of time to take effect.¹⁰

Escalating Southeast Asia's annual, newly installed renewable energy capacity—by seven to 12 times for solar and wind power—to reach its net-zero aspirations will require a coordinated effort. This could involve, for example, policy changes such as establishing higher short-term targets, which have not yet been fully realized. Support mechanisms may also be needed—for instance, feed-in tariffs (FITs) for new capacity additions. Lastly, industrialization of the whole renewable ecosystem, from manufacturing to operation and maintenance services, will be required to achieve scale.



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⁶ *Share of wind and solar in electricity production, World Energy & Climate Statistics—Yearbook 2023*, Enerdata, October 27, 2023.

⁷ *Energy transition in ASEAN*, European Union-Association of South East Asian Nations, April 5, 2023.

⁸ *Challenges and implications of coal phase-down to the ASEAN energy landscape*, Association of South East Asian Nations (ASEAN), Centre for Energy, January 31, 2022.

⁹ "Carbon intensity of electricity, 2000 to 2022," Our World in Data, 2022.

Examples of regional renewable energy aspirations and programs

Southeast Asia offers particularly interesting opportunities for international renewable energy developers.



Singapore

Currently, 95 percent of Singapore's power generation comes from imported natural gas.¹ While Singapore's land size limits the number of solar plants the country can deploy domestically, Singapore is committed to decarbonizing its grid. Under Singapore's multi-ministry Green Plan 2030, Singapore intends to import up to 4 GW of low-carbon electricity (an estimated 30 percent of projected electricity demand) from regional power grids by 2035, alongside its continued expansion of solar, energy storage, and low-carbon alternatives (including hydrogen).²

As a first step toward this, the Energy Market Authority (EMA) has undertaken various trials of 100-megawatt (MW) renewables imports from Indonesia, Lao PDR (through Malaysia and Thailand), and Malaysia.³ Mindful of its 2035 goal, EMA has awarded conditional approvals to potential projects importing of around 1 GW of electricity from Cambodia, around 2 GW from Indonesia, and around 1.2 GW from Vietnam.⁴

¹ "Natural gas," Energy Market Authority, August 16, 2023.

² *Green Plan: Energy reset*, Singapore Government, May 27, 2023.

³ "Singapore commences first renewable energy electricity import via regional multilateral power trade," Energy Market Authority, June 23, 2022.

⁴ "EMA grants conditional approval for 1 gigawatt of electricity imports from Cambodia," Energy Market Authority, March 16, 2023; ["EMA grants conditional approvals for 2 gigawatts of electricity imports from Indonesia,"](#) Energy Market Authority, September 8, 2023.

Malaysia

Malaysia aims to achieve 70 percent renewables in its power mix by 2050 at a cumulative investment of 637 billion ringgit (approximately \$135 billion) to 2050, which would increase the country's installed capacity by 11 times compared to 2023 levels.⁵

As of 2020, Malaysia's total power generation capacity amounted to 36.2 GW, with coal and natural gas predominantly driving this capacity, while renewable sources (excluding hydropower) accounted for approximately 4.5 percent of installed capacity.⁶

In recognition of the need for renewables, the government introduced a competitive bidding program in 2016 for companies looking to supply solar-generated energy.⁷ Over successive editions, large-scale solar (LSS) bidding has become increasingly competitive, being oversubscribed by between five and 13 times the auctioned capacity in the third and fourth bidding rounds.⁸ Lowest winning bid prices declined by 53 percent between the first (LSS1) and last (LSS4) bids, increasing the attractiveness of the technology compared to conventional power-generation sources.⁹ Since its introduction, the LSS scheme has become a key driver in boosting the share of renewable energy capacity in Malaysia, with a total of approximately 2.5 GW of project licenses awarded.¹⁰

Thailand

At the 2021 UN Climate Change Conference of the Parties (COP26) in Glasgow, Thailand committed to reach carbon neutrality by 2050 and net-zero greenhouse gas (GHG) emissions by 2065. To achieve its target, the share of renewable electricity generation in the country is expected to reach 74 percent by 2050.¹¹

As of 2021, Thailand's total installed electricity generation capacity was approximately 49 GW, with renewable sources contributing more than 11 GW (nearly 23 percent) of total installed capacity.¹²

To drive progress toward achieving the country's renewable targets, Thailand's Energy Regulatory Commission announced plans in 2022 to source renewable power under feed-in tariff schemes from 2024 to 2030.¹³ Under new renewable energy quota regulations, state distribution utilities have been purchasing targets of nearly 5 GW of wind, solar, and solar-plus-battery energy storage systems. Power purchase agreements (PPAs) are on offer, with terms ranging from 20 to 25 years, and at specified FIT rates. Applicants must be corporate entities registered in Thailand and with foreign shareholding of less than 49 percent.

⁵ Dollar conversion as of November 14, 2023; "Renewable energy capacity targeted at 70 percent by 2050," Malaysian Investment Development Authority (MIDA), May 9, 2023.

⁶ *Malaysia Energy Statistics Handbook*, Suruhanjaya Tenaga, 2021.

⁷ "Briefing session on the RFP for LSS PV plants 2017–2018," Suruhanjaya Tenaga, May 2016.

⁸ "Malaysian energy transition outlook," IRENA, 2023.

⁹ Based on lowest winning bid announced by Suruhanjaya Tenaga, assuming lowest cost bids chosen for 30–50 MW package in LSS1, 10–30 MW package (Peninsular Malaysia) for LLS2, 10–30 MW package for LLS4.

¹⁰ Kamarul Azhar, "Cover story: LLS4 awards: Boon or bane for winners?" *Edge Malaysia*, April 2021.

¹¹ *Thailand's long-term low greenhouse gas emissions development strategy* (revised version), Office of Natural Resources and Environmental Policy and Planning of Thailand, November 2022.

¹² "Thailand—commercial guide—energy," International Trade Administration, Department of Commerce, United States Government, July 2022.

¹³ *Global Compliance News*, "Thailand: The wait is over! New round of renewable energy auctions have officially been launched—bidding ends in November 2022," blog entry by Baker McKenzie, November 9, 2022.

Southeast Asian power markets are structurally unique

Given structural differences, we believe the region is unlikely to follow a similar pathway to other markets. Whereas generous subsidy schemes, stable regulatory frameworks, an ambitious decarbonization agenda, and private sector support drove the growth of the renewables sector in the European Union and North America, Southeast Asia's context is significantly different, with higher sensitivity in relation to tariff levels, a tighter regulatory framework, constraints on consumer choices, and more limited private sector participation.

1.

Low power tariff

Power tariffs in Southeast Asia are among the lowest globally, as local governments focus on affordability and local industries' competitiveness. Regional governments are trying to balance economic development (subsidizing fossil fuels and artificially lowering the cost of electricity generation) with renewables development to meet decarbonization targets.

We expect the renewable energy sector in Southeast Asia to grow exponentially, albeit on a different pathway from that of its counterparts in the European Union and the United States, requiring different playbooks and strategies for private players.

2.

Tighter regulatory frameworks

The difference in Southeast Asia's regulatory frameworks compared with other regions is reflected in power generation, which is still a largely regulated activity. Most markets in Southeast Asia have vertically integrated incumbents, with some degree of openness to independent power producers (IPPs) which rely on long-term contracts and capacity payments.

In contrast, generation markets in Europe operate in more liberalized and competitive wholesale markets, which allow for more rapid investment in new technologies and value pools to shift from conventional to renewable electricity generation. Should Southeast Asian countries express clear commitments and short-term targets, they could shift their energy mix while complying with existing contracts and avoiding building massive oversupply in the short to medium term.

The consumer segment—retail, commercial and industrial (C&I), and large consumers—also reflects the difference in regulatory frameworks. Southeast Asia has strong long-term sustainability targets and many consumers will likely be willing to accelerate the shift because of environmental consciousness or international commitments, such as the RE100 initiative (a commitment by companies to switch to 100 percent renewable energy) and the European Union's Carbon Border Adjustment Mechanism.

When Southeast Asian consumers are able to freely choose and procure "green energy", they could bring additional momentum in terms of a demand shift or push for green supply. For example, while consumers in Vietnam can for now only procure power from EVN, the incumbent power company, the country has for years been discussing the introduction of a direct PPA framework that would allow C&I consumers to contract directly with renewable electricity generators.¹¹

3.

Level of privatization

Most of the initial growth in the renewables sectors in the European Union and the United States was driven by private sector IPPs, often referred to as "disruptors."

In Southeast Asia, however, the market share and concentration of publicly owned utilities is significantly higher, which ensures stability but at the same time means that disruptors have yet to be able to shake up the sector and accelerate change.

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¹¹ "Vietnam set to open renewable energy market to PPAs," *PV Magazine*, October 27, 2022.

Key lessons learned from renewables developers

While no renewable energy player in Southeast Asia has yet developed at scale, there have been successes at other levels. Drawing on the experiences of these successful players, we observe vital practices that renewables developers in Southeast Asia could adopt to expand their regional renewable energy portfolios significantly.

Establish a strong local presence

Having a presence in the region is imperative. This allows renewables developers to be familiar with the local ecosystem along the renewables value chain, and to form connections with other companies and regulators, to get a better understanding of the state of the renewable energy industry and gain access to potential opportunities. Successful renewable energy developers also understand that there is no one-size-fits-all solution available across markets in Southeast Asia. A local presence and deep understanding of the different markets are therefore crucial to tap into growth opportunities. Building local teams, and developing and relying on local partnerships, is critical.

For example, Scatec, a Norwegian renewables developer, opened its Vietnam office in 2017, well ahead of the boom in capacity additions in 2019 to 2020 that positioned the country as a regional leader in renewables.¹² Having a local presence allowed Scatec to better understand both market nuances and its risk profile locally, and ultimately capture part of the renewable energy industry's

growth, as opposed to many other international renewable energy developers that have witnessed the developments from the sidelines. Other players, such as Vena Energy, have developed a hub and spoke model, centralizing some functions in their regional headquarters in Singapore and deploying local teams across markets in the region. Energy markets in Southeast Asia tend to move slowly until sudden regulatory changes create attractive investment opportunities. Those that have a well-established local presence—be they local firms or international developers with a local presence—may manage to capture most of the value from these changes.

In Vietnam, Sembcorp Industries signed a collaboration agreement in December 2021 to develop up to 1.5 GW in renewable energy projects with BCG Energy,¹³ a subsidiary of Bamboo Capital Group (a Vietnamese renewables, real estate, and infrastructure developer). While finding like-minded partners across borders is a big challenge, the benefits of combining local insights with international best practices make it worth the effort.

Similarly, ACWA Power, a leading Saudi-Arabian developer, investor, and operator of power generation, water desalination, and green hydrogen plants worldwide, signed a memorandum of understanding (MoU) with PT Perusahaan Listrik Negara (PLN), Indonesia's state-owned electricity provider, to investigate potential joint development of hydro, battery storage, and green hydrogen and ammonia projects in Indonesia.¹⁴

¹² For further information, please see Scatec's website, scatec.com.

¹³ "Sembcorp industries and BCG Energy sign collaboration agreement for up to 1.5GW of renewable energy projects in Vietnam," Sembcorp, December 2021.

¹⁴ "ACWA power to expand Indonesian portfolio via an extensive renewable energy and green hydrogen partnership with PR Perusahaan Listrik Negara (PLN)," ACWA power, November 24, 2022.

Shape the regulatory environment

Renewable energy developers could explore enhancing their capabilities in regulatory engagement and management. This is particularly crucial because renewable energy projects largely operate in a regulated environment. For instance, they often rely on long-term offtake contracts with local utilities, where tariffs are set by regulators or by a competitive process determined by regulators. Renewable energy developers should be able to engage with regulators to shape stable regulatory frameworks that enable investments in renewables projects.

As explained above, the region's unique conditions call for unique solutions. It is up to renewable energy developers to shape these solutions with regulators from different markets. One example of regulatory engagement required to shape opportunities for the growth of the renewables sector is in cross-country interconnections and renewables imports and exports.

For example, Sun Cable, an Australian venture proposing to export up to 20 GW of renewable power from Australia to Indonesia and Singapore, will require a massive effort to engage regulators across the three markets and get their blessing, among other challenges the venture faces.¹⁵ The project has clear benefits from a sustainability perspective and should help address the region's concerns over energy affordability and security of supply.

Similar efforts are taking place in Singapore as energy retailers such as Keppel Energy seek to import renewable and carbon-free electricity to the island. Conditional approvals have also been extended to import around 1 GW of electricity from Cambodia, around 2 GW from Indonesia, and around 1.2 GW from Vietnam, putting Singapore on track to meet its target of importing 4.0 GW of electricity by 2035.¹⁶

Regulatory frameworks in Southeast Asia differ from those in geographies such as the European Union and the United States. We see an opportunity for renewable developers to further increase cooperation with local governments, regulators, and grid companies to develop win-win regulatory frameworks that ensure systems are flexible enough to manage intermittent renewables—for example, through grid expansion plans that can accommodate additional renewable energy capacity, or new remuneration mechanisms to enable innovative technologies like integrated renewables and energy storage systems. This action could address necessary sustainability acceleration, while taking proper account of local constraints and affordability. At the same time, best practices from other regions where international renewables developers have an established presence should be shared.

¹⁵ "Sun Cable's huge solar project in Northern Territory a step closer after support from Indonesia," *Guardian*, September 2021.

¹⁶ "Singapore to import 12 GW of low carbon energy from Vietnam to help meet renewable imports," *Straits Times*, October 24, 2023.

Develop B2B solutions

Southeast Asia is home to numerous, large, local and international C&I consumers that have set ambitious decarbonization agendas and aim to buy 100 percent of their power from renewable sources. Assuming regulatory frameworks will continue to evolve and enable the required solutions, renewables developers in Southeast Asia have an opportunity to diversify their offtake agreements from relying solely on PPAs with local incumbent utilities toward a mix of PPAs and commercial agreements within the B2B segment.

For example, Sunseap, a Singapore-based renewable energy company acquired by EDP Renewables—a global leader in renewables development—has created value propositions that target large industrial players looking to install solar PV systems on the rooftops of their facilities.¹⁷ These offerings benefit industrial players in China, Singapore, and Vietnam by allowing them to increase their share of renewable power consumption with systems under 20 MW in contrast to typical utility-scale projects that exceed 50 MW.¹⁸ They also offer different financing and commercial structures to suit customers' needs, as well as energy efficiency and energy storage solutions for building owners.

Similarly, to expand into the region's renewable energy business, Malaysia's national oil company PETRONAS acquired Amplus Energy in 2019.¹⁹ Amplus Energy, a Singapore-based renewable energy company, focuses on the large C&I customer segment, with operations in India, the Middle East, and Southeast Asia.

Embark on bold, large developments

While most utility scale renewable energy projects in the region are below 100 MW, some renewable energy developers are focusing on large marquee projects that could pave the way for at-scale capital investments in the region.

For example, Sembcorp Utilities, a wholly owned subsidiary of Singapore company Sembcorp Industries, has received conditional approval to import 1.2 GW of electricity from Vietnam to Singapore.²⁰ While these large-scale projects require significant upfront effort to define their technical specifications and align their multiple stakeholders (in the case of the project that Sembcorp Utilities proposed, cross-border alignment is needed between Singapore and Vietnam), the upside if a project gets approved is also huge. Tremendous value could be created for the renewables developer, as well as for the local ecosystem, including contractors, energy off-takers, governments, etcetera.

¹⁷ "Distributed generation solar systems (rooftop solar systems)," EDP Renewables, October 2023.

¹⁸ "Utility scale ground-mounted PV projects," EDP Renewables, October 2023.

¹⁹ "PETRONAS to acquire Asia's leading distributed energy solutions provider," PETRONAS, April 2019.

²⁰ "Plans to import 4 GW of low-carbon electricity by 2035 continue to make steady progress," Energy Market Authority, October 24, 2023.

Adapt service offerings to evolving client needs

Serving C&I clients will soon require a differentiated set of capabilities, including offering sustainable “firm” power solutions—such as renewables paired with storage systems—for companies looking at 24/7 solutions. While this value proposition is nascent in Southeast Asian markets, we expect the demand for firm renewables power solutions to grow as corporates advance their commitment to reduce their carbon footprints stemming from power consumption.

As highlighted in a recent report by AirTrunk, an Asia-Pacific-based hyperscale data center specialist, the next frontier for large C&I

customers seeking to fully decarbonize their power supplies will be to consider hourly matching (purchasing electricity generation that matches hourly electricity consumption) or 24/7 carbon-free solutions.²¹ This will require bespoke value propositions from renewables developers, combining intermittent renewable energy sources such as solar and wind power with clean firming and dispatchable technologies such as green hydrogen, batteries, and long-duration energy storage (LDES).

Renewables developers in other markets have already taken steps to create such solutions. For example, in India, players such as Serentica Renewables, a subsidiary of Vedanta Group, have been very active in developing “round the clock” energy solutions, pairing solar and wind farms with battery storage solutions.²²



Successful renewable energy developers also understand that there is no one-size-fits-all solution available across markets in Southeast Asia.

²¹ “Powering a clean energy future,” Airtrunk, August 2023.

²² “Serentica renewables announces groundbreaking energy storage contract with Greenko,” Serentica, July 2023.

Further recommendations to light the way for renewable energy developers

We have so far discussed the vast potential of renewables in Southeast Asia, some of the unique challenges that are holding back further expansion of renewable energy capacity, and various lessons that could be learned from local renewable energy champions. Here now are a few guidelines for international developers who want to capture part of this growth in the region:

1.

Place their bets and commit to invest: Having a wide network of connections across different markets helps renewables developers familiarize themselves with how markets are developing and form a perspective on which markets may be more attractive. Once developers are ready to “place their bets”, however, they should invest in building the right team capabilities and local resources, and be prepared to sustain these local resources until markets mature and are ready for capital deployment, which could take years.

2.

Shape a distinctive value proposition: As seen in Vietnam’s renewable growth frenzy and in Singapore’s renewable energy tenders, there is a strong local appetite for renewables projects and capital ready to be reallocated when opportunities arise. Local sectors want for little and international developers will need to show what they can bring to the table. International entrants are unlikely to be able to compete solely on cost, but can differentiate themselves by leveraging their experience and best practices. They may have a window of opportunity to offer technologically complex solutions, such as developing 24/7 renewables solutions that require deep understanding of clean firming technologies, such as batteries, LDES, and “green molecules”, or focusing on offshore wind opportunities—but that window may pass quickly. For example, companies like Sembcorp, which has delivered in Singapore the largest power storage system in Southeast Asia to date, might have a potential advantage if it is able to replicate and integrate such systems in complex solutions fast enough.²³

3.

Support the development of a full renewables ecosystem: In addition to developing renewable energy projects in the region, there are opportunities to invest in building a broader renewable energy ecosystem, specially in equipment manufacturing. Southeast Asia currently manufactures 55 GW per annum of solar cells and around 70 GW per annum of modules, making it a global hub for these technologies. It also has the capacity to grow the manufacturing of modules to approximately 120 GW per annum by 2030. There is potential to build manufacturing capacities for other technologies that could be critical to unlocking the renewables industry, such as batteries.²⁴ In other markets, renewable energy developers have already identified equipment manufacturing as a strategic way for them to achieve their renewable energy aspirations. A case in point is ReNew in India, a large-scale renewable energy developer that is investing in multiple GW-scale solar PV module manufacturing facilities.²⁵

²³ Davina Tam, “SEA’s largest energy storage system opens on Jurong Island in push for solar power,” CNA, February 2, 2023.

²⁴ *Renewable energy manufacturing: Opportunities for Southeast Asia*, a joint report by Asian Development Bank, Bloomberg Philanthropies, ClimateWorks Foundation, Sustainable Energy for All, August 2023.

²⁵ “ReNew to commission 6 GW module manufacturing capacity by end of summer,” BQ Prime, May 22, 2023.

4.

Adjust their risk-return appetites and develop innovative risk mitigation strategies: Investment opportunities in Southeast Asian renewables markets will likely test the risk appetite of international renewables developers and infrastructure investors. While the market may not yet be mature enough for low-risk infrastructure investors such as pension funds, renewable energy developers could consider creating a set of risk-mitigation capabilities that may not be needed in more mature markets. For example, Scatec, which has been focusing on developing projects in frontier markets across the world, has on multiple occasions involved the Multilateral Investment Guarantee Agency, a member of the World Bank, with a mandate to promote cross-border investment in developing countries by providing guarantees (political risk insurance and credit enhancement) to investors and lenders.²⁵ Developing such capabilities, and diversifying investments across different technologies and markets, will help international renewables developers build resilient renewables portfolios in the region.

It is important to highlight that, for countries in Southeast Asia to accelerate their renewable energy capacity additions, there are many factors beyond the scope of this article, such as shifts in energy policies, grid investments, and regulatory or market mechanisms. Should all factors give rise to sufficiently conducive conditions, renewable energy developers have a golden opportunity to shape and capture this growth and make a difference in the region, thereby supporting Southeast Asia's ambitious net-zero goals. The path forward might not be without challenges, but early, ambitious movers could reap the rewards of the inevitable renewables boom in Southeast Asia.

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²⁵ "Scatec bond," Multilateral Investment Guarantee Agency, World Bank, October 2023.

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