

Understanding barriers to financing solar and wind energy projects in Asia

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01

Executive summary

Executive summary

Asia, one of the fastest developing regions in the world, is expected to see overall energy demand grow by c.90% by 2050. Over half of the global energy consumption is attributed to the region, with 85% of its energy consumption sourced from fossil fuels. Accordingly, Asia is expected to play a crucial role in tackling climate change and reducing emissions by transitioning to renewable energy. Renewable energy investments in Asia Pacific, excluding China, accounted for only 14% of the global renewable energy investments in 2022 (BNEF).

This study aims to analyze barriers to clean energy financing with a focus on utility-scale solar and wind energy projects in select

countries of Asia, namely Indonesia, Malaysia, Thailand, The Philippines, Vietnam, Japan, South Korea, Bangladesh and Pakistan.

A diverse list of over 170 market participants from the solar and wind sector (regional and country-focused, domestic and international, large- and mid-scale) were consulted to gather practical insights, nuanced view-points and comprehensive analysis on the barriers to clean energy financing in these markets.

Potential recommendations were sought to make the landscape for solar and wind projects more conducive for financing.

Key findings from the study

- The lag in renewable energy growth to date in the focus markets, compared to global peers, is attributed to the inadequate policy and investment frameworks in these countries. Legacy power sector structure and existing fossil fuel capacity limit the business case in specific markets.
- The study finds that generally availability of finance for renewables is not identified as a main barrier in most countries. Clean energy finance is waiting to be unlocked as non-financial barriers are addressed.
- In certain emerging markets such as Bangladesh and Pakistan, overall liquidity and macroeconomic instability pose challenges in establishing an investment-friendly climate. In such cases, development finance institutions have a crucial role to play in facilitating the development of renewable energy markets.
- Non-financial barriers related to permitting, development processes, land acquisition, lack of local supply chains and local content requirements have a knock-on impact on project risks, timelines, costs and overall bankability. This impacts cost and terms of financing, and depending on severity of risk, may even limit access to available finance. It also impacts the realizability of the project pipeline as many development stage projects fail to reach financing due to complexities and upfront costs involved.
- Meanwhile, the region requires capital with an impact agenda and a co-developer mindset. Early-stage development capital or contextualized financing products (e.g., guarantees and insurances) can help mitigate the risks associated with specific market challenges and evolving frameworks, including reducing the cost of capital.



Executive summary

Each market in Southeast Asia is nuanced by its unique features, opportunities and challenges, however the region as a whole still has common theme

Despite plunging solar and wind generation costs worldwide, solar and wind project costs remain comparatively higher in emerging markets. Lack of deployment scale in certain markets and underdevelopment of supply chains (e.g., in Indonesia), lack of regulatory clarity contribute toward such increase in the form of project costs and additional market risk premiums. This has led to challenging lending conditions in certain markets, e.g., Vietnam, which experienced impressive deployment of solar and wind in the past five years, however had difficulty tapping on international project finance due to PPA shortcomings. Philippines renewable energy market, which is adequately supported by domestic project financing, has advanced to assuming merchant electricity offtake risk. However, commercial bank's short loan tenor lending terms require improvement.

While both markets promise good resource potential, Pakistan and Bangladesh would have to first achieve macroeconomic stability and create an investment environment while tackling the regulatory

framework to enable competitive cost for renewables deployment.

Pakistan is facing a severe liquidity crunch, and the country's foreign reserves have fallen to a critically low level of US\$4.46b, which covers less than a month of imports. Bangladesh's downgraded sovereign credit rating of B1 by Moody's credit agency at the back of heightened external vulnerabilities, deteriorating foreign exchange reserves, and institutional weakness has muted lenders interest in the market. While the conditions wait to improve, development finance institutions have a more significant role to play and support renewable energy market progress.

East Asian markets, Japan and South Korea are reasonably well developed, but challenges remain about land acquisition, lengthy approvals processes, local content requirements, particularly in South Korea

Developers quote that obtaining permits and completing the development process in South Korea takes twice as long as in Europe, impacting project costs and timelines. This and other barriers associated with development stage necessitates support for development capital for the country.

An enabling environment will unlock clean energy finance at competitive terms and contribute toward the growth of the global green economy. The potential opportunity is immense, there are huge solar and wind resources across the region, and accelerating its deployment can bring a range of benefits from energy security to mitigating climate change risks. As per IEA estimates, the world demands US\$4.5t per year until 2030 in clean energy finance to limit global warming to 1.5 degrees Celsius above pre-industrial levels. This is a huge economic opportunity and countries should take steps in the right direction to address these barriers and unlock the economic potential of clean energy.

Executive summary

The uncertainties related to project development and macroeconomic landscape increase country risk premium and consequently the expected rate of return for the investors and developers in emerging markets. This is compounded by the rising interest rate environment and subsequent pressure on the cost of equity.

While a fall in cost of capital is required to accelerate the low-carbon transition, it is of greater importance that emerging markets provide an enabling environment to reduce country and technology hurdle rates and get

more projects to financing stage. It is also crucial to remember that the increased cost of capital issue is not unique to renewables or the focus countries and is driven by the global interest rate cycle. In comparison, the regulatory and macroeconomic environment of the focus markets can play a bigger role in unlocking the pace of deployment of renewable energy projects in these markets.

Given the disparate nature of each market and the unique nuances of barriers, the recommendations vary by each market.



Summary of **barriers** in focus countries

Focus countries	Non-financial barriers	Financial barriers
 Indonesia	<ul style="list-style-type: none"> ▶ The growth of solar and wind sector is largely dependent on early Coal-Fired Power Plant (CFPP) retirement ▶ Lack of clarity in regulatory, procurement and tendering procedures ▶ Structural barriers such as local content requirements and lack of domestic manufacturing capacity increase project costs ▶ Doubts about grid sufficiency leads to investment hesitancy 	<ul style="list-style-type: none"> ▶ Low negotiated tariffs affects Power Purchase Agreement (PPA) bankability ▶ Capital is generally available from both domestic and international lenders, but deployment is hindered by the lack of project pipeline ▶ Corporate guarantees to secure domestic lending during construction is a challenge for developers
 Malaysia	<ul style="list-style-type: none"> ▶ Conducive regulatory framework and auction mechanism for Large Scale Solar (LSS) ▶ Uncertainty in land conversion and acquisition increases project costs ▶ Fluctuating local shareholding requirements for LSS and Corporate Green Power Program (CGPP) are challenging to foreign developers 	<ul style="list-style-type: none"> ▶ No major financial barrier identified for large-scale projects ▶ Financing smaller projects may be a challenge ▶ Weak credit worthiness of Sabah's national utility hinders potential investors and lenders
 Thailand	<ul style="list-style-type: none"> ▶ Start-stop approach on procurement slowed market development ▶ Lengthy and challenging land acquisition process results in long project development lead time 	<ul style="list-style-type: none"> ▶ No major financial barrier identified
 The Philippines	<ul style="list-style-type: none"> ▶ Evolving regulations, complex permitting process and delays in approvals for system impact studies by the transmission operator result in long development periods ▶ Wind projects face some challenges due to the lack of a mature supply chain 	<ul style="list-style-type: none"> ▶ PPA bankability is affected by credit worthiness of financially weaker Distribution Utilities (DUs) ▶ Small developers' lack of banking relationships with lenders, lack of longer tenors for project loans and lenders' concern on step-in rights hinder domestic lending ▶ International financing is limited due to currency risks
 Vietnam	<ul style="list-style-type: none"> ▶ Delayed release of national targets and implementing framework has deterred investors ▶ Lengthy negotiation timelines and delayed decisions for "transitional" projects caused setbacks ▶ Curtailment of electricity generation due to inadequate transmission capacity is a significant concern 	<ul style="list-style-type: none"> ▶ PPA bankability is a challenge for international lenders, certain PPA clauses restrict International financing ▶ Domestic financing channels may not be sufficient to meet PDPVIII target capacity goals ▶ Lack of non-recourse financing from domestic lenders

Summary of **barriers** in focus countries (cont'd)

Focus countries	Non-financial barriers	Financial barriers
 Bangladesh	<ul style="list-style-type: none"> ▶ Land acquisition remains the biggest issue ▶ Undeveloped local supply chain for equipment drives up project costs 	<ul style="list-style-type: none"> ▶ PPA bankability affected by declining credit worthiness of the electricity off-taker and Bangladesh's recent rating downgrade ▶ Although project financing options are available, challenging macroeconomic conditions have made these solutions costly and difficult to execute
 Pakistan	<ul style="list-style-type: none"> ▶ Suboptimal transmission network remains a key barrier, with transmission losses built up and low recoveries ▶ Land acquisition is hindered by bureaucratic processes in land registry and transfers 	<ul style="list-style-type: none"> ▶ PPA bankability affected by tariff renegotiation ▶ Domestic funding for RE projects has dried up with domestic lenders favoring larger, more established developers ▶ International commercial banks shy away from funding RE projects due to high macroeconomic and political risks
 South Korea	<ul style="list-style-type: none"> ▶ Lengthy permitting process and land availability and acquisition process remain a concern ▶ Supply chain constraints for onshore and offshore wind projects highlighted 	<ul style="list-style-type: none"> ▶ Domestic lenders prefer solar projects due to market familiarity ▶ Offshore wind projects are likely to be finance by international lenders due to high capital requirement and technical know how
 Japan	<ul style="list-style-type: none"> ▶ Land scarcity and lengthy permitting process are key barriers, alongside market rise in Feed-in Premium (FiP) scheme ▶ Limited demand for Corporate Power Purchase Agreement (CPPA) and curtailment risk ▶ Further challenges are derived from higher cost of electricity and lack of CPPA off-takers for wind projects 	<ul style="list-style-type: none"> ▶ Project financing is readily available for solar and wind projects ▶ Lenders have expressed they will need time to fully assess the new FiP scheme

Summary of **recommendations** in focus countries

Focus countries	To address non-financial barriers	To address financial barriers
 Indonesia	<ul style="list-style-type: none"> ▶ Strong policy signals and timely coal-retirement to draw market interest ▶ Setting up specialized agency to streamline the land acquisition process ▶ Allowing off-site CPPAs to boost private sector-led capacity additions ▶ A phased approach to LCRs may balance local supply chain development and cost competitive energy transition 	<ul style="list-style-type: none"> ▶ Model PPA development to reduce negotiation times ▶ Deepening of the domestic finance market via blended finance, partial credit guarantees and targeted capacity building for domestic banks ▶ Framework establishment for sukuk and bond capital markets to expand solar and wind projects financing
 Malaysia	<ul style="list-style-type: none"> ▶ More regular solar auctions to maintain market interest ▶ Broadening of the CPPA program through grid's third-party access ▶ Promoting floating solar to deal with land acquisition challenges ▶ Proactive land parcel identification to ease private sector access and minimize pre-development uncertainties 	<ul style="list-style-type: none"> ▶ Credit enhancement solutions are required to enable the deployment in the State of Sabah ▶ Improving access and deployment of green financing structures to small and medium enterprises for the financing of smaller projects
 Thailand	<ul style="list-style-type: none"> ▶ Transition from Feed-in Tariff (FIT) to auction-based procurement for competitive solar and wind pricing ▶ Promoting floating solar to address land acquisition challenges and leverage synergies between solar and hydro technologies ▶ Collaboration between private developers and Electricity Generating Authority of Thailand (EGAT) to prioritize grid infrastructure investments 	<ul style="list-style-type: none"> ▶ No major financial barrier was expressed
 The Philippines	<ul style="list-style-type: none"> ▶ Commitment to expand the grid infrastructure from the transmission company and the regulator ▶ Capacity building and training of environmental consultants and specialists to turn around faster System Impact Study and ease National Grid Corporation of Philippines (NGCP) backlog ▶ Support lenders with independent assessments of new wind equipment to facilitate market development 	<ul style="list-style-type: none"> ▶ Introduction of credit enhancement products for smaller developers and weaker DUs, facilitated by development banks and donor agencies

Summary of **recommendations** in focus countries (cont'd)

Focus countries	To address non-financial barriers	To address financial barriers
 Vietnam	<ul style="list-style-type: none"> ▶ Develop regulatory framework, supporting supply chain ecosystem, and skilled resources for the successful deployment of offshore wind ▶ Dialogue between government and industry, coupled with an investment plan is required for offshore wind supply chain development ▶ Prioritize grid infrastructure investment and synchronize permitting with substation capacity 	<ul style="list-style-type: none"> ▶ Explore downside risk protection products to address curtailment issues ▶ Reevaluate model PPAs to enable international financing ▶ Enabling a CPPA program to allow international capital flow ▶ Incentivize GSS bond issuances with financial exemptions to promote RE investment ▶ Boost domestic non-recourse financing capacity through capacity buildings by development aid programs
 Bangladesh	<ul style="list-style-type: none"> ▶ Facilitate land acquisition by government-led identification and consolidation of suitable parcels for RE development ▶ Develop an RE procurement framework with year-wise action plans to reduce reliance on imported fossil fuels 	<ul style="list-style-type: none"> ▶ Support from international development agencies in the form of risk insurance and grants/subsidies to enable RE financing
 Pakistan	<ul style="list-style-type: none"> ▶ Institutional reform to reduce bureaucracy and simplify processes for a pro-business environment ▶ Establish competitive market framework and promote open access ▶ Engage in Public-Private Partnerships (PPPs) with private parties to upgrade the transmission network ▶ Recategorize imported renewable equipment from luxury to as essential to reduce cost and promote local Engineering, Procurement, and Construction (EPC) supply chain 	<ul style="list-style-type: none"> ▶ Implement upgrades and reforms to reduce transmission loss while promoting privatization to address circular debt ▶ Reinstate the financing scheme of the State Bank of Pakistan (SBP) to ensure better investment and treasury management for renewables ▶ Increase Foreign Direct Investment (FDI) with competitive tariffs in renewables while strictly adhering to investment agreements ▶ Engage Development Finance Institutions (DFIs) for direct investments or guarantee and assistance on policy reforms
 South Korea	<ul style="list-style-type: none"> ▶ Provide a clear procurement roadmap for large-scale renewables and simplify the development permit process between local and national levels ▶ Enhance transparency regarding substation capacity and project queues before applying for a Power Generation License ▶ Provide access to low-cost development capital to ensure interest in pre-development stage 	<ul style="list-style-type: none"> ▶ Increasing private sector participation through investments or partnerships with public entities

Summary of **recommendations** in focus countries (cont'd)

Focus countries

To address non-financial barriers

To address financial barriers



Japan

- ▶ Establish centralized entity to streamline land acquisition process
- ▶ Provide access to low-cost development capital to ensure interest in pre-development stage
- ▶ Increase the value of RECs through policies like higher minimum transaction prices, stricter regulations and potential market integration
- ▶ Expand transmission capacity, revise pricing mechanisms and encourage private sector investments
- ▶ Evaluate and improve incentive schemes for better grid integration
- ▶ Refine tender procedures and prioritize supply chain improvements for offshore wind

- ▶ Leverage advisor's support and guidance on legal/accounting treatment of CPPA



02

Introduction



Introduction

Global investment in renewable energy reached a new record US\$1.3t in 2022, according to the International Renewable Energy Agency (IRENA). However, this amount is considerably lower than the annual target of US\$4.5t required to limit global warming to 1.5°C scenario. The International Energy Agency (IEA) estimates global energy investment in 2023 to reach \$US2.8t, with clean energy accounting for a substantial 64% (\$US 1.8t) of the total global energy investment, compared to around \$US1t on fossil fuel investment over the same period. However, a large proportion of this increase is contributed by advanced economies, highlighting the global clean energy transition disparity.

Asia, one of the fastest developing regions in the world, is expected to see overall energy demand grow by c.90% by 2050. Over half of the global energy consumption is attributed to the region, with 85% of its energy consumption sourced from fossil fuels. Accordingly, Asia is expected to play a crucial role in tackling climate change and reducing emissions by transitioning to renewable energy. However, renewable energy investments in Asia Pacific, excluding China, accounted for only 14% of the global renewable energy investments in 2022 (BNEF).

This study aims to analyze barriers to clean energy financing with a focus on utility-scale solar and wind energy projects in Asia. The study was funded by a philanthropic foundation, which focuses on the nine Asian geographies studied in this report, namely Indonesia, Malaysia, Thailand, The Philippines, Vietnam, Japan, South Korea, Bangladesh and Pakistan. The two Asian leaders in the deployment of renewable energy, China and India, have their own ecosystem of developers and lenders are not

covered as part of this study.

The structure and design of power markets in the geographies covered by this study provide an essential backdrop for appreciating the status of renewable energy opportunities and challenges in these markets.

The selected geographies also differ in the level of renewable energy resource endowment. Most countries in the region have good solar energy potential. However, only a few have onshore and offshore wind resources, e.g., Japan, South Korea, The Philippines and Vietnam. There are also disparities in the economic conditions and subsidies built into the power sector.

Correspondingly, the focus geographies are at varying levels of maturity in the deployment and financing of renewable energy. While several geographies provide for successful and encouraging examples, there also exist opportunities for enhancement of current frameworks, market development and enabling levers to overcome barriers and unlock financing for utility-scale solar and wind energy projects in the region. Understanding these barriers is the first step toward progress.

To appreciate the country-specific context and the challenges, the report is structured into chapters dedicated to individual countries. These chapters delve into the present landscape of renewable energy, particularly solar and wind energy projects, along with the associated financial and non-financial barriers.

The report has been prepared based on consultations with over 170 market participants to capture a representative view of the sectoral barriers.

Objectives of the study

The study aims to identify and understand the specific financial and non-financial barriers to the financing of renewable energy projects in Asia, with a focus on utility-scale solar and wind energy projects in the following geographies.

Southeast Asia

- ▶ Indonesia
- ▶ Malaysia
- ▶ Thailand
- ▶ The Philippines
- ▶ Vietnam

South Asia

- ▶ Bangladesh

- ▶ Pakistan

East Asia

- ▶ Japan
- ▶ South Korea

The study aims to:

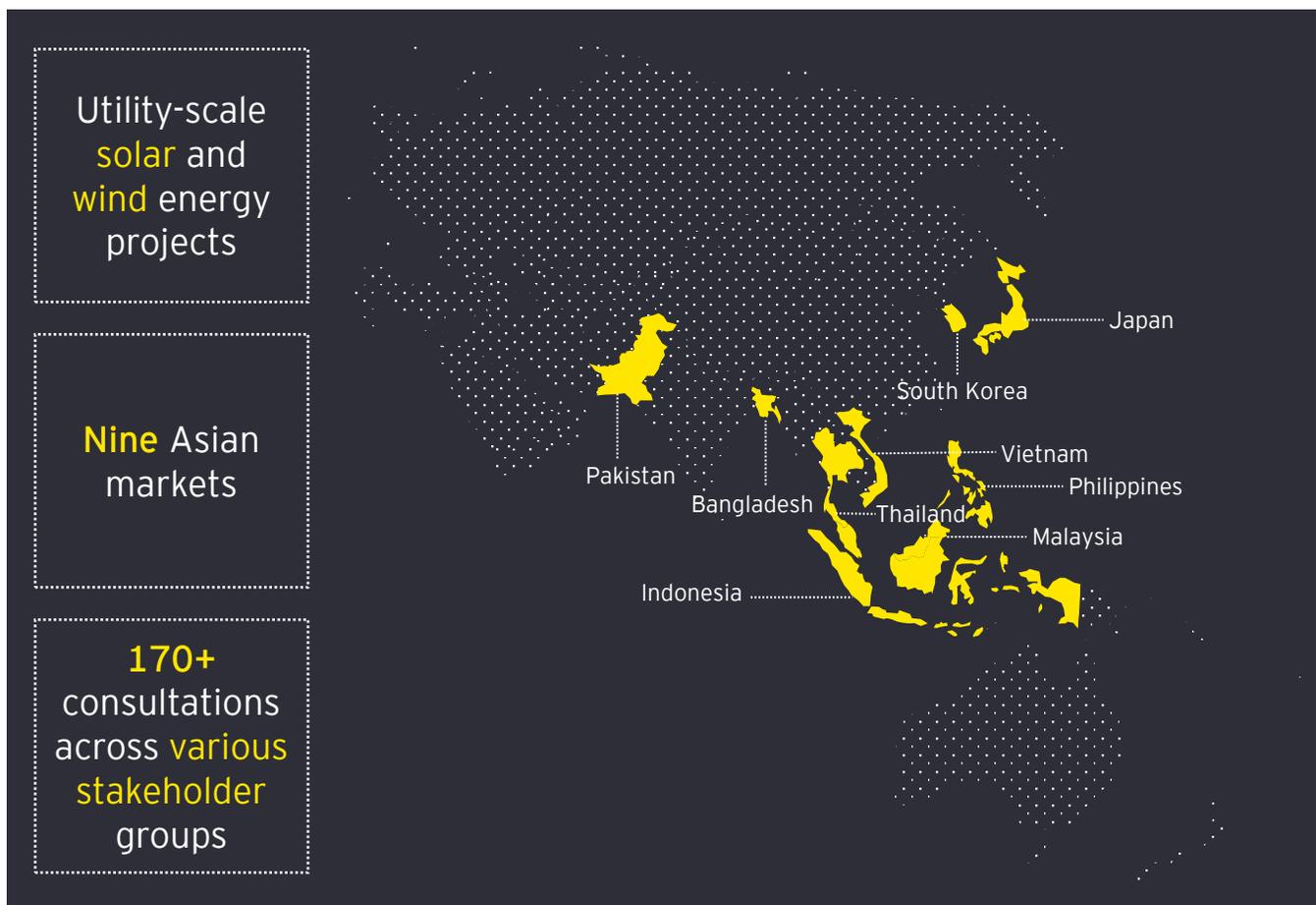
- ▶ Identify and articulate the key financial barriers limiting the deployment of utility-scale solar and wind energy projects in the focus geographies

- ▶ Identify the key non-financial barriers that would facilitate an enabling investment environment if addressed
- ▶ Provide recommendations to overcome such identified barriers and the relevant stakeholders to address the same

The development of this study is funded by a philanthropic foundation, which focuses on the nine Asian geographies studied in this report. China and India, which are much larger in scale and have distinct ecosystems are not covered as part of this study.

The study is intended to benefit all market stakeholders – the developers and investors in utility-scale solar and wind energy projects, as well as financing institutions and policymakers in the region.

The term renewable energy in this study has been mainly used in reference to utility-scale solar and wind projects unless otherwise applicable.



Approach and methodology

- ▶ To obtain a representative perspective on the financial and non-financial challenges within the solar and wind energy sectors, with focus on financing, a meticulous analytical framework was implemented. This framework delves into the fundamental drivers of renewable energy and addresses and identifies market gaps.
- ▶ The process involved individual consultations with identified market participants to gather practical insights, nuanced view-points and comprehensive analysis on barriers. Potential recommendations were sought to make the landscape for solar and wind projects more conducive for financing.
- ▶ A diverse list of market participants from the solar and wind sector (regional and country-focused, domestic and international, large- and mid-scale) was shortlisted across various stakeholder groups. The report follows a qualitative approach, employing semi-structured interviews as the primary feedback collection methodology for deeper exploration of responses. Responses were analyzed, categorized into themes and reported as findings of this report.

Primary and secondary research

- ▶ Individual consultations were conducted through targeted interviews and online surveys with experts in the renewable energy field. A minimum of 2-3 stakeholders per country per group were included from the following categories. A total of 170 consultations were completed.
 - 1 ●--● Large- and mid-scale developers of utility-scale solar and wind energy projects (domestic and foreign)
 - 2 ●--● Project finance lenders (domestic and international)
 - 3 ●--● Equity investors and funds
 - 4 ●--● Industry associations (solar, wind and renewable industry)
 - 5 ●--● DFI/ Multilateral development banks (MDBs)/ Specialized financing institutions
- ▶ Comprehensive secondary research using credible sources such as government energy plans, policy papers, analyst reports, and think tanks.
- ▶ Leading industry databases to access comprehensive information on latest transactions, tenders and project announcements, information on active financiers, sponsors and financing agencies, etc.

Sector fundamentals - Southeast Asia



Malaysia

- ▶ Net-zero target: 2050
- ▶ RE Target: 70% RE in power mix by 2050
- ▶ Resources: Solar only
- ▶ Off-taker: Tenaga Nasional Berhad (TNB) (AAA- local rating)
- ▶ Market structure: Single buyer utility
- ▶ PPA Tariff: MYR not indexed to USD
- ▶ Procurement: Auctions based
- ▶ Foreign ownership: varies with each tender, recently 49%

The Philippines

- ▶ Net-zero target: Not declared
- ▶ RE Target: 50% RE in power mix by 2040
- ▶ Resources: Solar, onshore wind and offshore wind
- ▶ off-taker: Largest is Meralco (BBB- S&P), Other off-takers exist, Wholesale market
- ▶ Market structure: Liberalized with WESM
- ▶ PPA Tariff: PHP not indexed to USD
- ▶ Procurement: Auctions based, Bilateral
- ▶ Foreign ownership: recently 100% permitted

Source: EY Research, Ministry websites and announcements

Indonesia

- ▶ Net-zero target: 2060
- ▶ RE Target: 23% RE in power mix by 2025
- ▶ Resources: Solar and onshore wind
- ▶ Off-taker: Perusahaan Listrik Negara (PLN) (BBB- Fitch)
- ▶ Market structure: Single buyer utility
- ▶ PPA Tariff: IDR indexed to USD
- ▶ Procurement: Auctions with ceiling prices
- ▶ Foreign ownership: 100% permitted, local content applies

Thailand

- ▶ Net-zero target: 2050
- ▶ RE Target: 50% RE in generation mix by 2050
- ▶ Resources: Solar and onshore wind
- ▶ Off-taker: EGAT (A- Fitch) for large projects, Provincial Energy Authority (PEA) and Metropolitan Energy Authority (MEA) for small projects
- ▶ Market structure: Single buyer utility
- ▶ PPA Tariff: THB not indexed to USD
- ▶ Procurement: FIT based
- ▶ Foreign ownership: 49% permitted

Vietnam

- ▶ Net-zero target: 2050
- ▶ RE Target: 30-39% RE in generation mix by 2050
- ▶ Resources: Solar, onshore wind and offshore wind resources
- ▶ off-taker: Electricity of Vietnam (EVN) (BB- Fitch)
- ▶ Market structure: Single buyer utility
- ▶ PPA Tariff: VND indexed to USD
- ▶ Procurement: FIT based, auctions expected
- ▶ Foreign ownership: 100% permitted

Sector fundamentals – South and East Asia



Bangladesh

- ▶ Net-zero target: Not declared
- ▶ RE Target: 40% RE in generation mix by 2041
- ▶ Resources: Solar, onshore wind and offshore wind
- ▶ Off-taker: Bangladesh Power Development Board (BPDB) (not rated)
- ▶ Market structure: Single buyer utility
- ▶ PPA Tariff: BDT indexed to USD
- ▶ Procurement: Tender based, unsolicited projects exist
- ▶ Foreign ownership: 100% permitted

Pakistan

- ▶ Net-zero target: Not declared
- ▶ RE Target: 60% RE in generation mix by 2030
- ▶ Resources: solar and onshore wind
- ▶ Off-taker: Central Power Purchasing Agency - Guarantee Limited (CPPA-G) (not rated)
- ▶ Market structure: Single buyer utility
- ▶ PPA Tariff: PKR indexed to USD
- ▶ Procurement: Auctions based
- ▶ Foreign ownership: 100% permitted

Japan

- ▶ Net-zero target: 2050
- ▶ RE Target: 36-38% RE in electricity mix by 2036
- ▶ Resources: Solar, onshore wind and offshore wind
- ▶ Off-taker: Utility or electricity retailers, Wholesale market
- ▶ Market structure: Liberalized with WESM
- ▶ PPA Tariff: JPY not indexed to USD
- ▶ Procurement: FiT based, FiP recently introduced (August 2022)
- ▶ Foreign ownership: 100% permitted

South Korea

- ▶ Net-zero target: 2050
- ▶ RE Target: 30.6% RE in generation mix by 2036
- ▶ Resources: Solar, onshore wind and offshore wind
- ▶ Off-taker: Korea Electric Power Corporation (KEPCO) (AA- Fitch)
- ▶ Market structure: Liberalized with WESM
- ▶ PPA Tariff: KRW not indexed to USD
- ▶ Procurement: RPS Quota
- ▶ Foreign ownership: 100% permitted

Source: EY Research, Ministry websites and announcements

To facilitate effective consolidation and presentation, the report arranges input from market participants into thematic topics. These topics are further divided into financial and non-financial categories. These themes influence the financing and deployment of solar and wind energy projects in the focal

geographies. Considering the severity of each barrier and its impact on financing—assessed subjectively through market participant input and subject-matter experts – barrier themes for specific regions are then categorized as high, medium, or low to highlight the intensity.

	Categories, themes and examples	Financial Impact
Non-financial barriers	Regulatory and policy landscape <ul style="list-style-type: none"> ▶ Lack of or clear national renewables targets; ▶ Complex procurement process and auction frameworks; ▶ Unclear or cumbersome approval and permitting process; etc. 	<ul style="list-style-type: none"> ▶ Developers and Lenders add market risk premium ▶ Lengthen the development cycle with a corresponding increase in development costs ▶ Market becomes unattractive
	Development process and expenses <ul style="list-style-type: none"> ▶ Pre-development or development activity; permitting (i.e., before certainty of project award) that reduces the attractiveness of renewables in the country by putting too much capital at risk for too long for developers; etc. 	<ul style="list-style-type: none"> ▶ Lengthen the development cycle with a corresponding increase in development costs ▶ Capital at risk increases market risk premium ▶ Deter developers from pursuing market in the longer term
	Land acquisition <ul style="list-style-type: none"> ▶ Availability issues due to alternative uses of land; ▶ Cost, time or process challenges faced by developers in land acquisition process; etc. 	<ul style="list-style-type: none"> ▶ Legal challenges that impacts financing ability ▶ Add to project costs and impacts cost of renewable energy
	Supporting infrastructure <ul style="list-style-type: none"> ▶ Inadequate transmission capacity, grid infrastructure leading to curtailment, delay in project deployment; etc. 	<ul style="list-style-type: none"> ▶ Developers and Lenders add market risk premium
	Engineering procurement construction/supply chain <ul style="list-style-type: none"> ▶ Lack of availability of equipment for renewable energy projects in required volume and quality; ▶ Lack of maturity of the local supply chain; etc. 	<ul style="list-style-type: none"> ▶ Impact project costs ▶ Impact project returns and financing capability ▶ Impact cost of energy for the utility
	Local content requirement <ul style="list-style-type: none"> ▶ Policy or regulation mandating a certain percentage of the components, materials, or services to be sourced locally, etc. 	<ul style="list-style-type: none"> ▶ Impact project costs ▶ Impact project returns and financing capability ▶ Impact cost of energy for the utility
Financial barriers	PPA bankability <ul style="list-style-type: none"> ▶ Creditworthiness of the off-taker; ▶ Specific PPA clauses (curtailment, Force Majeure, etc.); etc. 	<ul style="list-style-type: none"> ▶ Directly impacts project bankability and lenders' interest to finance the project ▶ Impact market risk premium making projects expensive
	Domestic financing <ul style="list-style-type: none"> ▶ Lack of capacity to assess risk allocation; ▶ Lack of long term funding from domestic sources; ▶ Cost of debt in comparison to international sources; ▶ Lack of suitable project financing structures; etc. 	<ul style="list-style-type: none"> ▶ Impacts project returns ▶ Impacts cost of capital and energy for the utility ▶ Deter developers from pursuing market in the longer term
	International financing <ul style="list-style-type: none"> ▶ Lack of long term funding from international sources ▶ Cost of debt in comparison to domestic lenders ▶ Hedging, currency fluctuation risk ▶ Inability to provide non-recourse financing structures; etc. 	<ul style="list-style-type: none"> ▶ Impact project returns ▶ Impact cost of capital and energy for the utility ▶ Deter developers from pursuing market in the longer term



03

Country-specific analysis

An aerial photograph of a coastal city at sunset. The city skyline is visible on the left, with several high-rise buildings. The foreground and middle ground are dominated by a large, complex water treatment facility with numerous rectangular and irregular ponds connected by narrow channels. The sky is a mix of blue and orange, indicating the time is either dawn or dusk. A large yellow square is overlaid in the center of the image, containing the number 3.1.

3.1

Indonesia

Indonesia is endowed with abundant natural resources and significant potential for renewables, especially solar PV, hydro and geothermal. Indonesia also has a respectable wind energy potential. The country targets a 23% share of renewables in the electricity mix by 2025. Despite the increasing competitiveness of solar PV and wind technologies, Indonesia has yet to deploy these technologies on a large scale. Future renewable capacity additions up to 2030 do not focus on solar PV and wind technologies and rely on previously successful hydro and geothermal technologies.

Despite the promising potential, several challenges impede the adoption of solar and wind energy. The challenges and barriers are mostly non-financial and stem from the historical power sector landscape built around conventional fossil fuel generation, capped fuel costs, and subsidized retail electricity prices. The business case for renewables is hampered by the current power system's overcapacity in the main grid of Java-Bali-Madura.

Regulatory and policy obstacles, such as local content requirements, hinder solar and wind project development by increasing costs due to limited domestic manufacturing capacity in Indonesia. Implementation and governance of processes around land acquisition and other permitting add to project costs and timelines, making the market less attractive for developers.

Consulted stakeholders have stated that solar and wind energy projects that reached the financing stage to date have received sufficient interest from the lenders and are successfully financed. So far, the deployment of capital toward solar and wind energy projects has only been restricted by the limited pipeline of such projects rather than due to the availability of capital.

Most solar and wind projects have been financed based on USD-denominated project finance loans by international lenders given the USD indexation provided in the PPA tariff.

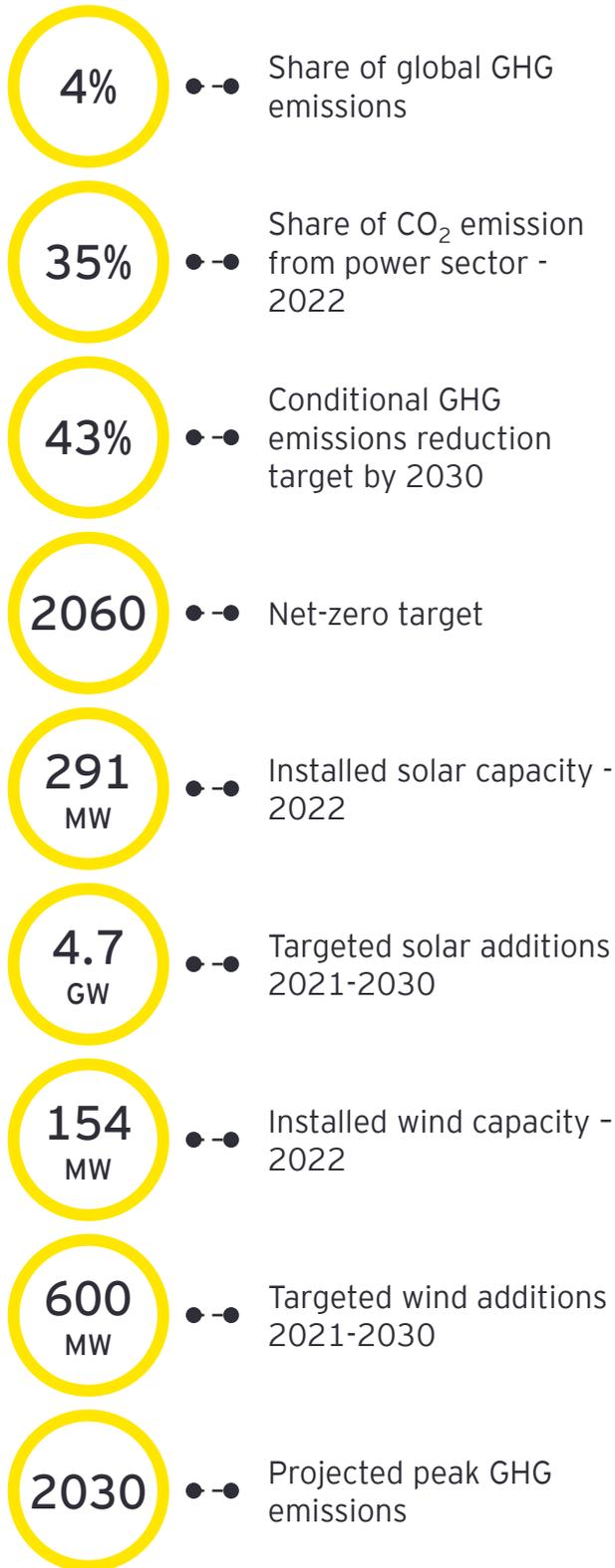
Once a robust project pipeline is established and demand for IDR financing grows, the effectiveness of domestic lending capabilities in IDR at a large scale will be put to the test, particularly if the USD indexation of PLN PPA tariffs is eliminated. There is an opportunity to improve the offerings from domestic institutions, and lenders have acknowledged the need to build internal capability to introduce suitable project finance products and enhance the skills of personnel.

Indonesia also has a developing bond/sukuk market, which is also being readied for sustainable finance. There is precedence for a corporate raising USD bonds for geothermal projects and domestic financial institutions raising IDR to finance renewable energy projects, amongst other green projects. Given the limited pipeline for solar and wind projects, this capital market segment is yet to be meaningfully utilized for renewable energy. There is potential to support green sukuk market development when the project pipeline increases.

These barriers and challenges are manageable, and the subsequent segments of this chapter explore market feedback on the financial and non-financial barriers in more detail to arrive at recommendations for key stakeholders.

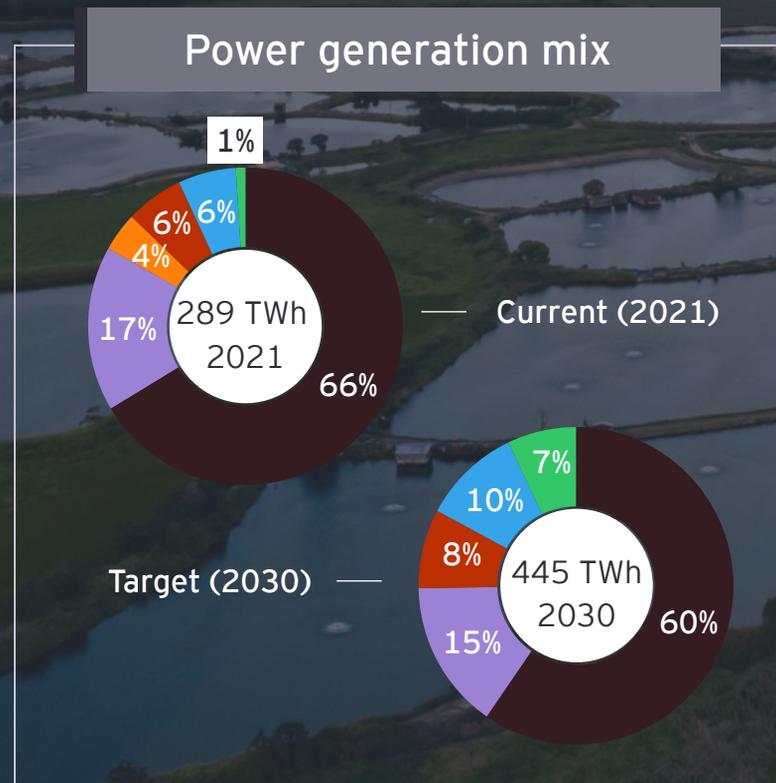
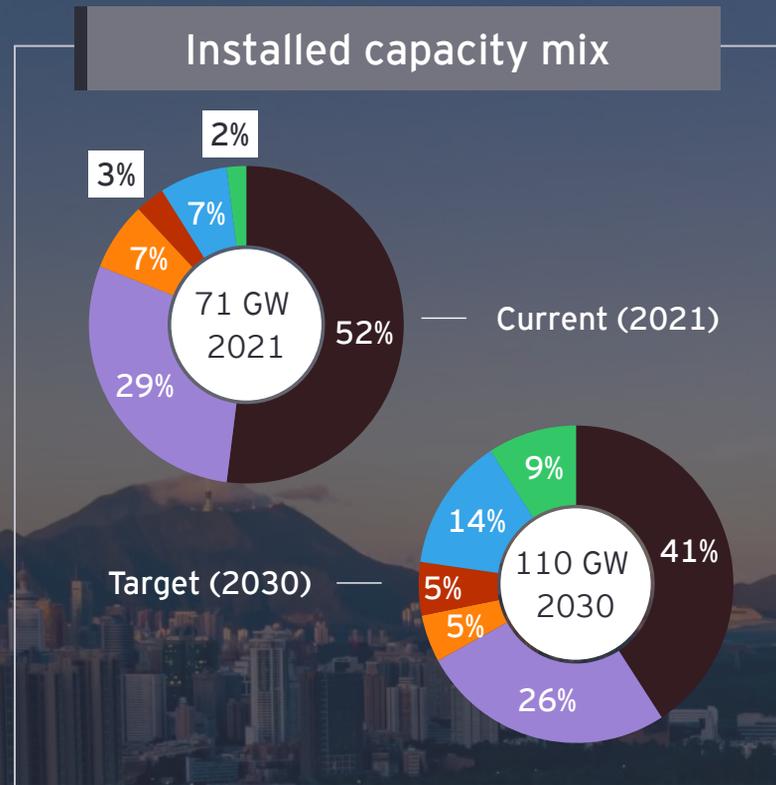
Indonesia

Snapshot of renewable energy deployment



Note: Renewables include solar, wind, bioenergy and waste

Source: MEMR Handbook Of Energy & Economic Statistics of Indonesia, Rencana Usaha Penyediaan Tenaga Listrik (RUPTL) 2022-2030, IRENA Renewables Capacity Statistics 2023, Emissions Database for Global Atmospheric Research 2022



Indonesia

Snapshot of domestic loans and bond markets

Indonesia domestic bond market

US\$
563.4b

Outstanding LCY and FCY bonds and sukuk - March 2023

2nd

Ranked as the second largest bond market in ASEAN

USD

Preferred currency for green and sustainable bond issuance

US\$
6.4b

Outstanding green bonds and green sukuk - March 2023

1st

Largest issuer of green sukuk in the world (54%)

20%

Of proceeds from green bond issuance allocated for energy projects

Indonesia domestic loan market

US\$
110.1b

Outstanding investment loans by public and commercial banks - 2022

US\$
1.43b

Credits mobilization by local banks for renewable energy (2018-2022)

US\$
883m

Amount of green loan issued in 2021-2022

Investment in renewable energy sector

US\$
1.6b

Total investments realized in renewable energy sector - 2022

US\$
1.56b

Average annual investment realized in renewable energy sector from 2018-2022

US\$
8b

Average annual investment required to meet renewable energy target by 2025

Note: Sukuk refers to "sharia compliant" or Islamic bonds. Indirect investments regarding renewables development such as grid expansion are not calculated in this report.

Source: EY Research, AsianBondsOnline 2022, Climate Bonds Initiative 2023, Bank Indonesia 2023, Institute for Essential Services Reform (IESR) Indonesia Energy Transition Outlook 2023

Indonesia

Summary of key barriers to renewable energy

Stakeholder feedback suggests the following areas as financial and non-financial barriers to deploying and financing utility-scale solar and wind energy projects in Indonesia. Contribution and cooperation by more than one stakeholder group is required to eliminate or mitigate these barriers to some degree.

	Area	Solar/ wind	Description	Addressed by
Non-financial barriers				
High	Regulatory and policy landscape		Lack of ambitious target capacity additions for solar and wind in the short to medium term given the fossil fuel overcapacity in the main load centers	Policy makers
	Local content requirement		Local content requirements for utility scale solar projects is challenging for developers and increases project costs until suitable domestic manufacturing capacity is established	Policy makers
Medium and low	Land acquisition		A lengthy process adds to project development timeline and costs	Policy makers
	Supporting infrastructure		Skepticism on the adequacy of existing grid infrastructure to support the integration of intermittent renewable energy on a large scale	PLN and policy makers
Financial barriers				
Medium and low	PPA bankability		The PPA with PLN is generally considered bankable by investors and lenders. Ownership lock-in requirements has been cited by smaller developers as a barrier to recycling capital	PLN
	Domestic lending		Need to add depth to the domestic lenders ability to provide non-recourse financing and long tenors matching the terms offered by international lenders	Lenders
	International lending		While USD financing has been preferred and available, with targeted increase in RE projects, increased exposure to PLN may constraint availability of international capital	Lenders
Other barriers				
Not identified	Development process and expenses		Market feedback has not highlighted development process and expenses as a barrier to clean energy financing in Indonesia	
	EPC		Market feedback has not highlighted availability or price of EPC as a barrier to clean energy financing in Indonesia	

Indonesia

Non-financial barriers

Regulatory and policy landscape



The business case for renewables in Indonesia relies on the early retirement of CFPPs to make way for green electricity in an oversupplied grid dominated by competitive fossil fuel-based power.

The market views Indonesia's historical power sector landscape and related regulatory framework as un conducive to the deployment of renewable energy on a large scale, resulting in limited installation of solar and wind projects to date.

Installed capacity for solar and wind projects stood at 290 MW and 154 MW, respectively, as of 2022. The latest Electricity Supply Business Plan, RUPTL (2021-30), developed by PLN and approved by ESDM, envisages capacity additions of 6.4 GW toward solar, wind, and mini-hydro. New RUPTL (2022-30) is expected to be released soon, with expectations of ambitious targets given Indonesia's net-zero commitment and the Just Energy Transition Partnerships (JETP) support.

Coal has been the dominant source of electricity mix and makes up 52% of the country's total installed capacity. 14 GW of pre-committed coal-fired power plant additions are envisaged in the RUPTL (2021-2030), out of which 19 projects amounting to 10.8 GW are already under construction and are likely to come online.

The main grids are oversupplied with coal-based generation. High reserve margins of 40-50% have been observed in Java-Madura-Bali. Unless the coal capacity is meaningfully retired and market regulations to prioritize renewable energy are introduced, the pipeline for renewable energy projects is expected to remain opportunistic until the demand catches up with supply and PLN needs to procure new capacity. The regulatory framework does not currently allow end consumers to procure their green

electricity supply through green corporate PPAs (direct electricity supply contracts between RE developers and corporate off-takers), which is an important lever to increase renewable energy deployment.

Indonesia is participating in multiple initiatives to support early retirements of coal-fired power plants (CFPPs) to repurpose or replace with RE for decarbonization and overall energy transition. JETP was announced at the 26th Conference of Parties (COP26) as a financing mechanism provided by International Partners from developed countries to help coal-dependent emerging economies realize just energy transitions. JETP pledged to mobilize up to US\$20b in public and private finance over the next three to five years for Indonesia's energy transition. In February 2023, Indonesia's JETP Secretariat was set up in the Ministry of Energy and Mineral Resources (Kementerian ESDM) with support from the Asian Development Bank to coordinate stakeholders and coordinate JETP project development.

In November 2022, the Government of Indonesia also launched the Energy Transition Mechanism (ETM) country platform and has appointed PT Sarana Multi Infrastruktur (Persero) (PT SMI) as ETM Country Platform Manager to develop a financing and investment framework for the ETM program. PT SMI is collaborating with various institutional partners. Following technical assessments and discussions with its stakeholders, the Government of Indonesia has identified more than 15 GW of CFPPs for early retirement, the first step in determining near-term and meaningful actions to accelerate the transition from fossil fuels to clean energy.

Following these announcements, ADB signed an MOU with PT PLN, Cirebon Electric Power, and the Indonesian Investment Authority (INA) to begin discussions for the accelerated retirement of Cirebon-1, a 660-megawatt coal-fired power plant in West Java. INA is working on a pipeline of potential private sector transactions totaling 1.5 GW, which includes Cirebon-1. Successful execution of these initiatives will build a case for more renewable energy deployment in the country.

Source: Rencana Usaha Penyediaan Tenaga Listrik (RUPTL) 2022-2030

Indonesia

Non-financial barriers (cont'd)

Regulatory and policy landscape



Developers view renewable energy procurement and tendering procedures as uncertain in terms of requirements and timelines.

Utility-scale renewable energy projects are procured under “direct selection” and “direct appointment.” Direct selection refers to a competitive process with a minimum of two bidders. Under special circumstances, PLN can purchase green electricity from a developer without a tender process, which refers to a direct appointment. Theoretically, the two methods are established, but developers quote the tendering process as a significant barrier in practice.

While investors and developers acknowledge the potential for solar and wind deployment in Indonesia, setting up a presence on the ground and hiring local development teams is costly without visibility on the project pipeline and tendering process.

Through a pre-qualification tender launched in 2019, PLN developed a list of pre-selected solar developers known as Daftar Penyedia Terseleksi (DPT). The DPT for solar was issued in 2019. PLN would only invite developers from the DPT to participate in tenders. However, there is a lack of clarity on whether all developers from the DPT, in practice, are invited to participate in a tender. Similarly, tender evaluation criteria and results are private. Stakeholders need to rely on their local network to garner such information.

According to developers, the current tendering regime does not sufficiently reward pre-development activities, and hence, they find marginal benefit in engaging in any pre-development activities.

Tender participants are also required to comply with the mandatory partnership provisions from PLN, which require that one of PLN's subsidiaries hold 51% of the shares in the project company. It is understood from developers that, at times, they are requested to fund full/in part the PLN portion of equity contribution, which diminishes project returns for the developers.

Renewable energy projects are awarded on a Build-own-operate-transfer (BOOT) basis instead of a build-own-operate (BOO) structure.

Investors can not account for additional revenue beyond PPA years as additional benefit. BOO structures would also allow more time for developers to recoup their investment, an interesting solution in the context of higher interest rates.

Uncertainty of the outcome of an already complex and lengthy procurement process (permitting and approval) adds to costs for investors.



Developers and financiers of renewable energy projects have indicated that the permitting process can be particularly challenging, with the complex and lengthy course that involves multiple agencies leading to delays and uncertainties. It is the uncertainty of permitting outcome (delayed or rejected) that is of most concern and leads to additional direct and indirect costs for investors.

Indonesia

Non-financial barriers (cont'd)

Key permits (not exhaustive)	Key office	Months
Single Business Number (NIB)	BKPM	0-3
Letter of tax registration and tax registration number + taxable entrepreneur confirmation letter (SPPKP)	Relevant Tax Office	0-3
Electricity business license for public interest (IUPTLU)	BKPM and MEMR	0-3
Building approval (PBG) for the power plant/power installation	Kemen PUPR	0-3
Letter of building ownership		3-6
Certificate of operation worthiness (SLO) and Commissioning certificate for the power plant	BKPM and MEMR	3-6
Location permit/suitability of space utilization activities		3-6
Right to build certificate for the power plant, transmission lines or any other facilities to transmit the electricity	Local land office	9-12
Forestry area utilization approval	MOEF	9-12
Land permit to transmit electricity - forestry area	BKPM and MOEF	9-12
Environmental permit for the power plant		9-12

Indonesia

Non-financial barriers (cont'd)

Regulatory and policy landscape



While a recent Presidential Regulation delinked renewable energy tariffs from PLN's coal driven average generation cost (BPP), tariff attractiveness remain low in given the local content requirements.

Traditionally, tariffs for renewable energy projects were negotiated on a deal-by-deal basis but with a ceiling linked to the national/local cost of production; this limited attractiveness of renewables as the cost of production was dominated by competitive coal-based generation, limiting the returns of renewable energy projects.

PR No. 112/2022, announced in September 2022, does not use BPP as a reference anymore for renewable energy tariffs but sets annual

ceiling prices as adjusted to account for the projects' location, technology and size.

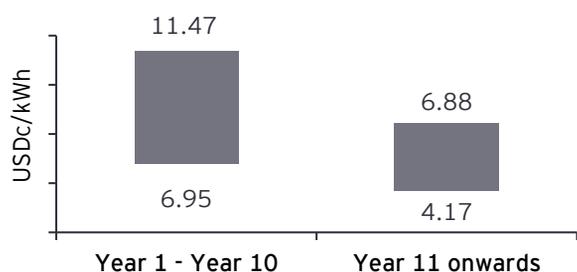
Removing the indexing of renewable energy tariffs to the PLN's national average cost of generation would ensure a reasonable return for renewable energy projects. Developers believe the resulting tariffs are attractive enough, especially for smaller projects below 20 MW, as the ceiling is higher. Regulations around local content requirements for larger projects and lower tariff ceilings in the Java-Bali region may not yield the minimum required returns in Indonesia for the developers and investors.

The draft new renewable energy bill (RUU EBT), still under discussion, is expected to provide a clearer regulatory framework to accelerate renewable energy development.

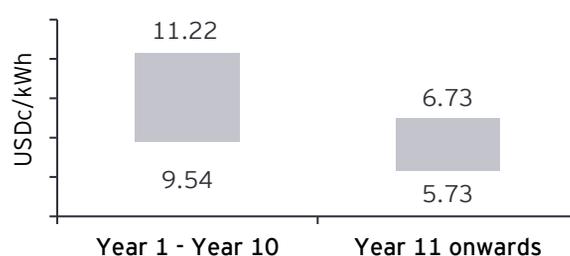
Feedback from stakeholder consultations also suggests that PLN is not still seen as actively engaging in PPA negotiations despite positive developments on renewable tariffs. This may be the result of the oversupply situation in many of the larger grids.

RE PR ceiling tariff(USDc/kWh) ranges based on technology, capacity, location and timeline

Graph 1. Solar tariffs for projects >20 MW



Graph 2. Wind tariffs for projects > 20 MW



1. For expansion of solar power plants, the ceiling price range is reduced by a factor of 0.2
2. For solar power plants built on government land, the ceiling price range is reduced by a factor of 0.05

1. For expansion of wind power plants, the ceiling price range is reduced by a factor of 0.3

Different tariff ceilings apply for various locations. Therefore, base tariffs are multiplied by a factor called "location factor". Location factors for territories across Indonesia range from 1.0 (Java-Bali) to 1.5 (Papua). Profitability of a project will depend on the location because tariffs for the first 10 years are linked to the location factor.

Source: Presidential Regulation 112/2022, September 2022

Indonesia

Non-financial barriers (cont'd)

Local content requirement



Stringent local content requirements for solar are cited as a barrier, given the lack of domestic manufacturing capacity.

Ministry of Industrial Regulation (MOI Regulation) No. 54/M-IND/PER/3/2012 (as amended by MoI Regulation No. 5/M-IND/PER/2/2017) stipulating local content requirement specifies the minimum percentage of local goods and services (measured by value) required to be used for the development of electricity infrastructure. The regulations do not specify LCR for wind power plants.

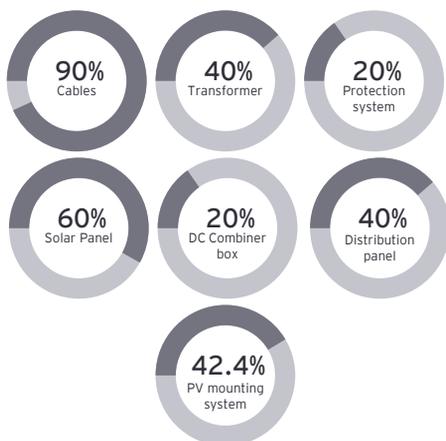
Local content requirements (LCRs) for solar projects have been highlighted by developers as being too difficult to comply with due to the lack of a mature domestic manufacturing industry/supply chain lagging in capacity and quality, itself a consequence of a sparse project pipeline in the country.

Ambitious LCR can lead to a paralysis of the industry as projects are unable to comply with such requirements. It has been quoted that Indonesia's domestic panel industry is not yet mature enough to produce tier-1 solar modules, which is a key requirement for investment by investors and lenders. Meeting these requirements is difficult and, if at all, render the project expensive and unattractive in relation to offered tariff ceilings. Stakeholders have quoted that a lower LCR with planned increases over time would enable the initial deployment and encourage the localization of manufacturing over time.

LCR for on-grid solar PV project

- ▶ The regulations cover the minimum threshold for local content for geothermal, gas, steam gas, hydropower and solar power plant (stand-alone and centralized off-grid, centralized on-grid)
- ▶ Import products maybe done under the following circumstances:
 - ▶ The goods cannot be produced locally
 - ▶ The technical specifications of local goods does not meet the requirements or
 - ▶ Domestic production quantity is not enough to supply demand (a statement by an association or factory is required to support this)
- ▶ Non-compliance with the LCR could lead to financial and administrative sanctions

For centralised on-grid solar PV, Min. Required local content for materials



For centralised on-grid solar PV, Min. Required local content value



Source: Institute of Energy Economics and Financial Analysis (IEEFA) Indonesia's Solar Policies 2019

Indonesia

Non-financial barriers (cont'd)

Land acquisition



A lengthy land acquisition process, with unrealistic price expectations of local stakeholders, adds to project costs and timeline.

Stakeholder feedback indicated that, like most emerging economies, acquiring land for renewable energy project development in Indonesia is a lengthy and complicated process due to a lack of clarity on title ownership in certain locations. Additionally, the governance in the country operates under a regime of national, regional and local government agencies with authority over land-use planning. E.g., developers must obtain permission from the Ministry of Environment and Forests before any land clearance can occur. If developers display adherence to regional spatial plans, permission is granted, and a location permit from the relevant regency overseeing the project's location would be issued. Once the developer receives the permit and before its expiry, it is the responsibility of the developers to finalize the land acquisition transactions promptly. This bureaucratic interlace of permissions and permits from various levels of authority creates challenges for developers to manage project timelines.

While law no. 2 of 2012 has improved the process of land acquisition in Indonesia and addressed the issue of unrealistic landowner pricing expectations to an extent (by establishing a mechanism whereby compensation can be determined by an independent appraiser should the negotiations between the parties fail to produce an agreement) implementation is not always guaranteed, leading to increased project costs.

Supporting infrastructure

Skepticism around the adequacy of supporting grid infrastructure creates hesitancy in investment.



There is no evidence of grid infrastructure being an issue for the few existing renewable energy projects. However, stakeholders are skeptical about the ability of the current grid infrastructure to sustain an increase in intermittent energy.

PLN must demonstrate its ability to deal with an increase in intermittent energy and allocate sufficient capital to develop the grid infrastructure required to support the c.41 GW of new capacity envisaged in RUPTL 2021-2030. As per the RUPTL 2021-2030, PLN estimated investment of c. IDR 213 tn in transmission and substations in this decade. With the expectation of the increased role of solar and wind, this investment will need to materialize to send a strong signal to investors.

Indonesia

Financial barriers

PPA bankability



The PPA with PLN is generally considered bankable by investors and lenders. Ownership lock-in requirements restrict smaller developers from recycling capital.

Stakeholder feedback suggests that the financiers generally considers PPAs with PLN bankable. Developers and lenders stated they are familiar with and, to a certain degree, comfortable with the general risk allocation. Therefore, the bankability of PPAs is highly dependent on the agreed tariff between the developer and PLN, which has been a matter of concern due to previously discussed reasons.

Developers have raised concerns about the "investor lock-in period" in power purchase agreements (PPAs), which prohibits investors from selling or redeeming their investment in the project. This restriction hampers the ability to improve financial structures and limits the recycling of equity capital that could be invested in new projects.

In many markets, independent developers would take a project to a "ready-to-build" stage before divesting partially or fully to larger and better-capitalized investor who would take the project to completion. The "investor lock-in period" in Indonesia prevents the nurturing of such an ecosystem of smaller or independent developers.

The PPA is considered bankable and the allocation of risks between PLN and developers is appropriate. They have highlighted that the lack of a project pipeline is the constraint. There are simply not enough projects to lend to.

The solar and wind PPAs with PLN are denominated in local currency IDR and provide for an indexation to USD.

This provides an option to use either IDR (with or without a cross currency swap) or USD project financing. Developers and lenders have highlighted that USD financing has generally been more competitive because of higher IDR interest rates and the cost of a cross currency swap.

Domestic banks can provide IDR-project financing and government backed FIs such PT Indonesia Infrastructure Finance (IIF) and PT Sarana Multi Infrastruktur (SMI) have proven to be successful in promoting IDR-project financing solutions and can be benchmarked as successful specialized financing vehicles. However, developers considering "inside the fence" PPAs with industrial/mining customers for self consumption, have highlighted the need for IDR project financing with competitive terms - lower cost of capital, longer tenors without requirement of corporate guarantee. Additionally, should the USD indexation be removed from PLN PPAs in the future, developers would rely more toward the domestic lending market for IDR financing.

This would mean that domestic lenders will need the capabilities to evaluate and deploy the required funding. A few domestic lenders have indicated they lack the required capacity and project finance products to fund renewable energy projects. Non-recourse project loans with long tenors to lend directly to renewable energy SPVs are limited. The market identifies the need for capacity building of domestic commercial bank personnel in terms of risk assessment, structuring and assessment of security value.

Domestic and international lending



Domestic and international lenders are interested and ready to deploy capital, however, the lack of a healthy project pipeline is the constraint.

Domestic and international lenders have indicated a strong appetite to support the deployment of renewable energy in Indonesia.

Indonesia

Financial barriers (cont'd)

Domestic and international lending



Domestic and international lenders are interested and ready to deploy capital, however, the lack of a healthy project pipeline is the constraint (cont'd).

It is yet to be tested if the domestic lending market will have sufficient depth to fund the deployment of renewable energy on a large scale once the project pipeline is unlocked.

An increasing number of projects may also test international banks limits, i.e., the aggregate exposure to PLN as the counter party. Diversification of PPA structures with the ability for projects to sell power directly to corporate end customers holds the potential to address this potential risk.

Indonesia also has a developed domestic loan and bond/sukuk market, which is also being readied for sustainable finance to allow dedicated pool of socially responsible investors to allocate capital toward projects with environmental benefits. This could be an additional source of raising funds for deployment in the renewable energy sector, both by the lenders and by large corporates and hopefully by smaller developers directly.

Domestic lending

Corporate guarantees are required to secure domestic lending during construction.



OJK Regulation No. 31/POJK.05/2016 states that borrowers need to provide physical security against a loan sufficient to cover the outstanding loan and interest payments. This is a challenge as assets under construction may not qualify as suitable security and domestic financing institutions would typically require a corporate guarantee until the project is completed. Developers indicate that such requirement is a barrier.

Source: Institute of Energy Economics and Financial Analysis (IEEFA) Indonesia's Solar Policies 2019



Just Energy Transition Partnerships

The JETP was announced at the 26th Conference of the Parties (COP26) as a financing mechanism provided by developed countries to help coal-dependent emerging economies realise just energy transitions.

Key features

Purpose	<ul style="list-style-type: none"> ▶ Aims to bridge the gap between developed and developing nations in moving toward clean energy
Focus countries	<ul style="list-style-type: none"> ▶ South Africa, Indonesia and Vietnam are the first three countries
Funding and sources	<ul style="list-style-type: none"> ▶ JETP funding is expected to comprise grants, loans or investments ▶ As of March 2023, the donor pool includes the International Partners Group (IPG) and the Glasgow Financial Alliance for Net-zero (GFANZ) Working Group ▶ The IPG consists of Japan, the USA, Canada, Denmark, France, Germany, Italy, Norway, the EU and the UK ▶ The GFANZ Working Group comprises multilateral and national development banks and finance agencies such as HSBC and Citibank
Ongoing programmes	<ul style="list-style-type: none"> ▶ South Africa <ul style="list-style-type: none"> ▶ First JETP announced at COP26 Glasgow in November 2021 ▶ The funders, five of the current IPG members, pledged US\$8.5b in the first financing round ▶ A year later, at COP27 Sharm El Sheikh, South Africa published its JETP Implementation Plan (JETP IP), laying out finance requirements of US\$98b ▶ Indonesia <ul style="list-style-type: none"> ▶ Second JETP announced at G20 Bali Summit in November 2022 ▶ Set to receive initial US\$20b in public and private financing over the next three to five years ▶ Donors to assist via grants, concessional loans, market-rate loans, guarantees, private investments and technical assistance ▶ In February 2023, Indonesia launched MEMR as the Secretariat for the Just Energy Transition Partnership. ▶ Vietnam <ul style="list-style-type: none"> ▶ Third JETP announced in December 2022 after a lengthy negotiation process ▶ Assist Vietnam in finance, technology and capacity building. It will also support the country's policy and regulation improvement to increase private investment in renewable energy ▶ The initial fund for the next three to five years is US\$15.5b ▶ Vietnam is expected to publish its JETP Resource Mobilization Plan (JETP - RMP) by November 2023

Source: Just Energy Transition Partnership, EY Research



ADB's Energy Transition Mechanism (ETM)

The ETM, launched in 2021, is Asian Development Bank's (ADB) top-down financing scheme intended to accelerate the process of retiring coal power from national energy grids and replacing it with other sources of power. It is a funding vehicle to phase out coal while scaling up renewables in Southeast Asia.

Key features

Purpose	<ul style="list-style-type: none"> ▶ Aims to use concessional and commercial capital to accelerate the retirement or repurposing of fossil fuel power plants and replace with clean energy alternatives ▶ Consists of two facilities: coal retirement and clean energy financing
Countries	<ul style="list-style-type: none"> ▶ Operates in Indonesia, the Philippines, Vietnam, Kazakhstan and Pakistan
Funding and sources	<ul style="list-style-type: none"> ▶ Targets to raise a total of US\$3b-US\$5b of funding for the two facilities ▶ Potential sources of funding: <ul style="list-style-type: none"> ▶ Japanese government has committed a grant of US\$25m as the first seed financing ▶ ADB is reported to be in conversation with philanthropies to raise additional funding facilities
Initial plan	<ul style="list-style-type: none"> ▶ Plans to launch pilot phase of 2-3 years to retire five to seven coal-fired power plants in the Philippines and Indonesia. ADB to support across: <ul style="list-style-type: none"> ▶ Establish policies and business conditions for the improvement of the programme's governance ▶ Carbon reduction and just transition goals ▶ Provide technical assistance for reskilling and the livelihood development of affected workers/communities ▶ Expected to retire 50% of the coal portfolio consisting of 30 GW in the Philippines, Indonesia and potentially Vietnam, over the next 10-15 years ▶ The total financing needed for the following countries to retire coal; estimates by Prudential <ul style="list-style-type: none"> ▶ Indonesia - US\$16b-US\$29b ▶ Vietnam - US\$17b ▶ Philippines - US\$5b-US\$9b
Latest known status	<ul style="list-style-type: none"> ▶ Aim to ultimately identify coal and other fossil fuel assets for early retirement or repurposing as part of the transition toward clean energy ▶ While ETM is scalable and replicable, unique characteristics of each country require a range of ETM models ▶ ADB is working extensively with stakeholders in participating countries to set up and tailor individual ETM programs

Source: [ADB ETM](#), EY Research

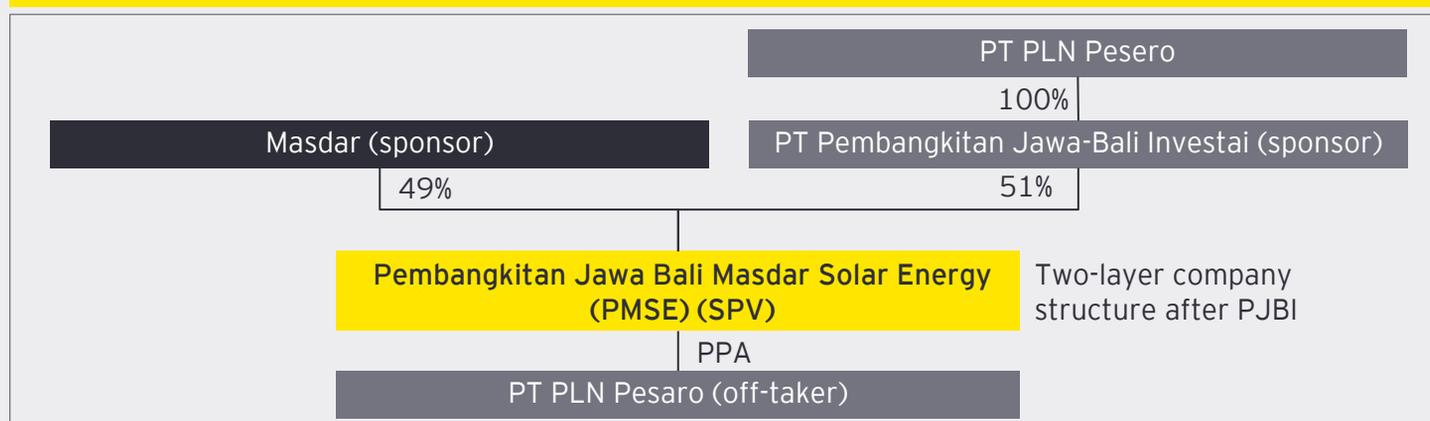
Financing structure in Indonesia

Typical financial structure offered by commercial lenders

Tenor	Coupon Rate	Key terms
▶ 12-18 years	▶ 10%-12% IDR financing ▶ 5%-7% USD financing	▶ Gearing ratio: 75:25

Case Study: Masdar floating solar project (designated as a National Strategic Project (NSP) giving it priority status) financed using international lenders.

145 MW Cirata floating solar project structure



Financial close	▶ Aug 2021
Project cost	▶ US\$150m
Debt	▶ Senior secured term loan ▶ Tenor: 15 years ▶ Maturity date: August 3, 2036
Lenders	▶ Standard Chartered Bank (US\$37.44m) ▶ SMBC (US\$37.44m) ▶ Société Générale (US\$37.44m)
Gearing	▶ 75%
Expected COD	▶ Q3 2023
PPA tariff	▶ USDc 5.8/kWh (vs. 2020 BPP USDc 7.05/kWh)

“ This achievement would not have been possible without the constant support of the Government of Indonesia, our lenders and our strategic partnership with PJBI and PT PLN, who have been with us on every step of our journey.

Mohamed Jameel Al Ramahi,
Chief Executive Officer of Masdar

Indonesia

Market recommendations

Stakeholder consultations have indicated the following priorities and ideas would support the market development:

Recommendations addressing non-financial barriers



1. A strong signal is needed from policymakers to the market that renewable energy deployment is a government priority through improvement in regulatory framework and permitting.

It is critical for policymakers to deliver on coal-retirement plans as a signal of the government's intention to accelerate the adoption of renewable energy, encourage market participation and attract capital.

PLN and policymakers could consider studying and disclosing the priority locations/grid connection points where renewable energy can be deployed in the near term. Doing so will assist the developers to focus their development activities on those regions and potentially offer renewable energy at competitive prices compared to other locations that may require additional development effort and are more suitable for the longer term as the market matures.

To eliminate the hurdles and expedite the land acquisition process, the government could consider setting up a specialized agency to assist and oversee land acquisition exclusively for solar and wind energy projects. The agency could support developers in identifying suitable land parcels and provide support on permitting.

The regulators and policy makers may consider allowing offsite corporate PPAs to enable private sector led off-take and capacity additions, allow PLN to earn a wheeling charge and increase attractiveness of Indonesia as an investment destination to secure more foreign direct investment.

2. Consider a phased approach to local content requirements to gradually encourage the development of local supply chain while maintaining cost competitive energy transition.



Policy makers could carefully review and reconsider the applicability of the local content requirement (LCRs) for solar PV projects, at least for the initial projects and targets up to 2025. This would ensure competitive prices and sustainable market development.

Policy makers could study benefits of a phased approach on LCR until the domestic supply chain matures to meet international standards and competitive pricing, which is expected to come hand in hand with a larger project pipeline.

Indonesia

Market recommendations (cont'd)

Recommendations addressing financial barriers



3. Develop a standard model PPA template to reduce negotiation lead times and provide certainty to the market on risk allocation

PLN could consider developing a standard PPA template based on the consistent framework for solar and wind projects to remove the need for project-by-project negotiations. Assistance from external expert agencies may be required. PLN and regulators could also review the need for an "investor lock-in period" in the PPA to enable recycling of capital, allowing developers to develop multiple projects in parallel and sequence.

4. Add depth to the domestic financing market by using blended finance to meet expected market demand for financing.



Several measures may add depth and support the development of the domestic market:

- ▶ Credit lines from external impact investors could blend with domestic lenders' own capital to enable USD lending or longer tenor and lower cost in IDR lending.
- ▶ Aid agencies and other supporting actors can work toward targeted capacity building for domestic commercial banks in terms of risk assessment, structuring and assessment of security value.



5. Potential need for guaranteed products to enable bankability and enhancement of credit.

A credit enhancement product in the form of a Partial Credit Guarantee (USD or IDR) could be considered, which could cover any potential default during construction (to enable domestic financing without the need for a corporate guarantee from the developers) or throughout the operational period to lower the all-in cost of funding. To enable this, impact investors could consider capitalizing on an existing provider with strong delivery capabilities. A credit enhancement product structured to enable projects to draw financing at a lower debt service coverage ratio (DSCR) threshold/gap funding could also be structured to enable the viability of debt financing and ensure returns for project sponsors.

Indonesia

Market recommendations (cont'd)

Recommendations addressing financial barriers



6. Enable an investment environment for Green social and sustainability bonds, focusing on capital deployment toward solar and wind energy projects.

Though not explicitly highlighted by market participants, Indonesia could explore establishing a conducive framework for sukuk and bond capital markets. This would offer solar, and wind projects an additional financing avenue as their pipeline expands. Malaysia's success story can serve as an example, where a 30 MW solar project utilized the sukuk market for financing.

Regulators could consider introducing financial incentives for green bond issuers, by way of exempting pre- or post-issuance cost for issuing a green bond, waiving the verification and external reviewer fee, or reducing or exempting of the listing fee altogether. Funding for such waivers and fees could be supported by various aid agencies working to support Indonesia renewable energy sector.



3.2

Malaysia

Malaysia

Overview of clean energy financing landscape

Malaysia has vast renewable energy potential that can provide local and affordable alternatives to coal and natural gas, which currently dominate (78%) the 36 GW installed capacity. Reliance on fossil fuel is higher in Peninsular Malaysia than Sarawak, where hydropower contributes 70% of the total capacity.

According to the Malaysia Renewable energy roadmap (MyRER) New Capacity Target (NCT) scenario, Malaysia aims to increase its renewables target from the existing 23% share at the end of 2020 to 31% (12.9 GW) in 2025 and 40% (18 GW) in 2035. To achieve this, Malaysia has set a solar target of 4.7 GW by 2025 with solar penetration of 24% of peak demand and 7.3 GW by 2040 with 30% of peak demand in Peninsular Malaysia.

Based on recent announcements in May 2023, Malaysia will target to increase RE target to about 70% by 2050, requiring investments of about MYR637b (US\$143b) between 2023 and 2050, an 11x increase.

While Malaysia has no commercially viable wind resources, it is endowed with suitable solar irradiation. The country's installed capacities of solar PV have been growing thanks to the establishment of concrete renewable energy policies and schemes. The regulators have conducted successful auctions for LSS projects since 2016. Approximately 2.5 GW of solar capacity has been awarded under the four auctions rounds, with the last round (LSS4) in 2021.

These auctions have been heavily oversubscribed, and tariffs have been reduced by c.50% between LSS1 and LSS4. LSS4 projects were, however, held back post-award due to COVID-19 and subsequent inflation on equipment costs that made awarded tariffs challenging to maintain.

To further accelerate the uptake of solar PV and meet its target for renewable energy installed capacity of 40% by 2035, Malaysia has launched a Corporate Green Power Purchase program, allowing third-party grid access for VPPA with a quota of 600 MW. Applications are to be submitted in May 2023. Once implemented, this will provide alternative avenues for utility-scale solar capacity additions.

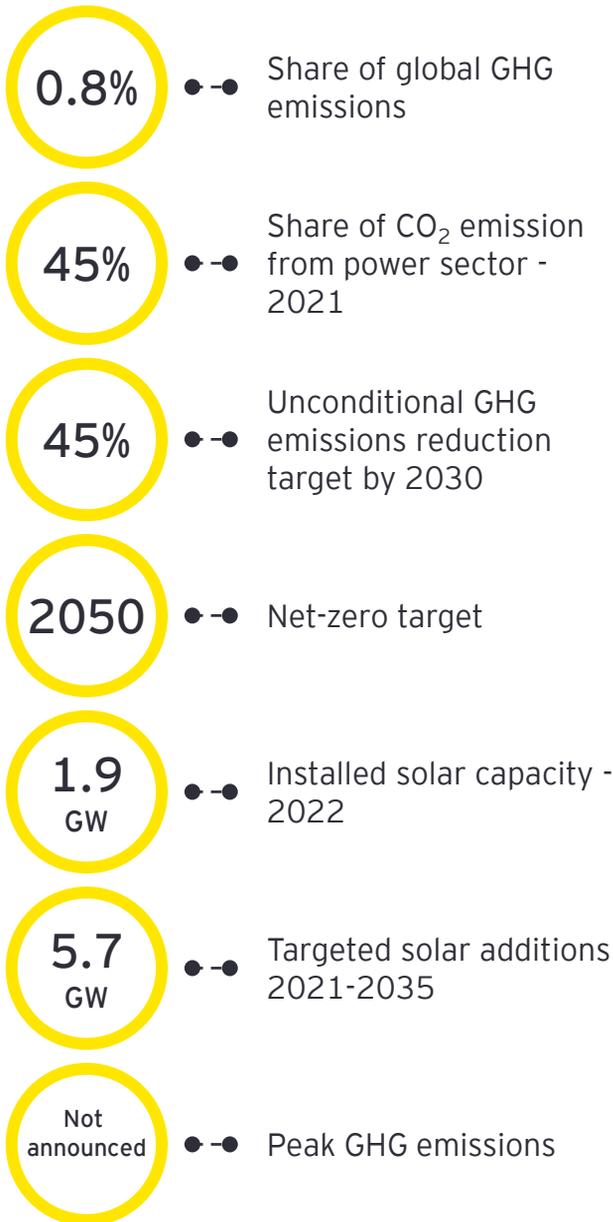
Malaysia has an active and deep domestic lending market with ample project finance, bond, and sukuk products, which are actively utilized to finance utility-scale solar energy projects. Malaysia has been a pioneer in introducing green sukuk to finance renewable energy and other green projects.

Solar energy firm Tadau Energy Sdn Bhd successfully issued RM250m worth of sustainable, responsible investment (SRI) Sukuk in 2017 to finance its 50 MW solar project in Kudat, Sabah, making it the first green sukuk issued in Malaysia. There are only a few examples of project bonds / sukuks in the region. However, Malaysia provides this opportunity for solar projects to raise direct financing from the bond market.

While stakeholders do not report severe challenges with Malaysian renewable energy policy and financing landscape, the market suggests a couple of levers to unlock capacity additions and enable financing for smaller projects.

Malaysia

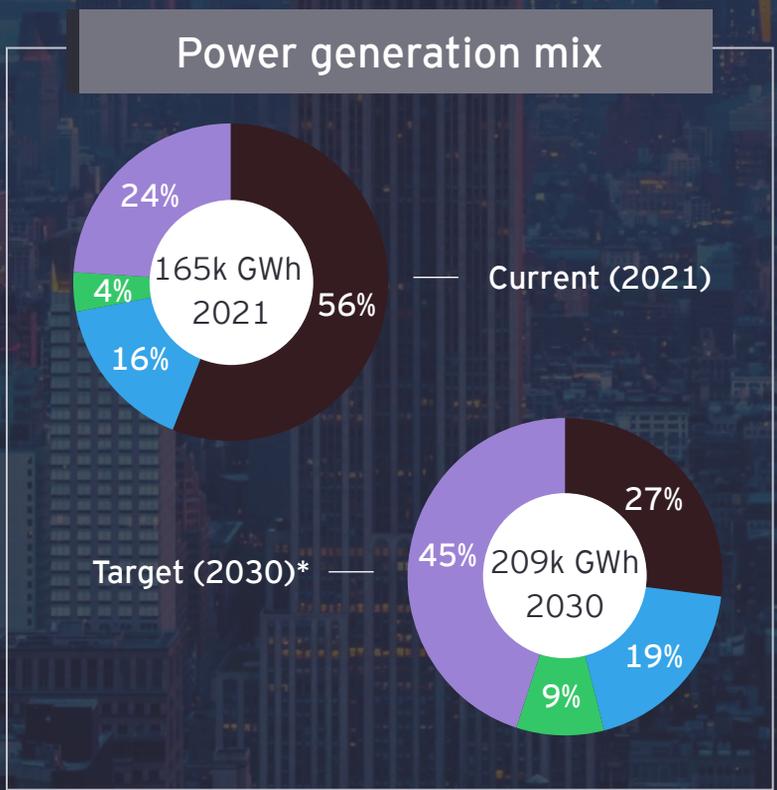
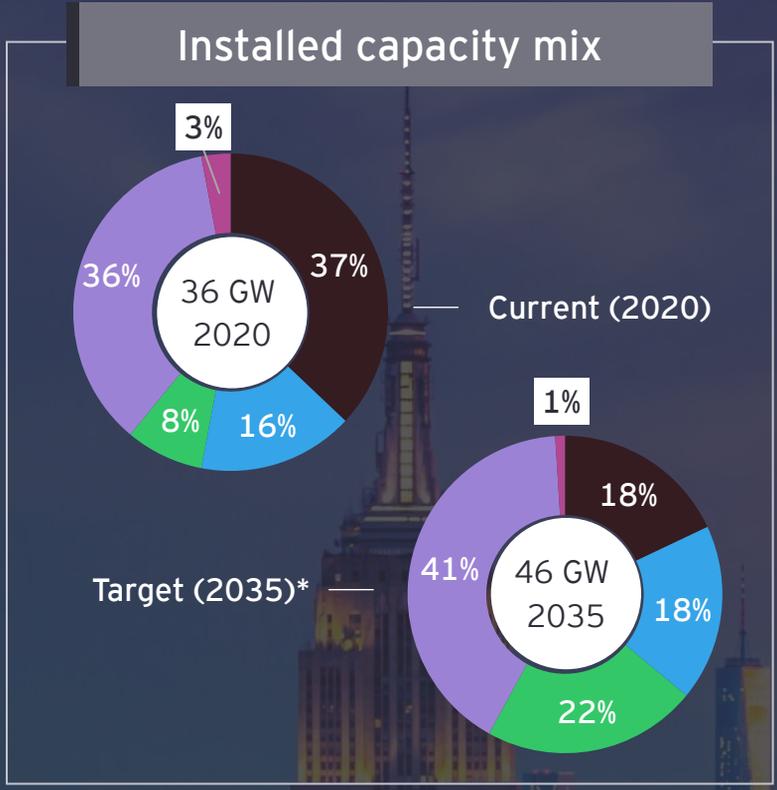
Snapshot of renewable energy deployment



Due to unfavourable wind generation economics, Malaysia has no wind installed capacity and no targets for wind generation

- ▶ In recent announcement in July 2023, The Ministry of Economy of Malaysia has announced to target more than 90% of RE in power mix by 2050
- ▶ Malaysia expects an investment of c.US\$145b on energy transition initiatives to achieve the objective

* New Capacity Target (NCT) scenario instead of BAU
 Source: Malaysia Renewable Energy Roadmap 2035 (MYRER), New Capacity Target (NCT) scenario, Emissions Database for Global Atmospheric Research 2022 and National Energy Transition Roadmap (NETR) Phase 1



■ Coal ■ Hydropower ■ Renewables
■ Gas ■ Others

Renewables include gas, solar, biomass and geo-thermal. Others include interconnection, diesel and distillate and industrial heat and process.

Malaysia

Snapshot of domestic loans and bond markets

Malaysia domestic bond market

US\$
477.8b

Outstanding LCY and FCY
bonds - March 2023

US\$
1.65b

Outstanding green
bonds/sukuk - March
2023

1st

First and only country among
ASEAN member states (AMS) with
project level green bond/sukuk

1st

Issued the first green sukuk in
the world in 2017 for solar PV
project

70%

of proceeds from green
bond issuance allocated to
energy projects

MYR

Only currency used for green
sukuk issuance

Malaysia domestic loan market

US\$
178.2b

Total loan/financing in
banking system - March
2023

US\$
950m

Credits mobilization by local
banks for renewable energy
projects in 2022

Investment in renewable energy sector

US\$
2.7b

Total investments realized in
renewable energy sector from
2016-2021

US\$
143b

Total investment required to
meet 40% renewable energy
target by 2035

US\$
375b

Total investment required to
become net zero by 2050

Note: Indirect investments regarding renewables development such as grid expansion are not calculated in this report.

Source: EY Research, AsianBondsOnline, Climate Bonds Initiative, Bank Negara Malaysia, Climatescope by Bloomberg NEF, Enerdata and IRENA

Malaysia

Overview of key barriers to renewable energy

Stakeholder feedback suggests the following areas as financial and non-financial barriers to the deployment and financing of utility-scale solar energy projects in Malaysia. Contribution and cooperation by more than one stakeholder group may be required to address or mitigate these barriers to some degree.

	Area	Solar/ wind	Description	Addressed by
Non-financial barriers				
Medium and low	Regulatory and policy landscape		Greater regularity of LSS auctions, an increased quota for Corporate Green Power Purchase program, and consistent local/foreign ownership requirements would further increase market attractiveness	Policy makers
	Pre-development process and expense		Uncertainty and challenges related to land conversion and acquisition during the pre-development stage increases risk and project costs	Policy makers
	Land acquisition			Policy makers
Financial barriers				
Medium and low	PPA bankability		While PPA is broadly considered bankable from a financing perspective, developers cite certain challenges related to timeline and current macro economic conditions. There is also a bankability concern for projects in the State of Sabah	Policy makers
	Domestic lending		While financing of large projects through loan or sukuk/bond market is not considered a challenge, smaller projects (10-30 MW) face challenges in tapping these sources	Lenders
Other barriers				
Not identified	Supporting infrastructure		Supporting infrastructure has not been highlighted by the stakeholders as a challenge	
	EPC/Supply chain		EPC/supply chain has not been highlighted by the stakeholders as a challenge	
	Local content requirement		Local content requirements have not been highlighted by the stakeholders as a challenge	
	International financing		Not applicable in Malaysia (domestic currency PPA)	

Regulatory and policy



A clear regulatory framework and well-designed auction mechanism for large-scale solar projects has proven successful in attracting developers. Greater clarity on future procurement window is expected by market participants.

There is limited clarity around the timeline of future LSS auctions. The fifth round was expected to start in 2023. Developers seek clarity from Policymakers and regulators on timeline to progress on development activities.



Unclear avenues for electricity sales outside the LSS auction.

Meeting the targets and investment requirements may require opening other avenues beyond large-scale solar auctions.

Developers quoted that third-party access to the grid would enable a significant utility scale corporate PPA market. Electricity export projects to Singapore, while would not contribute to green energy in Malaysia, may benefit market development by way of further bolstering supply chains and transmission network.

There seems to be progress on these matters as Malaysia announced a 600 MW pilot program, the Corporate Green Power Program (CGPP), an initiative to allow corporate consumers to purchase solar energy from developers under virtual power purchase agreements (VPPA), or Corporate Green Power Agreement (CGPA) in November 2022.

Malaysia also announced to end trade barriers for renewable energy exports. The announcement is welcome news for the developers and comes after an initial ban in December 2021. The National Energy Transition Roadmap (NETR) highlights that Malaysia is planning solar parks as well as renewable energy special zones.

Implementation of these multiple new avenues for off-take would be critical to meeting the capacity additions and market development.

Grid capacity limits hinder utilization of full potential.



At present, installed solar energy capacity in Sabah is at 84 MW (50 MW large-scale solar project in Kudat and 34 MW through the feed-in tariff). Based on the Malaysia Renewable Energy Roadmap (MyRER), Sabah ranked the highest in ground-mounted solar PV resource. About 99,400 MW can be tapped from solar panel installed on 1,887 sq km of undeveloped land area, or around 2.6 percent, of Sabah's land area. However, solar penetration is capped at 20% in the Sabah region to ensure system stability.

The Grid System Operator (GSO) established the thresholds due to concerns that the system may become unstable if solar generation reaches maximum levels in very low demand days.

Pre-development process and Land acquisition

Land conversion and acquisition uncertainty during the pre-development stage increase risk and project costs.



Identification of suitable land parcels for solar projects and validating the feasibility of selected land for solar development in terms of yield, interconnection and permitting have been cited as challenges by developers. This is particularly challenging as developers must have secured land before they can bid in the LSS auctions. In cases where the land is earmarked for agriculture, the land conversion process needs to be undertaken post-contract award. The costs and uncertainties involved in such process and land acquisition increase the development risk and consequently the cost of solar PV projects.



LSS auctions and falling bid prices in Malaysia

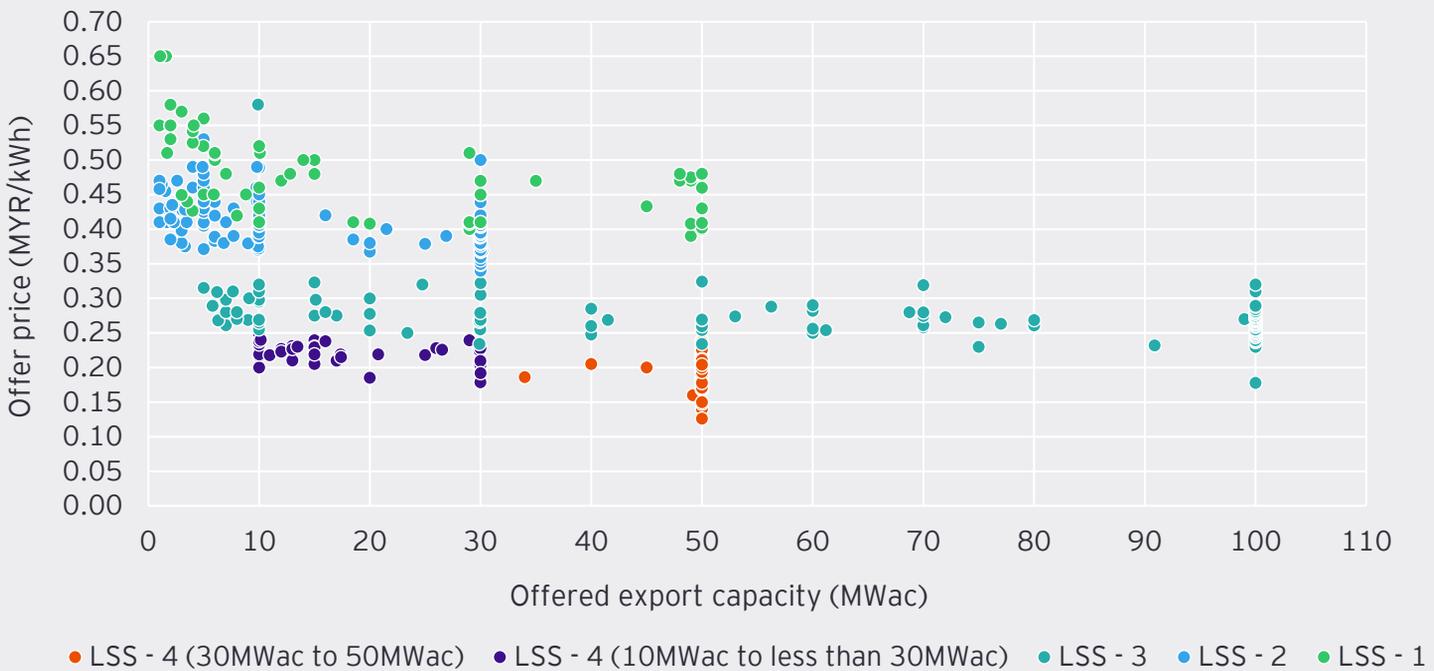
Malaysia has set an example for market-led price discovery and competitive bids, with every auction round at the back of a clear regulatory auction framework. While developers may complain about the competitive landscape and diminishing returns, this forces the market to innovate.

Since its launch in 2016 by the Energy Commission, Malaysia has held four competitive rounds of bidding under the LSS Programme (LSS1 - LSS4), which aimed to lower the Levelized Cost of Energy (LCOE) for LSS projects. The decreasing lowest bid price with each round implies that the LSS projects are increasingly viable and efficient at a lower cost. The lowering of tariff bids could be a result of a multitude of reasons ranging from solar PV technology advancements, lowered the cost of panel production, mature supply chain, project management improvements and better financing options. Despite the declining bid prices, the strong oversubscription of LSS4 underscores strong interest from project developers and investors' confidence in utility-scale solar farms in Malaysia.

Round	Year	Lowest bid price (MYR/kWh)	Lowest bid price (US\$/kWh)	Combined capacity
LSS1	2016	0.3900	0.084	450 MWac
LSS2	2017	0.3200	0.069	562 MWac
LSS3	2019	0.1780	0.038	491 MWac
LSS4	2020	0.1768	0.038	823 MWac

*Exchange rate: MYR 1 = US\$ 0.216

LSS auctions in Malaysia, raw offer price vs. offered export capacity



Green Sukuk issuance in Malaysia

Case Study: Green sukuk to refinance Solarpack's 116 MWp solar plant through 3SP

Named as the world's most sustainable utility by the Sustainalytics ESG Risk Ratings, Solarpack is a Spanish solar photovoltaic (PV) power producer with a global presence. In April 2023, Solarpack raised MYR285m through its project company Solarpack Suria Sungai Petani Sdn Bhd (3SP). While there are not many examples of project bonds/sukuks in the region, Malaysia provides this opportunity for solar projects to raise direct financing from the bond market.

Project summary	
Country	Malaysia
Size	MYR285m (US\$64.3m)
Use of proceeds	Refinance the existing bridge loan of 3SP used for the construction of 116 MWp solar farm in Mukim Sg. Petani, Kedah
Tenor	38 semi-annual tranches with tenors ranging from 1 to 19.5 years
Bond framework used	3SP's ASEAN Green Sustainable and Responsible Investment (ASEAN Green SRI) Sukuk Wakalah Framework
Additional project details	<p>Kedah, located in northern Peninsular Malaysia, is one of the Malaysian states with higher solar radiation in the country. The solar farm is expected to produce an estimated 177 GWh per year.</p> <p>In late 2019, Solarpack and their local consortium partner JKH Renewables were shortlisted in the 3rd LSS3 tender and entered a 21-year PPA with Malaysia's sole electricity utility provider Tenaga Nasional Berhad (TNB).</p> <p>The project has an estimated emission reduction of 1.99 million tonnes of greenhouse gases through the lifetime of the project</p>

3SP's ASEAN Green Sustainable and Responsible Investment (ASEAN Green SRI) Sukuk Wakalah Framework

Eligible project category	Renewable energy production
Use of proceeds	To finance and/or refinance, in part or in whole, new costs or existing loans to fund the development, construction, installation and operation of electricity generation facilities that produce electricity from solar photovoltaic projects, generating clean renewable while creating employment for country nationals
Standards used	ASEAN Green Bond Standards, Securities Commission Malaysia's Sustainable and Responsible Investment Sukuk Framework and International Capital Market Association's Green Bond Principles
External review	Second Opinion Report by RAM Sustainability Sdn Bhd

Source: Solarpack

Malaysia

Non-financial barriers

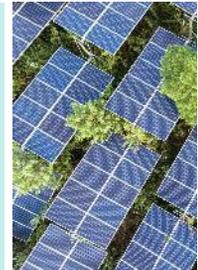


Market participants would benefit from more clarity on domestic/foreign ownership restrictions for LSS and CGPP projects challenging.

Market participants have cited challenges with foreign ownership restrictions. For LSS(1-3) and CGPP, bidders are required to maintain at least 51% local shareholding. The criteria for LSS4 was narrowed down, allowing only companies 100% Malaysian-owned or listed with at least 75% shares held by local people or companies to participate. Greater clarity and consistency across auctions and programs is needed to ensure market participants form the right partnerships and consortiums.

five years from the Commercial Operation Date of the solar projects. Project developers consider this period long as it restricts their ability to recycle capital for new project development.

The creditworthiness of the national utility in Sabah is a constraint for investors and lenders, which may lead to an “uneven greening” of Malaysia.



The electricity grid that supplies power in Sabah is owned and operated by Sabah Electricity Sdn Bhd (SESB). Under the single-buyer model, SESB is Sabah's sole off-taker of electricity. SESB's financial situation suffers from a lack of cost recovery, and as a result, the creditworthiness of SESB is a constraint for developers and lenders. The creditworthiness of SESB is hampering the development of solar projects in Sabah, which may result in an “uneven greening” of Malaysia.

PPA bankability



While PPA is broadly considered bankable from a financing perspective, developers cite certain challenges related to timeline and current macroeconomic conditions.

Developers have also indicated that stringent timelines set by Single Buyer combined with policies related to permitting and land use varying between states sometimes impede achieving financial close.

It is understood from developers' feedback that inflation and rising interest rates have impacted the last round of solar projects awarded through the LSS4 program in achieving financial close.

Domestic lending

While financing large projects through loans or the Sukuk/bond market is not considered a challenge, smaller projects (10-30 MW) face challenges in tapping these sources.



PPAs are denominated in MYR and not indexed to USD. Stakeholders have indicated that domestic financing for renewable energy projects is available for large-scale projects without challenges. Project financing solutions are widely available from commercial banks (both domestic lenders and international lenders active in Malaysia) as well as the local sukuk bond market.

Developers have highlighted that medium-scale projects are too small to enable bond financing yet still too large for pure equity financing. Project loan financings, while available, remain the only option for such projects.



The investor lock-in period in the PPAs is considered long by smaller developers.

The PPAs of both LSS and CGPP programs prohibit a change in shareholding within the first

Renewable energy initiatives in Malaysia

Various fiscal incentives are in place for renewable energy project developers:

<p>Green Technology Financing Scheme (GTFS)</p>	<p>Applicable for producers of green technology (RE generators), green technology users and energy efficiency-related projects</p> <ul style="list-style-type: none"> ▶ GTFS 1.0: Initiated in 2010, with US\$0.8b (MYR3.6b) approved in green financing. Performance assessment found 28 financial institutions provided support to 319 projects between 2010 to 2017, with more than 90% beneficiaries being small and medium enterprises. This resulted in US\$1.6b (MYR7.05b) in green investments, including in renewable energy projects generating 532.9 MWh annually. Of the total finance, 53% came from conventional financing and 47% from Islamic financing ▶ GTFS 2.0: In March 2019, the Ministry of Finance approved GTFS 2.0, for majority Malaysian-owned companies, allocating US\$0.47b (MYR2b) for period January 2019 to end of 2020. This offered a 2% annual interest subsidy for the first seven years, with the government providing a 60% capital guarantee on the financing. Performance assessment showed by end of 2019, 35 projects been certified at a combined cost of US\$0.37b (MYR1.6 b), with 25 projects receiving bank loan approvals of US\$0.2b (MYR0.9b). Around half of the projects are solar (mainly utility scale). The impact is expected to reach US\$0.3b (MYR1.33b) in green investments ▶ GTFS 3.0: awaited to be launched
<p>Green Investment Tax Allowance (GITA)</p>	<ul style="list-style-type: none"> ▶ Tax incentives for the acquisition of green technology assets or undertaking of green technology projects ▶ Through Budget 2023, application period extended to December 31, 2025. Also proposes to extend the tax allowance from 3 to 5 years ▶ Allows 70% of Qualifying Capital Expenditure (QCE) incurred to be offset against 70% of statutory income to reduce tax liability.
<p>Green Income Tax Exemption (GITE)</p>	<ul style="list-style-type: none"> ▶ For green technology service provider companies ▶ Through Budget 2023, application period extended to December 31, 2025. Also proposes to extend the tax exemptions from 3 to 5 years ▶ Allows green service providers to exempt 70% of their statutory income

Malaysia

Market recommendations

Stakeholder consultations have indicated the following priorities and ideas would support the market development:

Recommendations addressing non-financial barriers



1. A regular and predictable rollout of renewable projects in the country and multiple avenues for off-take.

Stakeholders have indicated that Malaysian energy regulators can leverage its robust auction framework and launch bid windows regularly to maximize market interest.

2. Promote floating solar to deal with land acquisition challenges.



According to MyRER, Malaysia's estimated floating solar PV resource is smaller than ground-mounted solar but at an appreciable 16.6 GW. Policymakers and regulators could consider promoting floating solar, which can add solar capacity and address land acquisition concerns.



3. Consider making fundamental changes in securing land.

While not an easy ask, the Malaysian government could take a more proactive approach to identifying land parcels for solar development, facilitating the land use conversion process, and considering solar park development to assist with private sector access to land, to reduce the uncertainties around land during the pre-development stage.

A case in point is India, where local utilities and state governments pre-develop land parcels under Solar Park Scheme and provide the necessary infrastructure (e.g., interconnections) to boost solar PV auction participation.

Malaysia

Market recommendations (cont'd)

Stakeholder consultations have indicated the following priorities and ideas would support the market development:

Recommendations addressing financial barriers



4. Enable a Corporate PPA program to accelerate the deployment of capital.

Implementing a grid's third-party access regulation would enable a healthy Corporate PPA market, which developers estimated to be well above the current pilot of only 600 MW.

5. Credit enhancement solutions are required to green Sabah State.



Credit insurance products are needed to enable the development and financing of solar projects in the State of Sabah.



6. Improving access and deployment of green financing structures to Small and Medium Enterprises.

While certain banks in Malaysia are already offering SME Renewable Energy financing, more can be done in providing training to SME's in raising project finance for small and medium size utility-scale renewable energy projects.



3.3

Thailand

Thailand

Overview of clean energy financing landscape

Thailand updated its nationally determined contribution (previously announced at COP26 in 2021) at COP27 in June 2022. As per new targets, Thailand aims to reduce its 2030 emissions by 40%, compared to business-as-usual levels, and reach carbon neutrality by 2050 and net zero GHG by 2065. The power sector accounts for 23% of total carbon emissions.

The latest version, Power Development Plan 2018 Revision 1, was published in 2020 and covers planning from 2018 to 2037.

In 2021, 66% of Thailand's generation mix was covered by natural gas and 17% by coal, while low-carbon sources provided only ~12%. Therefore, a rapid scale-up of renewables will be needed to align power sector development with Thailand's climate commitments. Thailand is endowed with high solar irradiance in the northeast and southern parts of the country. Wind power potential is in the northeastern region of the country. However, the demand centers are in the center of the country. Transmitting solar and wind power from the good resource areas toward demand centers would require investment in transmission networks.

Floating solar is a focus in Thailand. The country has commissioned a 45 MW floating solar PV plant and is targeting to add more than 2.7 GW through 15 other such plants on existing hydropower projects to harness synergies in relation to transmission and leverage on complementary seasonality.

Thailand was an early adopter of renewable energy in the region through the implementation of supportive policies such as the Adder scheme, Energy-for-all Scheme, Feed-in-Tariff (2015) mechanism, and other tax incentives to initiate the deployment of renewable energy. It was, at some point, the largest solar market in Southeast Asia.

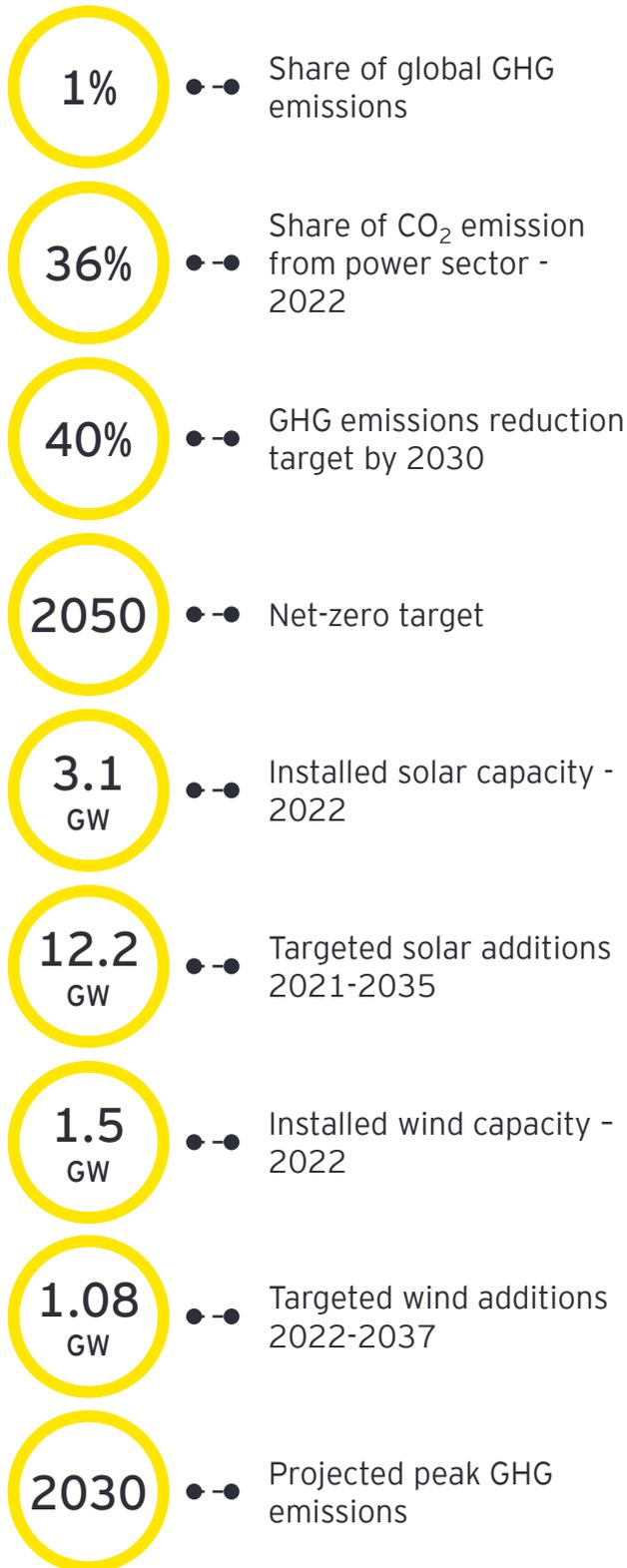
However, momentum slowed, and only a few utility-scale renewable energy projects came online in recent years. In September 2022, ERC announced FiT-based procurement for 5.2 GW renewable energy projects for implementation between 2022 and 2030. Selected bidders and projects under the phase 1 round were announced recently in April 2023. ERC has now launched phase 2 with target capacity additions of 3.6 GW. The phase 1 tender invited "firm PPAs" for 1 GW of ground-mounted solar with Battery energy storage systems, reflecting Thailand's advancement in adopting newer technologies.

Developers have cited challenges with land acquisition and supporting infrastructure. However, financing renewable energy projects has not been highlighted as a barrier in Thailand, which has an active and deep domestic project finance market. Thailand corporates have also tapped the green bond market to raise capital. ADB invested US\$155m in the country's maiden 5 to 7-year green bonds. Proceeds were earmarked for nine operational solar projects with a total capacity of 67.7 MW and seven solar plants under construction with a total capacity of 30.8 MW. Recent launch of green taxonomy is also aimed to assist financing for renewable energy projects.

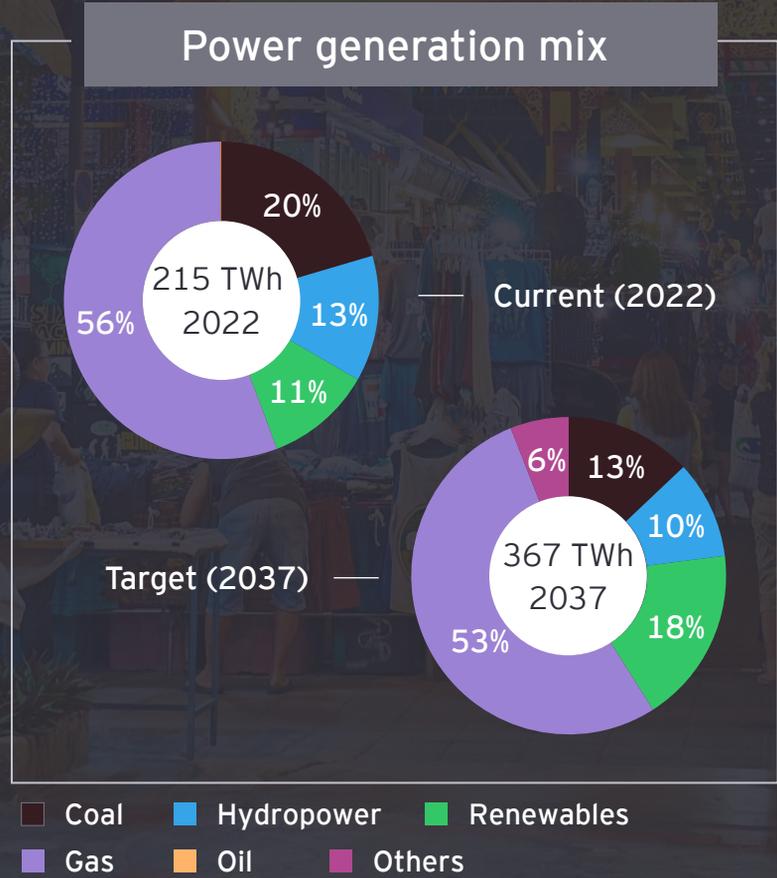
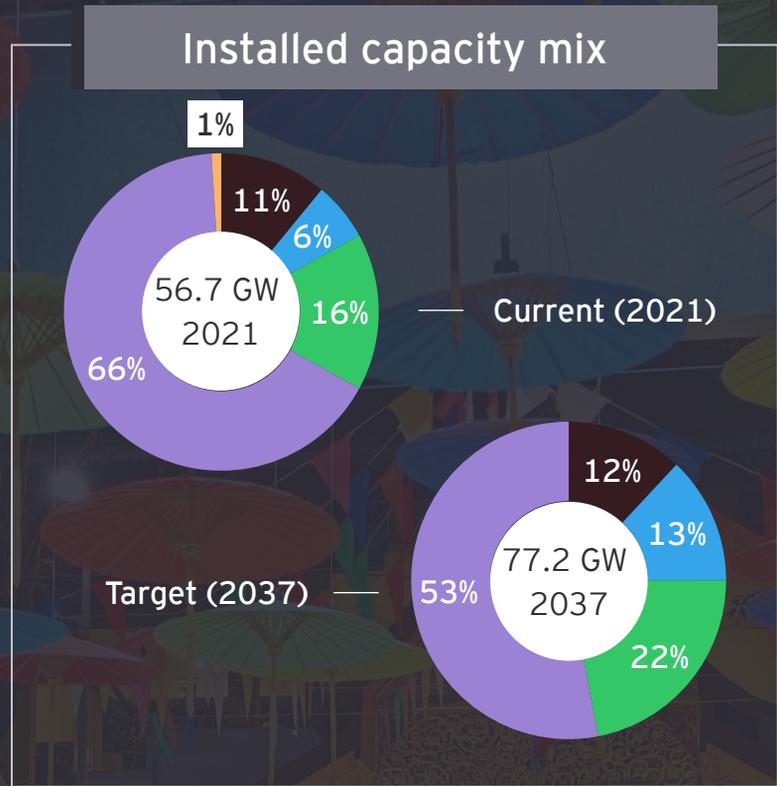
No challenges have been cited in relation to risks in the PPA contracts and the acceptability of it by the lenders. International financing is not required as the PPAs are denominated in THB and do not provide indexation to the USD.

Thailand

Snapshot of renewable energy deployment



New PDP 2023-2037 will be published by 2023, which would increase renewable energy make up to 50% of total fuels used electricity generation by 2036. The net-zero target will also be shifted from 2065 to 2050



Renewables include solar, wind, small hydro, geothermal, biomass and biogas

Source: Thailand Power Development Plan 2018-2037, Ministry of Energy Policy and Planning Office Statistics, Emissions Database for Global Atmospheric Research 2022 and IEA ASEAN Renewables Investment Opportunities and Challenges

Thailand

Snapshot of domestic loans and bond markets

Thailand domestic bond market

US\$
491.7b

Outstanding LCY and FCY
bonds - March 2023

3rd

Ranked as the third largest
bond market in ASEAN

THB

Preferred currency for green
and sustainable bond issuance

Note: LCY bonds are bonds issued in local currency i.e., Thai baht, while FCY bonds are issued in foreign currency

US\$
3.86b

Outstanding green bonds -
March 2023

2nd

Rank in ASEAN in green
bond issuance

55%

of proceeds from green bond
issuance allocated to energy
projects

Thailand domestic loan market

US\$
279.6b

Outstanding private sector
loans - March 2023

US\$3b

Credits mobilization by
local banks for renewable
energy in 2022

US\$
418m

Cumulative green loan
issued from 2020 to
Q12023

Investment in renewable energy sector

US\$
5.1b

Total investment
realized in renewable
energy sector from
2016 - 2021

2%-5%

of GDP required for annual
investment to transform power
sector (low-carbon technologies,
battery storage EV)

US\$10b-
US\$24b

Average annual
investment required to
transform power sector

Note: Indirect investments regarding renewables development such as grid expansion are not calculated in this report.

Source: EY Research, AsianBondsOnline, Climate Bonds Initiative, Bank of Thailand, Bangkok Bank, efinanceThai, Kasikorn Bank, Bank of Ayudhya, CIMB Thai Bank, Climatescope by Bloomberg NEF, CASE for Southeast Asia

Thailand

Overview of key barriers to renewable energy

Stakeholder feedback suggests the following areas as financial and non-financial barriers to deploying and financing of utility-scale solar and wind energy projects in Thailand. Contribution and cooperation by more than one stakeholder group may be required to address or mitigate these barriers to some degree.

Area	Solar/ wind	Description	Addressed by
------	----------------	-------------	--------------

Non-financial barriers

Medium and low	Regulatory and policy landscape		Developers cite a start-stop approach and modest ambition to procurement as a barrier to development of solar and wind projects	Policy makers
	Land acquisition		Land acquisition process can be lengthy and challenging, resulting in long lead times for project development	Policy makers
	Pre-development process and expenses		Requirements related to land procurement in the FIT tender conditions increases cost of project development	Policy makers
	Supporting infrastructure		Transmission grid may not be well-equipped to handle the large-scale renewables deployment in high resource areas	EGAT and policy makers

Other barriers

Not identified	PPA bankability	PPA bankability has not been identified as a barrier by the market participants
	EPC/Supply chain	EPC or supply chain has not been mentioned as a challenge by market participants
	Local content requirement	Local content requirements were not mentioned as a challenge by market participants
	Domestic financing	Domestic financing is widely available at competitive rates
	International financing	International financing is not needed as the project tariffs are in THB and not indexed to USD

Thailand

Non-financial barriers

Regulatory and policy landscape



While recent FiT bids brought back the missing momentum, developers cite a start-stop approach and modest ambition to procurement as a barrier to development of solar and wind projects.

While the market welcomed recent procurements, the policy uncertainties procurements and lack of clarity on long-term procurements of renewable energy projects are a disappointment for the private sector.

It was reported that 175 companies, with a combined capacity of 17 GW, submitted proposals for the recent FiT-based scheme with

a quota target of 5.2 GW. This reflects the private sector's active interest in Thailand's renewables market, which has been dormant for some time.

Private sector readiness and response indicate the potential for the Government to increase its ambition and targets for solar and wind projects in new schemes.

ERC FiT renewables scheme - Phase 1

Type	Capacity (MW)	FiT price (THB/kwh)	FiT price (US\$/kwh)*	Winners (non-exhaustive)
Biogas	335	2.0724	0.059	▶ Gulf
Wind	1,500	3.1014	0.088	▶ B Grimm
Ground-mounted solar farms	2,368	2.1679	0.062	▶ Absolute Clean Energy
Ground-mounted solar + battery storage	1,000	2.8331	0.081	▶ Thai solar energy, BCPG
				▶ WHA Utilities and Power Plc (WHAUP)

Additional FiT premium of THB 0.50/kWh for projects located in the southern border provinces.

*Exchange rate: THB 100 = US\$ 2.85

Renewables	Targeted MW purchase (MW) for each year of scheduled commercial operation dates (SCODs)							
	2024	2025	2026	2027	2028	2029	2030	Total
Biogas (from wastewater/ solid waste)			75	75	75	70	40	335
Wind		250	250	250	250	250	250	1,500
Ground-mounted solar	190	290	258	440	490	310	390	2,368
Ground-mounted solar with BESS	100	100	100	100	200	200	200	1,000

Source: [Infrastructure Journal](#), [Recessary](#), [Chandler MHM](#)

Thailand

Non-financial barriers (cont'd)

Land acquisition



The land acquisition process can be lengthy and challenging, resulting in long lead times for project development.

Developers have cited that land acquisition continues to be a barrier for solar and onshore wind projects. The availability of suitable land, particularly for solar, is limited, especially in densely populated areas or areas with high agricultural activity.

Stakeholder consultations also indicate that local communities sometimes resist the development of renewable energy projects due to concerns about the impact on the environment, heritage, and livelihood.

Supporting infrastructure

The transmission grid may not be well-equipped to handle the large-scale renewables deployment in high-resource areas.



Like most markets with transmission grids built for fossil fuel base load projects, transmission grid infrastructure creates challenges for intermittent generation from renewables.

Stakeholder feedback indicates a mismatch between high resource potential areas for solar and wind and the demand load centers in Thailand.

For projects under the latest FiT scheme, applicants must identify a grid interconnection point by submitting the request to the Electricity Generating Authority of Thailand (EGAT) and obtain confirmation on the grid's ability to handle additional electricity generation.

Supporting grid infrastructure for new projects will need to be built by the developer at additional cost and can significantly increase the overall project cost depending on project location. Reaching an optimal bid price by evaluating projects in high resource generation areas plus high transmission costs and projects in lower resource generation plus lower transmission costs has been challenging for the private sector.

Predevelopment process and expenses



Requirements related to land procurement in the FiT tender conditions increase the project development cost.

The FiT bid stipulates that participants are prohibited from altering the project's location, contracted capacity, or type of renewable power plant after being awarded. Developers understand this as a fair ask as selection is based on a combination of these factors. However, developers indicated they are often required to make an upfront investment to secure rights to use land or land ownership before winning the bid, and this is "capital at risk" without assurance of winning the project. Additionally, a local nuance is that land rights typically have a time-bound validity and must be utilized within a designated timeframe.



Thailand bond market case study to finance renewable energy

Case study: Global Power Synergy Public Company Limited (GPSC)

As the leading power generation company in Thailand and a subsidiary of the PTT Group, GPSC is one of the top corporate green bond issuers in the country. In 2023, GPSC received the award “Corporate ESG Bond of the Year” by the Thai Bond Market Association in the awarding ceremony of Best Bond Awards 2022.

Green issuance summary

Country	Thailand
No. of issues	8, from September 29, 2017 to April 4, 2023
Total outstanding	THB17b
Tenor	Ranges from 5 to 15 years
Historical coupon yield	Fixed rates depending on tenor and issuance dates: 1.97%, 2.11%, 2.21%, 2.24%, 2.52%, 2.55%, 2.82%, 2.86%, 2.94%, 3.04%, 3.15%, 3.24%, 3.25%, 3.56%, 3.75%, 3.78%
Standards used	ICMA GBP 2021, ACMF ASEAN GBS 2018, LMA/APLMA GLP 2021
External review	External verification to be provided by a second party opinion provider/verifier/external auditor
Others	CBI certified

GPSC's Green Finance Framework

The use of proceeds will be relevant for investment and/or refinance in whole or in part, new and/or existing eligible projects of GPSC and its affiliates through the categories of Renewable Energy, Energy Efficiency, Pollution Prevention and Control and Clean Transportation.

For renewable energy, projects can be for the acquisition, conception, construction, development and installation as well of re-powering of renewable energy production. Eligible projects include solar projects, wind projects and run-of-the-river hydropower projects except large-scale hydropower projects over 25 MW.

GPSC's energy portfolio

Hydropower
449 MW

Solar power
2799 MW

Offshore wind
149 MW

Cogeneration
4431 MW

Source: GPSC Green Finance Framework 2022, GPSC Green Debenture No. 1/2022



Thailand

Market recommendations

Stakeholder consultation has indicated the following priorities and ideas would support the market deployment:

Recommendations addressing non-financial barriers



1. Policymakers may consider moving from FiT-based bids framework to auction-based procurement framework for solar and wind projects to discover market price competitively.

Pre-declared feed-in-tariffs provide market players certainty over project cashflows before bidding and allow room to make higher returns with better structuring. This approach does not however achieve the most competitive price for the utility.

Thailand's energy regulators may consider moving to an auction-based procurement framework to reward competitive bids. The overwhelming interest in FiT bids indicates sufficient interest for a successful auction. Given the diversity in solar and wind potential across Thailand, policymakers can consider regional auction quotas to allow for true cost based on the location of the project.

2. Policymakers and EGAT should promote floating solar to deal with land acquisition challenges.



Riding on the success of the 45 MW Sirindhorn dam floating solar project, noted as the largest floating solar farm, EGAT can consider exploring other hydro dams for more such projects. Installing solar PV on the water means less land is needed to develop it. This also reduces land acquisition challenges in such projects while increasing yields thanks to the cooling effect of the water.

IEA highlights that adding solar PV to a system with hydropower allows harnessing interesting synergies between the two technologies, as they have strong seasonal complementarity. While adding PV to an existing hydro dam has advantages, such as reducing transmission interconnection costs, it can also create adverse effects, such as not being the most optimal location regarding resource availability. This, along with the impact on local communities e.g., fishing communities, should be examined to ensure sustainable development.



3. Consultations between EGAT and developers may assist in identifying priority investments into the grid infrastructure.

Developers have been scouting the country's best resources for solar and wind for several years and have a good insight into the geographies most appropriate for renewable energy development, which could assist the Electricity Generating Authority of Thailand (EGAT) in prioritizing grid infrastructure investments.



3.4

The Philippines

The Philippines

Overview of clean energy financing landscape

The Philippines features an unbundled electricity market compared to its peers in Southeast Asia. The power sector is unbundled, with the generation and distribution sectors privatized. The transmission sector is also managed by the private sector with a 25-year concession awarded to the National Grid Corporation of the Philippines. An active Wholesale Energy Spot Market (WESM) exists in Luzon and Visayas, with a 10-year operating history. Mindanao and some islands with mini-grids are currently isolated from the WESM. Coal now makes up over half of the energy mix at 58.5% and is expected to stay dominant until 2030, while renewables are projected to increase their share from 22.5% (Q2 2022) to 35% in 2030.

Solar and wind energy comprise 5.1%(1.4 GW) and 1.6%(0.4 GW) of the total installed capacity of 27 GW. 35% of renewable energy is projected in the power generation mix 2030 and 50% by 2040. This means capacity additions of 74 GW are expected from renewable energy in the next two decades. Solar and wind are the focus technologies to meet this target. Offshore wind is picking momentum in the Philippines; the Department of Energy is working toward optimal development of the country's Offshore Wind resources.

Given the government's ambitious plans to transition to renewables, reducing coal to a 24.7% share of the capacity mix is expected in 2030. The first transaction under the energy transition to accelerate the retirement of a coal-fired power plant saw investment from an insurance fund (Fixed income-oriented, long-term investor) with value creation through investment in renewable energy assets. More such transactions are likely to follow.

Given the landscape of activity and potential opportunity, Investors and developers now rank the Philippines highest in terms of renewable energy investment attractiveness within Southeast Asia.

With most levers for renewable energy growth (sizeable projects, pipeline of projects and auctions, multiple off-take options for the sale of electricity, deep domestic financing market, etc.) in place in the Philippines, the speed of development is only hampered by a lengthy and complex regulatory approval process related to permitting and obtaining interconnection approval from the transmission company. It is understood from developers that the requirements in the recent auction framework related to performance bonds created hindrances for smaller, capable developers to participate.

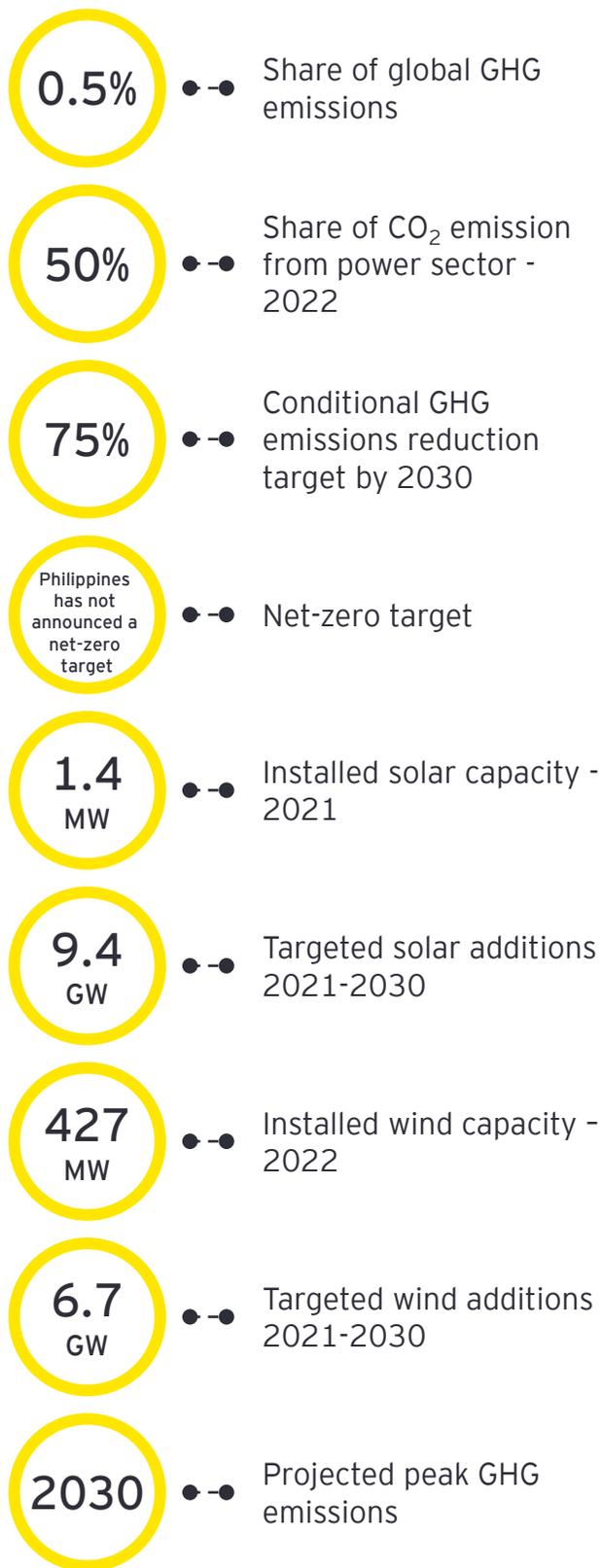
As wind energy picks up momentum in the Philippines, there is an emerging need for technical evaluation of newer, untested technologies to ensure successful projects and sustained market development.

Project financing for solar and wind energy projects is well-established with multiple domestic banks and products available. However, with the growth of solar and wind projects relying on merchant sale of electricity into the WESM, projects contracting with financially weaker distribution utilities and the potential for large ticket-size offshore wind, there is an emerging need to support the domestic financing market with additional products.

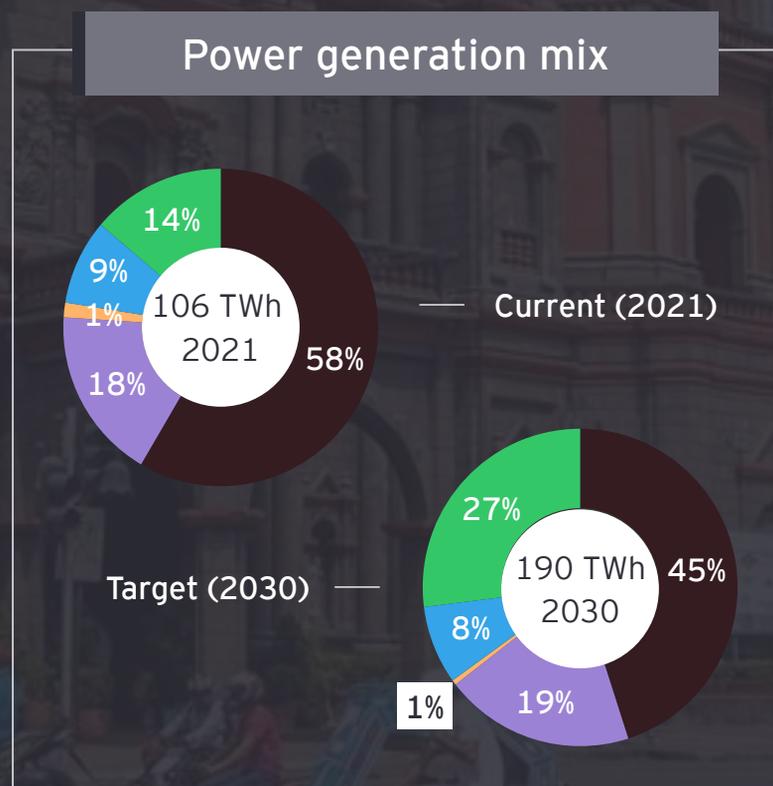
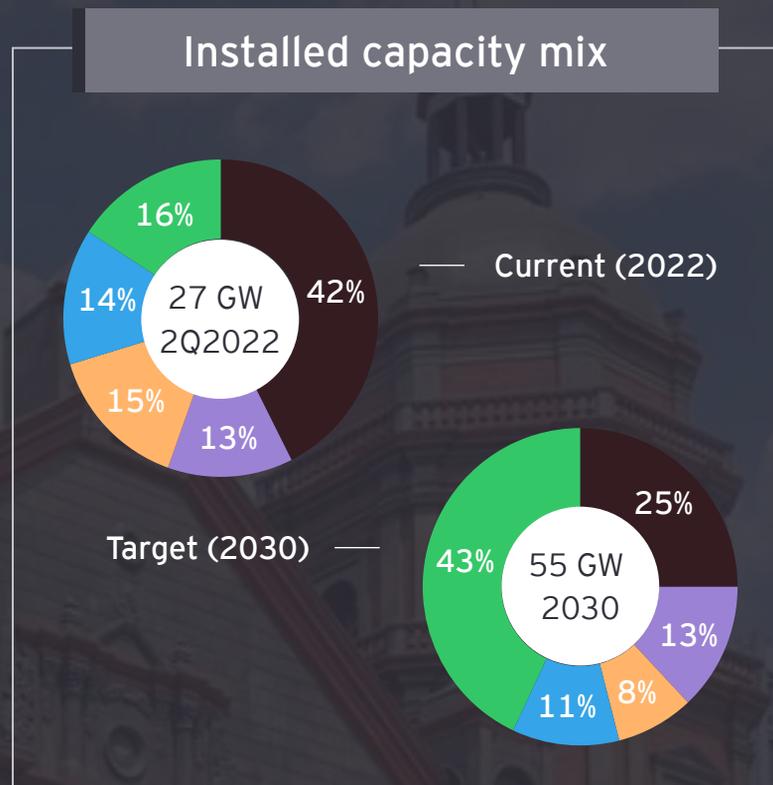
These obstacles and difficulties can be effectively addressed. The following sections of this chapter delve deeper into market insights concerning both financial and non-financial hurdles and aims to formulate recommendations for essential stakeholders and participants.

The Philippines

Snapshot of renewable energy deployment



Source: National Renewable Energy Program 2020-2040 (NREP), The Philippines Department of Energy and Emissions Database for Global Atmospheric Research 2022



■ Coal
■ Natural Gas
■ Oil based
■ Hydro
■ Renewables

Renewables include solar, wind, geo-thermal and biogas

The Philippines

Snapshot of domestic loans and bond markets

Philippines domestic bond market

US\$
283.9b

Outstanding LCY and FCY bonds - March 2023

US\$
360m

Outstanding LCY and FCY green bonds - March 2023

PHP,
USD

Preferred currency for green and sustainable bond issuance

Philippines domestic loan market

US\$
180.3b

Outstanding loans for production in Philippines banking system - 2022

US\$
6.7b

Credits mobilized in renewable energy projects in 2021-2022

0

There have been no green loans from the Philippines yet

Investment in renewable energy sector

US\$
6.8b

Total investment realized in renewable energy sector from 2009-2022

US\$
2.4b

Total investment realized in solar energy from 2009-2022

US\$
1.3b

Total investment realized in wind facilities from 2009-2022

US\$
360m

Average annual investment realized in renewable energy sector from 2009-2022

US\$
121b

Total investment required to meet Clean Energy Scenario (CES) from 2020-2040

US\$6b

Average annual investment required to meet Clean Energy Scenario (CES) by 2040

Note: Indirect investments regarding renewables development such as grid expansion are not calculated in this report.

Source: EY Research, AsianBondsOnline, Climate Bonds Initiative, Bangko Sentral ng Pilipinas (BSP), Department of Energy (DOE), State-owned Development Bank of the Philippines (DBP) and Land Bank of the Philippines,

The Philippines

Overview of key barriers to renewable energy

Stakeholder feedback suggests the following areas as financial and non-financial barriers to the deploying and financing of utility-scale solar and wind energy projects in the Philippines. Contribution and cooperation by more than one stakeholder group is required to eliminate or mitigate these barriers to some degree.

	Area	Solar/ wind	Description	Addressed by
Non-financial barriers				
Medium and low	Regulatory and policy landscape		Evolving regulatory frameworks and lack of right resources in government agencies impact project progress and timelines, adding to project costs	Policy makers
	Pre-development process and expense		Lengthy permitting and multiple steps have been cited as a challenge leading to long development periods	Policy makers
	Supporting infrastructure		Project timelines are impacted by long delays in approvals by the transmission operator for system impact study	Policy makers
	EPC / Supply chain		Lack of mature supply chain for wind projects and unfamiliarity with new equipment suppliers could impact project bankability from technical perspective	Private sector and policy makers
Financial barriers				
Medium and low	PPA bankability		A need to address the credit profile of financially weaker distribution utilities, either contractually or through credit enhancement products or blended finance	Policy makers and private sector
	Domestic lending		Lack of banking relationships hinders smaller developers. Shorter tenors offered for projects with WESM off-take	Lenders
Other barriers				
Not identified	Land acquisition		Land acquisition has not been identified as a key barrier	
	Local content requirement		Does not apply in the Philippines	
	International financing		Considering PHP is the primary currency of operation, International financing is not currently required	

The Philippines

Non-financial barriers

Regulatory and policy landscape



Evolving regulatory frameworks and requirements have an impact on development activities of developers.

As one of the more complex power markets in Southeast Asia, the Philippines provide the renewable energy project sponsors with multiple routes for selling electricity to off-takers. However, the continuously evolving regulatory frameworks and requirements have at times slowed down the development processes for developers.

One of the recent examples quoted by developer is related to the ongoing second round Green Energy Auction (GEA) program held in July 2023. Potential bidders are required to submit a bid bond and upon qualification, developers are required to submit a performance bond, which shall be valid until at least 60 days after the committed date/delivery date of the plant. The requirement for the performance bond is 20%-30% of the total project cost depending on the nature of the bond. Developers have cited that the performance bond amount requirement is prohibitively high and favoring the developers with larger balance sheets. Not surprisingly, established developers have welcomed the high-performance bond requirement to screen out the “fly-by-night” developers. However, there are instances of smaller/new developers, who despite having the capabilities, resource assessment and system impact studies in place, do not have enough credit-worthiness to meet the requirement for the high-performance bond. This has led to small new developers either approaching larger developers to collaborate or withdraw from further participation in the auction.

The government has also introduced the Green Energy Option Program (GEOP) which allows qualifying end-users to procure green electricity from the distribution utilities and Department of Energy permitted retail electricity suppliers (RES). New entrants cite difficulty in understanding the requirements of such contracting, making it hard to deploy capital in this market.

Pre-development process and expense

Lengthy permitting and multiple steps have been cited as a challenge leading to long development periods, combined with a lack of resources in government agencies.



Long and complex permitting processes have affected developers' execution speed in the Philippines for a long time. Developers highlighted the permitting process to be tedious, often taking years to complete.

Similar feedback were reported by WWF-Philippines in a policy report based on roundtable discussions with various stakeholders in the country. The report also highlights approvals are required from a multitude of government bureaus, divisions, and agencies each having their own timeline and milestones. Even though the Energy Virtual One Stop Shop (EVOSS) was identified as one of the renewable energy transition enabler, the already lengthy permitting process with numerous permits and signatures can get further delayed when each of these bureaus, divisions and agencies have clarifications on various aspects of the projects. There appears to be a need for further engaging key government departments and adding more personnel to effectuate the implementation of such process.

Difficult to corroborate with publicly available information, but stakeholders have also highlighted a general lack of technical personnel in the renewable energy related government agencies who are not equipped to analyze technical information related to renewable energy project.

Stakeholder feedback also indicates that Power Supply Agreements, which require approval from by the Electricity Regulatory Commission are often delayed. Competitive selection process is not always transparent and fair, with limited time provided for a price challenge.

The Philippines

Non-financial barriers (cont'd)

Supporting infrastructure



Delays in approvals for system impact studies by the transmission operator, causing project delay for investors.

A few years back, the lack of transmission capacity was considered a barrier for renewable energy projects in Philippines. However, this issue has since been resolved. While curtailment is currently not an urgent issue, developers need to apply for a system impact study (SIS) with NGCP to assess the project's impact on the national grid.

Some developer consultations suggested NGCP has suffered huge backlogs as SIS applications have accumulated, with more than 160 projects still waiting for the review of their studies. This has resulted in long delays for several projects and conflict with the investor's project development timeline.

It is quoted by the Department of Energy that transmission and supply issues have hampered the GEA-2 auctions. Out of a total of 11.6 GW targeted capacity between 2024-2026, only 3.58 GW (30.86%) was committed through auction, and the balance remains unsubscribed. A SIS usually takes a year and a half to two years to complete, and this timeframe can be detrimental to companies who would like to offer renewable energy capacities during auction stipulated timeframe.

While new interconnections would boost NGCP's revenues, it is reported that NGCP's franchise contract does not provide sufficient incentives or penalties to process SIS applications and clear the backlog in a suitable timeframe.

Based on a developer's feedback, while the delayed approval scenario has now started to improve, down to 14 months lead time from 16-18 months, it has been observed that there is still room for NGCP to appoint more accredited service providers to conduct the SIS to fast-track approvals.

Source: Philippines Department of Energy GEA-2 Notice of Award 2023

Despite service provider firms owning multiple software to conduct assessments, NGCP has been seen to award only one project at a time, leading to delays despite software availability.

EPC/Supply chain

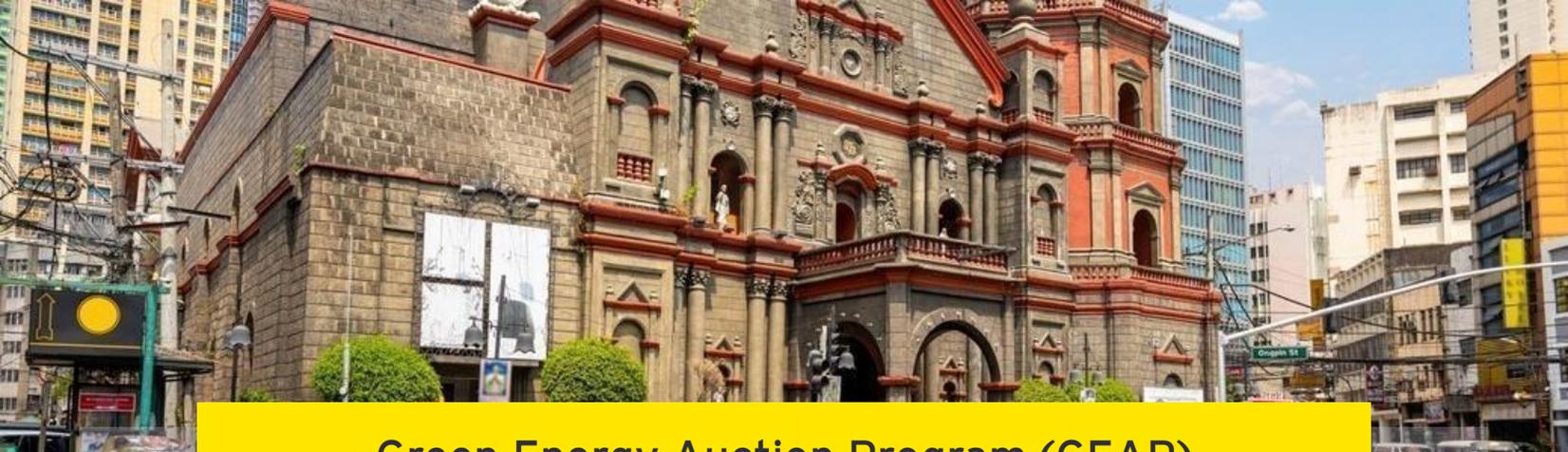
The lack of a mature supply chain for wind projects and unfamiliarity with new equipment suppliers could impact project bankability.



Wind technology is targeted to increase its installed capacity share with a total addition of 11.4 GW expected over the next twenty years as per the Philippines Energy Plan. Offshore wind is picking momentum in the Philippines. The Department of Energy has recently issued a circular outlining the policy and administrative framework for the efficient and optimal development of the country's Offshore Wind (OSW) resources.

Stakeholders have indicated challenges related to the procurement of equipment for wind projects and the lack of a mature supply chain for equipment and materials. A recent emerging consideration for developers is the pricing difference between proven European turbines vis-à-vis the newly launched equipment from leading Chinese manufacturers. One data point provided during consultations highlighted a pricing difference of as much as 40% for wind turbines, with Chinese turbines standing out on cost competitiveness.

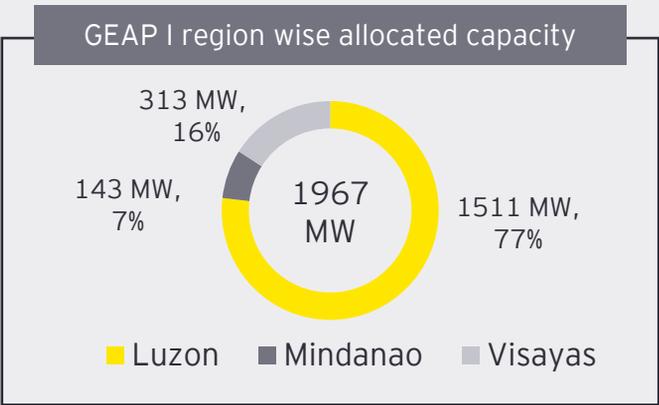
While the investors' view this as an opportunity to maximize returns and structure competitive GEAP bids, market acceptance of the technology is required before it can be leveraged. Technical assessments for the use of recent turbine equipment in the Philippines' climatic conditions are needed to ensure reliability and safety, and ultimately, bankability.



Green Energy Auction Program (GEAP)

The GEAP is a government-led initiative to promote development of RE projects through a competitive auction process. RE developers can bid for contracts to sell their generated energy to distribution utilities and electric cooperatives.

GEAP I



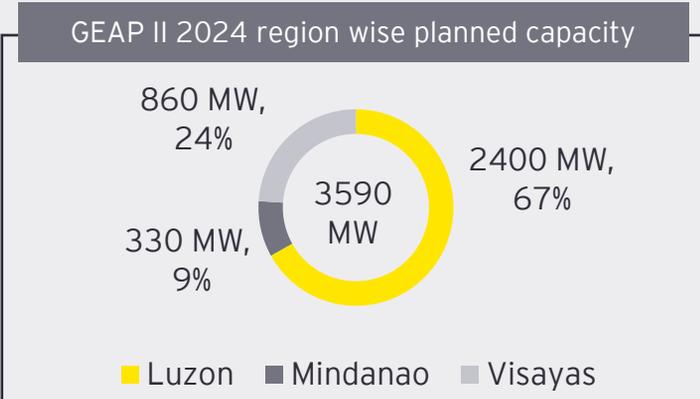
Commencement year:	June, 2022
Awarded capacity:	1,967 MW
No. of companies awarded	14

GEAP II

The Department of Energy (DOE) is eyeing 11.6 GW of renewables under the GEA-II from 2024 to 2026, DOE has proposed installation targets of 3,590 MW for 2024, 3,360 MW for 2025, and 4,390 MW in 2026.

- ▶ The winning bidders will be granted a 20-year power supply agreement
- ▶ Expected capacities of 3.6 GW in 2024, 3.6 GW in 2025 and 4.4 GW in 2026
- ▶ Energy Regulatory Commission (ERC) recently announced the final GEAReserve price:

Technology	Ground mounted solar	Floating solar	Rooftop solar	Biomass	Onshore wind	biomass waste-to-energy
Price (PHP/kwh)	4.4043	5.3948	4.8738	5.4024	5.8481	6.2683



The Philippines

Financial barriers

PPA bankability



The creditworthiness of financially weaker DUs is creating bankability challenges for some projects.

In the Philippines, the wholesale power buyers include over 120 distribution utilities that sell to captive customers in their franchise areas and over 25 retail electricity suppliers that sell to over 2,000 large commercial and industrial consumers. These are spread across various regions (Luzon, Visayas and Mindanao). Other than the larger off-takers such as Meralco (catering to about 60% of Luzon demand) or Aboitiz Group (catering to more than 20% of Visayas) that are considered financially creditworthy, domestic banks have indicated creditworthiness of smaller distribution utilities and retail electricity suppliers as a constraint. Certain distribution utilities and Co-op utilities are financially weak, and this has been cited as a counter party risk by the lenders. It may lead to some projects not being able to achieve financial close and would lead to an uneven “greening” of the Philippines outside of Luzon.

Newcomers have indicated that corporate guarantees are required by banks in obtaining the required financing. Likewise, domestic banks have acknowledged that there is a preference to fund larger conglomerates with existing banking relationships and track record rather than upcoming small developers.

Lack of longer tenors for project loans due to unfamiliarity with WESM risk exposure and untested turbine technology in an otherwise well-established domestic financing market.



Developers have indicated that the short lending tenor offered by the banks is a severe financing challenge. For projects with a PPA of 20 years (GEAP), banks are willing to lend for door-to-door 15-year tenor. However, the debt-equity ratio and tenor are both conservative for projects supplying to the Wholesale Electricity Supply Market (WESM). Lenders have highlighted a need to build technical capacity to understand WESM's price outlook as more renewable energy plants supply to WESM.

Additionally, lenders have indicated unwillingness to commit to longer tenor loans for yet-to-be-proven newest wind turbines due to perceived technology risks related to the quoted degradation factors.

The current cost of debt is not highlighted as a concern as the current high rates can be attributed to the overall global macroeconomic situation and the expectation that the market will return to an average mean. No interest rate swap is available due to the lack of a reference base rate, leaving projects exposed to an increase in interest rates.

Domestic lending



Lack of existing banking relationships restricts financing for smaller developers at competitive terms. The banks generally favor established conglomerates.

Domestic banks have a strong presence in renewable project financing, with most debt financing being PHP-denominated to match the currency of the off-take contracts. Non-recourse financing is widely available especially for established players and local conglomerates as domestic banks tend to lend to existing clients or based on established relationships and without corporate guarantees.

The Philippines

Financial barriers (cont'd)



Lenders concern around step-in rights in case of projects utilizing to government land is creating challenges for financing.

Based on stakeholder feedback, project location is an emerging concern with only few domestic banks willing to fund projects built on government land and/or land leased from the government. This is because of step-in rights granted to the lenders. In case of a lender step-in following a project defaulting on its loan, the government needs to clear the step-in right of the bank or the right to assign a nominee. Hence, while project on government land is cheaper and easier in terms of legal lease ownership, it is tougher for developers to finance as lenders perceive their step-in right might be more difficult to enforce.



Availability of international lending is limited due to PPA currency mismatch, forex and high-country risk premium increasing the overall lending costs.

International banks have been active in the market through local subsidiaries e.g., HSBC, SMBC - through RCBC etc. However, given the smaller scale of projects so far and PHP-denominated off-take contracts with no USD indexation and high potential costs of forex currency swaps, there is a limited need from developers for international lending. While not highlighted as a current barrier but as a developing situation with a lift on foreign ownership restrictions an increase in the project pipeline and large ticket size projects are expected, as large international developers are focusing on the Philippines market. These players may not hold relationships with local banks and may look to leverage international banks to finance their projects.

Additionally, potential offshore wind projects, though still a few years away, would require international banking expertise for evaluation and lending the required quantum of debt. It is not known today if PPA contracts for offshore wind would provide USD indexation. This might necessitate tapping on the international lending market.



Financing structure in Philippines

Typical financial structure offered by commercial lenders

Tenor	Coupon Rate	Key terms
<ul style="list-style-type: none"> ▶ 10-12 years with a maximum of 15 years from domestic lenders with partial bullet structures 	<ul style="list-style-type: none"> ▶ 8% - 8.5% by domestic banks to domestic developers ▶ Domestic banks would typically provide a long-term loan at an all-in rate (no reference to a market rate plus margin), but with a re-pricing at year 5 or 7 	<ul style="list-style-type: none"> ▶ Gearing: 70:30 for a project with a PSA ▶ DBP's Solar Merchant Power Plant (SMPP) Financing Program sets out gearing covenants at 60% for projects within the Luzon grid and up to 50% for projects within the Visayas grid

Case study : Chinese manufacturer MingYang breaks into Philippines' turbine market with a 300 MW deal

MingYang secures 300 MW order for onshore wind farms in Philippines, May 2023

Deal details	<ul style="list-style-type: none"> ▶ Recent announcement of manufacturing major MingYang Smart Energy signing a deal to supply 306 MW of wind turbines across two wind farms being developed by Vena Energy, 212.5 MW Talim and 93.75 MW Sembrano projects in Rizal province east of the capital, Manila ▶ The deal includes supply, transportation, installation and commissioning of wind turbines as well as long term O&M service agreement for two projects ▶ With this deal, Chinese manufacturers have officially entered the Philippines turbine market for the first time
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The Philippines

Market recommendations

Stakeholder consultations have indicated the following priorities and ideas would support the market development:

Recommendations addressing non-financial barriers



1. Commitment to expand the grid infrastructure from the transmission company and the regulator.

It is vital for the transmission company NGCP and the policymakers to prioritize grid augmentation and construction of additional transmission and substation infrastructure ahead of the scheduled build-out of renewable energy projects under programs such as GEAP.

It would benefit the market development if the regulator and policymakers take early steps in planning the additional transmission infrastructure required to deploy offshore wind in the Philippines successfully.

2. Capacity building and training of environmental consultants and specialists to turn around faster system impact study and ease NGCP backlog.



A potential solution to the issues around the backlog of NGCP approvals could be to enable NGCP to have a larger pool of accredited service providers who can turn around the SIS faster. Aid agencies could consider funding courses and capacity building of accredited system impact study providers to reduce the human resources crunch.



3. Assist lenders in independent technical evaluation of the new wind equipment to facilitate market development.

Donors and aid agencies could also facilitate speedy market development by supporting independent technical evaluation of currently untested wind equipment and its suitability for the Philippines' climatic conditions. This would speed up lenders' evaluation and allow developers to manage financing timelines.

The Philippines

Market recommendations (cont'd)

Recommendations addressing financial barriers

Recommendations addressing financial barriers



4. Need for credit enhancement products and blended finance to support smaller developers and mitigate the risk for weaker distribution utilities.

The market suggests the need for guarantee-type products for smaller developers who lack strong banking relationships. Such a product could fund performance bond guarantees and enable early project development. Existing development agencies with guaranteed products and capabilities to evaluate, filter and assess credible developers could be further capitalized by donor agencies and impact investors to add this offering for the Philippines.

Additional credit enhancement guarantees could be considered for projects relying on off-take by financially weaker distribution utilities. Multilateral development banks, donor agencies and impact investors have an opportunity to support the market development of the Philippines covered by such DUs. Such support could also be channeled through existing development agencies with proven capabilities.



3.5

Vietnam

Vietnam

Overview of clean energy financing landscape

Vietnam has pledged to become Net-zero by 2050 and is targeted to reduce GHG emissions by 15.8% with domestic resources and 43.5% with international support by 2030 under the COP26 framework.

Vietnam relies on coal (33% of capacity mix) and hydropower (27%) to meet its electricity demand. Renewables currently represent a considerable portion of the capacity mix (28.3%), but a smaller percentage in the energy mix (12%).

The government of Vietnam recently approved the National Electricity Development Plan for 2021-2030, more commonly known as Power Development Plan VIII (PDP VIII), in May 2023, at a time of high-power demand growth of 7% p.a. in one of the fastest growing economies in Southeast Asia. The publication of PDPVIII had waited for three years and paves the way for renewed deployment of renewable energy. However, the market still awaits the rules and regulations to implement the targets laid out in the PDPVIII.

Starting from 138 MW in 2018, Vietnam achieved about 18 GW of solar installations (including 9 GW of rooftop solar) in three years using two rounds of the Feed-in-Tariff (FiT) scheme. Regulatory approvals for projects less than 50 MW in capacity were quicker, requiring only provincial-level approvals and licenses. Such isolated planning resulted in multiple small assets built next to each other in high resource areas to maximize revenue, overlooking grid overload considerations and resulting in temporary curtailment of up to 40% in Ninh Thuan and Binh Thuan provinces. Until grid-related issues are resolved, no solar additions are planned under the PDPVIII until 2030.

Wind built-out occurred in the second round of FiT and resulted in ~4.5 GW of installed capacity. 64 wind power plants missed the completion deadline for FiT eligibility, mostly because of the pandemic, and are in the transitional stage. The tariff mechanism for them is being finalized in discussion with EVN.

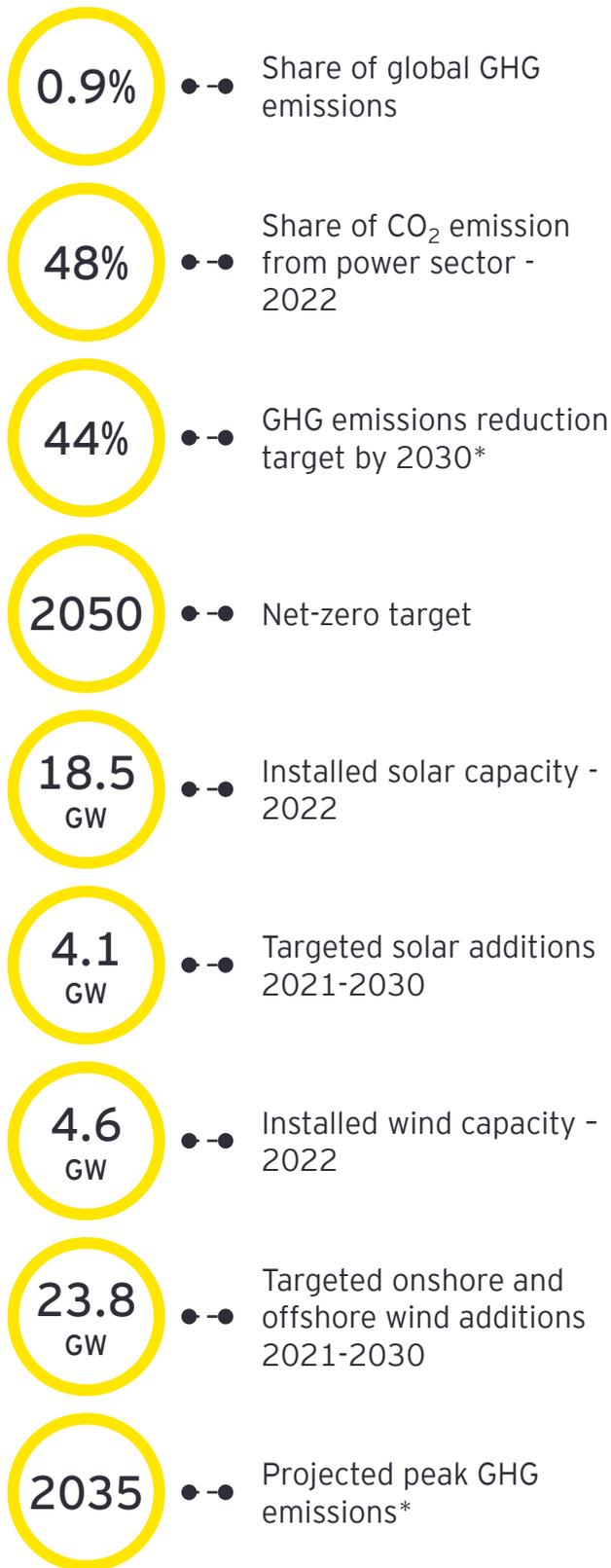
Apart from onshore wind, Vietnam is turning its attention to leveraging its vast potential for offshore wind technology, with agencies studying the options to develop the optimum regulatory framework for the sector, which the World Bank estimates could generate up to 30% of Vietnam's electricity output by 2050. The PDPVIII has ambitious targets of 6 GWs for offshore wind and 13 GW onshore wind by 2030.

Given the PPA risk allocation, the substantial build-out of solar capacity has been led by domestic developers and financed by domestic lenders. The international debt market widely talks about the shortcomings of renewable energy PPAs with EVN, specifically concerning curtailment, termination, force majeure, and change in law clauses, which do not adequately protect investors and lenders alike. Accordingly, the availability of non-recourse international project financing remains a constraint in Vietnam.

The growth of renewable energy has a strong business case in Vietnam, backed by favorable supply-demand fundamentals and the long gestation period of competing LNG-to-power projects. Vietnam can rely on a fast rollout of renewable projects to meet electricity demand in a timely manner, especially solar and wind technology. The current situation may warrant policymakers and EVN to relook at the risk allocation in the PPAs to attract international capital, especially for the offshore wind market while at the same time focus on grid infrastructure investments to handle intermittent renewable energy to enable a next phase of growth.

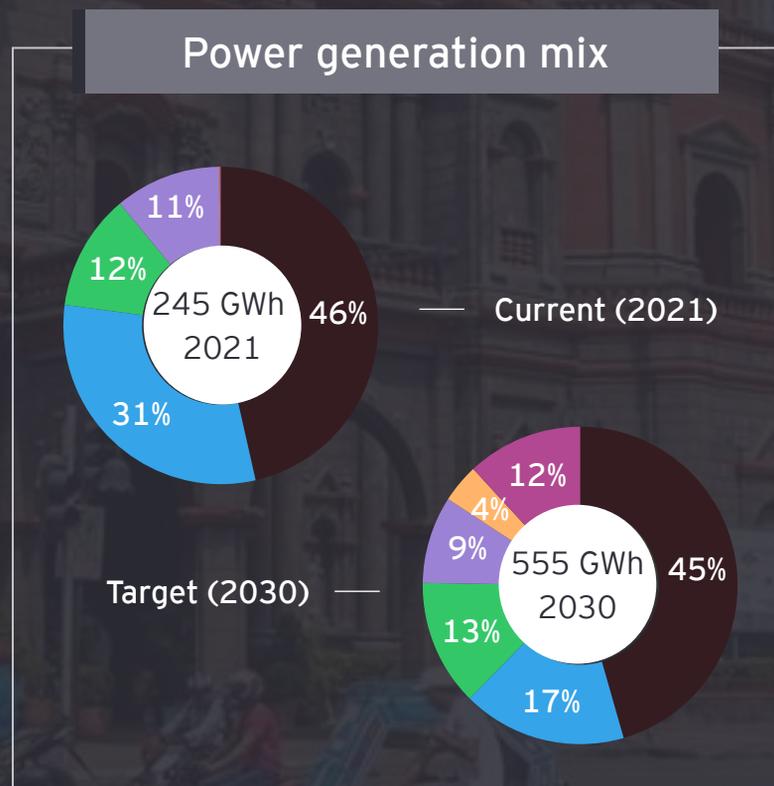
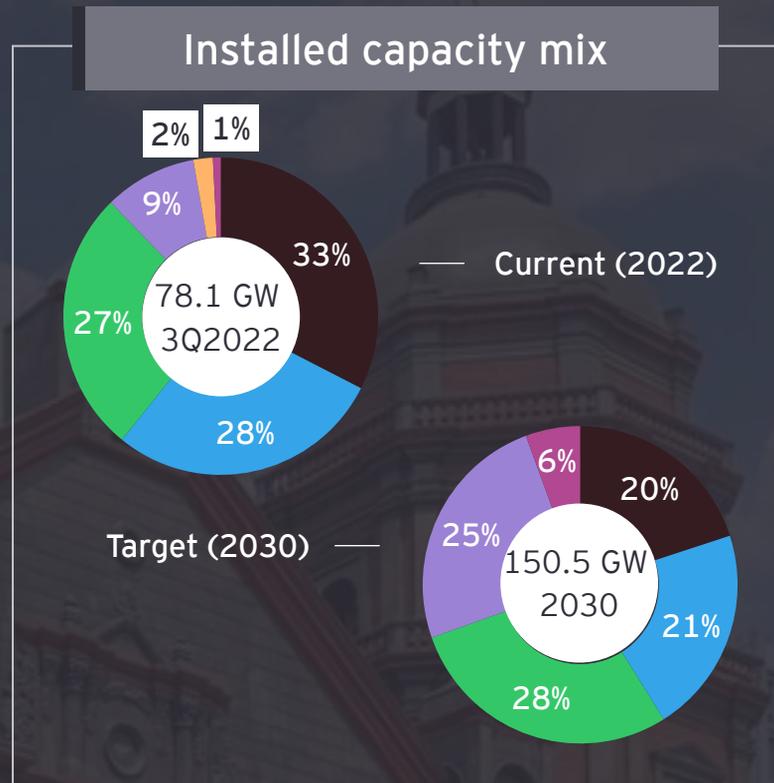
Vietnam

Snapshot of renewable energy deployment



* Emission reduction target is conditional and based on BAU

Source: Draft Vietnam Power Development Plan 8, IEEFA, Emissions Database for Global Atmospheric Research 2022, National Climate Change Strategy 2022 and IRENA Renewable Capacity Statistics 2023



■ Coal
 ■ Hydropower
 ■ Renewables
■ Gas
 ■ Oil
 ■ Others

Renewables include wind, solar, biomass, pump storage and BESS

Vietnam

Snapshot of domestic loans and bond markets

Vietnam domestic bond market

US\$
148b

Outstanding LCY and FCY
bonds - March 2023

US\$
200m

Outstanding LCY and FCY
green bonds - March 2023

USD

Preferred currency for green
and sustainable bond issuance

Vietnam domestic loan market

US\$
516b

Outstanding loans in Vietnam
banking system - April 2022

US\$
9.4b

Outstanding loans for
renewable and clean energy
sector as of October 2022

US\$
1.1b

Cumulative green loan issued
from 2019 to 2022

Investment in renewable energy sector

US\$
23.8b

Total investment in clean
energy from 2016 to 2021

US\$
6b

Total Investment in clean
energy in 2021

10th

Global ranking in terms of
clean energy investment in
2021

US\$
135b

Total investment
required to meet PDP
VIII's long term objective
by 2030

US\$
11.3b

Average annual investment
required to meet objective by
2030

1st

Ranking in terms of clean
energy investment among
ASEAN member states
(AMS)

Note: Indirect investments regarding renewables development such as grid expansion are not calculated in this report.

Source: EY Research, AsianBondsOnline, Climate Bonds Initiative, State Bank of Vietnam (SBV) and Power Development Plan 8, Climatescope by Bloomberg NEF

Vietnam

Overview of key barriers to renewable energy

Stakeholder feedback suggests the following areas as financial and non-financial barriers to the deploying and financing of utility-scale solar and wind energy projects in Vietnam. Contribution and cooperation by more than one stakeholder group is required to address or mitigate these barriers to some degree.

Ranking	Area	Solar/ wind	Description	Addressed by
Non-financial barriers				
High	Regulatory and policy landscape		Pending release of implementation rules to support PDP VIII continue to hamper progress of projects in development	Policy makers
	Supporting infrastructure		Insufficient transmission capacity and inadequate transmission approval planning are highlighted as issues by multiple stakeholders. Curtailment of electricity generation has impacted project returns and confidence by developers and lenders	EVN
Low	Land acquisition		A few market participants highlight that land acquisition is a time-consuming process requiring the need to form the right local partnerships	Policy makers
Financial barriers				
High	International lending		Despite interest, International lending is restricted by the risk allocation offered by EVN in the template PPA	DFIs, Lenders, EVN
Medium and low	PPA bankability		Template PPA terms are considered un-bankable by international lenders. Corporate PPAs are not allowed in Vietnam	EVN
	Domestic lending		Domestic lending market may not be deep enough to fund additional capacity in the PDP VIII, especially considering large capital requirements of offshore wind projects. The availability of non-recourse project financing is also limited	Policy makers and lenders
Other barriers				
Not identified	Local content requirement		Local content requirements for solar and wind energy are not imposed in Vietnam. This has not been identified as a barrier by the stakeholders	
	EPC / Supply chain		Stakeholders have not highlighted supply chain as a barrier for Vietnam solar and wind energy projects, although an appropriate supply chain will be required to enable the development of the offshore wind market	

Vietnam

Non-financial barriers

Regulatory and policy landscape



Delays in releasing national targets and implementing framework has dampened the progress of a market once considered the most attractive in terms of capacity additions and scalability.

Vietnam's remarkable growth in solar and wind energy installations through two rounds of FiTs came to a halt upon the expiry of FiT regulation in late 2021.

While PDP VIII provides clarity on future renewable energy targets, the absence of implementation rules and regulations are holding progress for projects under development.

Investors and developers require further guidance on

- ▶ Method of renewable energy procurement, e.g., another round of FiT, or auctions (national or location wise)
- ▶ The implementation of a corporate PPA framework
- ▶ Terms of the template PPA with EVN (e.g., currency indexation of the tariff)

Such lack of clarity has led developers to slow down, if not stop, development activities and pause allocation of additional capital.

In the last 12-18 months, multiple renewable energy asset owners attempted to sell part stake in their portfolios to recycle capital and capitalize themselves for the next phase of growth. Still, only some, if any, concluded a deal partly because of the difficulty of valuing development-stage assets without clarity on the future regulatory and implementation framework.

Lengthy negotiations timeline and delay in decisions related to specific "transitional" projects.

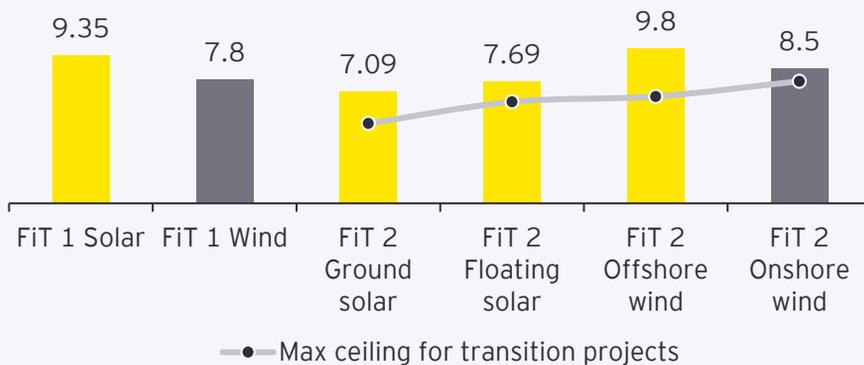


85 projects (8 solar and 77 wind, with an aggregate capacity of 4.7 GW) were reported to have missed the commercial operational date qualifying deadline for the second round of FiT (December 2020 and November 2021, respectively, for solar and wind).

As of July 2023, 55 transitional projects are reported to have finalized tariff negotiations with EVN, and 10 projects have entered commercial operation. Although the tariff ceiling was established in the range of 5.04 to 7.71 US cents per kilowatt-hour (USDc/kWh) for solar and wind projects, it was reported that 59 projects have accepted temporary rates equal to 50% of the ceiling to manage debt obligations or mitigate their financial setbacks. The currency of tariff is reported to be in VND.

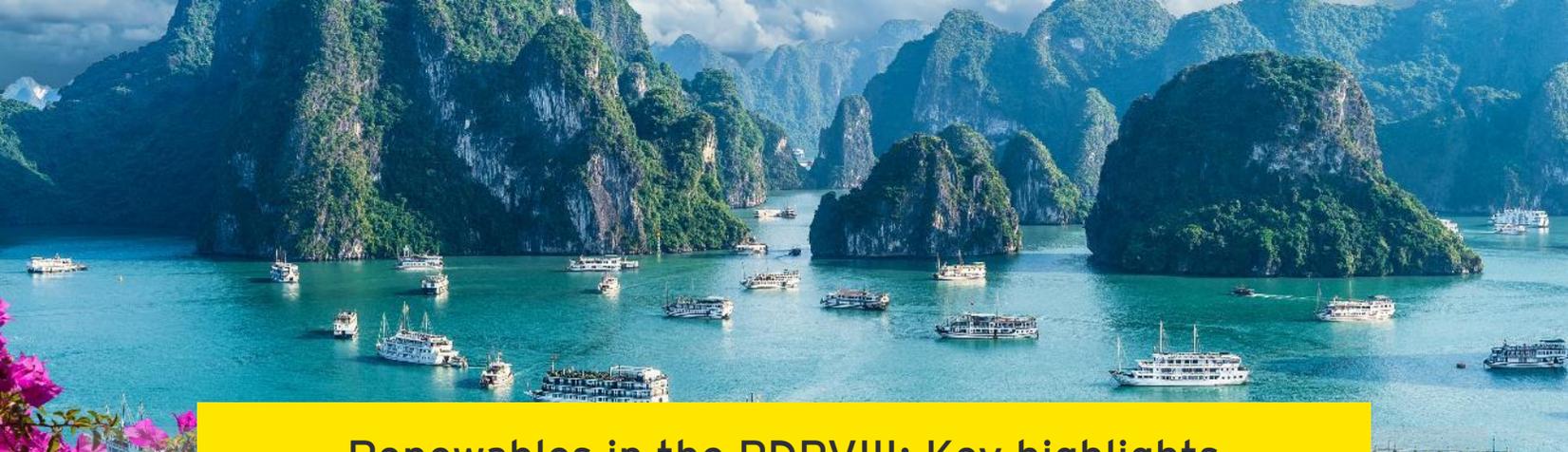
The extended period of uncertainty has brought some discomfort to investors and lenders.

Tariff for utility-scale wind and solar projects (USDc/kWh)



2023 ceiling price range for transitional utility-scale wind and solar projects that did not secure FiTs, but **EVN wants to negotiate at 32-39 US\$/MWh**

Note: *first round of wind FiT did not separate onshore and offshore
Source: MOIT, Wood Mackenzie, Vietnam Briefing, [EVN](#)



Renewables in the PDPVIII: Key highlights

The PDPVIII aims to increase the proportion of renewable by c. 31-39% in 2030, and 67-71% in 2050 from the 69 GW in 2020. All renewable capacity not connected to the grid should be encouraged without capacity limits, which gives a welcome boost to the industry until the national grid issues are resolved.

Key renewables installed capacity and related highlights			
	By 2030	By 2050	
Onshore wind	21.8 GW (14.5%)	60-77 GW (12-13%)	▶ Focus on onshore wind continues in Vietnam
Offshore wind	6 GW* (4%)	70-91.5 GW* (14-16%)	▶ Most planned growth after 2030. To actively develop export and new energy products without connecting to national grid (3-4 GW by 2030). ▶ To maximize technical capacity to produce electricity and new energy for domestic and export demand (15 GW by 2035, 240 GW by 2050*)
Solar	12.8 GW* (8.5%)	168.6-189.6 GW* (33-34%)	▶ Excludes existing rooftop installation. Provisions for unlimited capacity of solar PV for self consumption (10 GW by 2030)
Hydropower	29.3 GW* (19.5%)	36 GW (6-7%)	▶ Gradual decrease in electricity mix from 28% in 2022
Coal	30.1 GW (20%)	0	▶ New coal plants of up to 7 GW to come online by 2030

PDP VIII is targeting US\$135b of investments in new power generation and grid between 2021-30 and further US\$400-523b between 2031-50



**The PDP mentions targets are conservative estimates and may increase based on technological advancements and favorable socio-economic and environmental conditions. The infographic has included projections for solar and wind power, as these renewables are the focus of the report. Projections for hydropower and coal are also included due to its prominent decrease in the energy mix from 2030-2050. Others e.g., Biomass, LNG, domestic-gas, pumped hydro and imports are not mentioned in the table above but are part of PDP VIII. Please refer to the official document for complete targets under PDPVIII*

Vietnam

Non-financial barriers

Supporting infrastructure



Curtailment of electricity generation is a significant concern amongst developers and lenders. Insufficient transmission capacity and inadequate transmission approval planning are highlighted as issues by multiple stakeholders.

The rapid build-up of geographically concentrated solar and wind between 2018 - 2021 was not accompanied by the necessary planning and investments in transmission assets, resulting in overloaded transmission lines and curtailment of electricity generation for numerous projects. The PPA with EVN did not protect investors and lenders from such curtailment, which impacted the profitability of investments and spooked investors and lenders.

Stakeholders' consultations highlight the perceived insufficient planning from Government agencies when approving interconnection agreements as a primary reason. Multiple projects were approved to connect to the same substations without reference to the line capacity.

The alternative of only approving a finite number of interconnection agreements may result in the opposite effect with the "hogging" of interconnection rights by developers simply looking to sell these for a quick premium. Stakeholders have suggested that a potentially suitable could be a combination of centrally managed permit planning coupled with a predefined expiration date in case there is no development activity.

Market participants will also scrutinize the recently announced grid investments set out in PDP VIII to confirm whether the scale and locations of grid investments support the target capacity additions.

Vietnam

Financial barriers

International lending



Availability of international financing is still limited on account of the PPA risk allocation.

International lenders have formed a view that several clauses in the template PPA are not conducive for project financing without some level of recourse to the sponsor.

This has resulted in limited international project financing to date. There are a few examples of limited recourse financings in USD, supported by Development Finance Institutions, extended by international banks where the developers have been able to provide some sponsor support for certain risks or pledge other assets in operation. However, international lenders have reiterated that certain amendments to the template PPA would be required to proceed with non-recourse solutions.

Certain wind projects have received Export Credit Agency financing support on account of equipment from Europe, which provided comfort to international lenders and made financing possible.

The development of offshore wind projects is expected to require international capital because of the sheer scale of investments and the required development expertise. This may prompt a re-look at the PPA terms to enable international financing. Developers with experience in Offshore wind have cautioned that the current template might either result in costly offshore wind projects or no projects at all.

EVN PPA tariffs were paid in VND but indexed to USD (it is not known if the same will be applicable for future projects). This enabled both VND and USD financing solutions for projects.

However, investors and developers have regularly cited the availability of financing as a major barrier.

The following clauses have been repeatedly cited as unbankable and not up to international benchmarks:

- ▶ No government guarantee or credit support for EVN's payment obligations
- ▶ No change in law protection
- ▶ No protection against curtailment
- ▶ PPAs governed by Vietnamese law
- ▶ No offshore arbitration
- ▶ No explicit recognition of lenders' rights
- ▶ Lack of explicit debt compensation upon early termination as a result of EVN default

Domestic lending

Domestic financing is available but may not be sufficient to fund the PDP VIII target capacity additions.



The buildout of renewable energy projects during 2018-2021 was funded largely by domestic capital. Domestic banks have extended long-term commercial loans in VND, accepting the terms of the template PPA, but have typically required corporate guarantees from developers during the construction phase. Stakeholder consultations indicated concerns about the ability of the domestic market to take further exposure to the sector, especially in the context of the more extensive capital needs for offshore wind projects and should the USD indexation from the PPA be removed.

PPA bankability



The template PPA with EVN remains difficult for international lenders.

EVN provides a template PPA for both solar and wind energy projects, which is beneficial as it expedites PPA signing once a project is fully permitted.



Financing structure in Vietnam

Typical financial structure offered by commercial lenders

Tenor <ul style="list-style-type: none"> ▶ For VND financing : 10-15 years ▶ For USD financing : 13-17 years 	Coupon Rate <ul style="list-style-type: none"> ▶ 10-11% p.a. VND loans 	Key terms and conditions <ul style="list-style-type: none"> ▶ Often require collateral ▶ Gearing: 70:30 ▶ International lenders require sponsor support ▶ Multilaterals have financed projects based on limited recourse and clauses that ask for gearing to reduce in an event of risk
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Case Study: Phu Yen 257 MW solar project financing supported by ADB under an A/B loan structure involving local and international banks

Project Overview

Project name	Phu Yen 257 MW Solar Plant
Sponsors and shareholding	B. Grimm (80%) TTVN (20%)
Details	Feed-in-tariff rate of USDc 9.35 /kWh for 20 years

Project Financing Overview

Financial close	26 October, 2020
Gearing	75:25
Total debt financing	US\$186m
Recourse	<ul style="list-style-type: none"> ▶ Sponsor support for three key risks: curtailment, change in law and termination ▶ In the event of a loan default as a result of any of the three risks, sponsors shall provide financial assistance to reduce the gearing down to c. 60%

Package	ADB's A loan facility	ADB's B loan facility	Senior secured facility
Total loan amount	US\$27.9m	US\$148.8m	US\$9.3m
Tenor	17 Years	15 Years	17 Years
Lender	Asian Development Bank	<ul style="list-style-type: none"> ▶ Bangkok Bank (US\$29.76m) ▶ Industrial and Commercial Bank of China (ICBC) (US\$9.76m) ▶ Kasikorn Bank (US\$29.76m) ▶ Kiatnakin Bank (US\$29.76m) ▶ Standard Chartered Bank (US\$29.76m) 	ADB managed fund - Leading Asia's Private Sector Infrastructure Fund (LEAP)

Source: ADB, Information

Vietnam

Market recommendations

Stakeholder consultations have indicated the following priorities and ideas would support the market development:

Recommendations addressing non-financial barriers



1. Develop an appropriate regulatory framework and a supporting supply chain ecosystem and skilled resources for the successful deployment of offshore wind in Vietnam and to meet PDP VIII targets.

Successful delivery of the 6 GW offshore wind target by 2030 will require a comprehensive regulatory framework, supporting grid infrastructure, the phased development of the supporting supply chain, including ports and drilling vessels, and the upskilling of the workforce.

Analysts from S&P estimate that up to USD 17 bn in debt funding would be required to meet the 2030 target. This is likely to require international capital. Consultations between Government agencies, experienced developers, and lenders such as DFIs, Export Credit Agencies and commercial banks are required to develop an appropriate PPA template for offshore wind and achieve a balanced risk allocation.

While supply chain for wind energy projects has not been identified as a barrier yet by the stakeholders, offshore wind development would require a local supply chain to achieve the installation scale and cost reductions achieved in other mature markets.

Wind energy associations highlight that this requires a collaborative dialogue between the government and the industry. Most investments are expected to come from the private sector, and the government needs a comprehensive plan to attract such supplies and services.

2. Prioritize investment in grid infrastructure and address the need to match permitting with substation capacity.



Policymakers are required to ensure timely planning and improved coordination amongst EVN, provincial and central level government agencies to plan right locations of approved renewable energy capacity additions and avoid overloading the grid infrastructure. It is vital to do so until grid capacity is augmented to handle increasing intermittent renewable energy generation.

To accelerate grid infrastructure investments, EVN and policymakers could possibly allow private sector participation to access capital.

Source: S&P Global: Seizing offshore wind investment potential in Southeast Asia 2023

Vietnam

Market recommendations (cont'd)

Recommendations addressing financial barriers



3. Explore potential financial/insurance products to address curtailment issues and facilitate financing.

Until grid investments materialize, there may be a potential market for bespoke financial/insurance products that offer coverage for curtailment issues.

The viability of such a product will be subject to pricing. The curtailment stories have spooked international lenders and investors. Downside risk protection offered by any such product could boost market confidence.

4. Revisit the terms of template PPA to reduce the cost of capital and, consequently cost of renewable energy in Vietnam.



EVN and policymakers may consider reevaluating the terms of the template PPAs to enable international financing at competitive rates by rebalancing certain PPA risks, which would reduce the cost of generation and, consequently, the cost of procuring renewable energy for EVN.

Deployment of offshore wind projects would require foreign expertise and international capital, which would be difficult to tap should the template PPA offer limited protection for investors and lenders.



5. Enable a Corporate PPA program to allow international capital to flow.

Stakeholders have often cited a Corporate PPA program may unlock the flow of international capital and could result in a win-win model to achieve the PDP VIII capacity additions:

- ▶ Reduces the financial burden on EVN for Offshore Wind which will initially be more expensive than its current average cost of electricity purchase
- ▶ Allows EVN to earn a wheeling charge on the use of its transmission assets
- ▶ Increase the attractiveness of Vietnam as a destination for FDI as more and more FDI is dependent on the ability to secure green electricity supply

Vietnam

Market recommendations (cont'd)

Recommendations addressing financial barriers



6. Promote Green social and sustainability bonds with a focus on capital deployment toward solar and wind energy projects.

Regulators could introduce financial incentives for green, social, and sustainability (GSS) bond issuers, by way of exempting pre- or post-issuance cost for issuing a green bond, waiving the verification and external reviewer fee, or reducing or exempting of the listing fee altogether. Funding for such waivers and fees could be supported by various aid agencies working to support Indonesia renewable energy sector.

7. Develop the capacity of the domestic banking market to extend non-recourse project finance loans, facilitate refinancing in the bond market.



Project finance market in Vietnam for renewables was estimated to be US\$21b in 2021, a vast majority coming from domestic banks.

There is however a need from investors and developers to access true non-recourse financing and this may be achieved through continuous capacity building. The objectives of the training programs are to broaden project finance knowledge for staffs of domestic financial institutions and enhance their ability to expand the range of product offerings within their banks.

There is also a need to develop Vietnam capital markets, including the green bond market, such that commercial banks to refinance their exposure to the sector into the bond market, free up their single borrower limits and extend new loans to support the buildout of new capacity additions.

Assistance from various development aid programs may contribute to the development of new products, processes and frameworks to support this objective.

An aerial photograph of a city, likely Lucerne, Switzerland, featuring a large blue lake, a bridge, and a prominent church with two tall, ornate towers. The city is surrounded by green hills and mountains under a clear blue sky. A yellow square is overlaid on the image, containing the number 3.6.

3.6

Bangladesh

Bangladesh

Overview of clean energy financing landscape

Bangladesh is dependent on fossil fuels for its electricity generation. In August 2023, the total installed capacity was 24.9 GW, of which 46.5% comes from gas, 29.4% from oil, 16.8% from coal-fired plants, and 4.6% from cross-border imports. On-grid renewable energy has a limited share of 1.8% (459 MW) from solar while no wind projects are connected to the grid.

The installed capacity of renewables was 1,195 MW as of August 2023. Solar comprised 961 MW of which on-grid solar is only 595 MW, off-grid solar is 365 and the remaining is hydropower.

High prices of fossil fuels such as fuel oil, gas, and coal have increased power generation costs for Bangladesh and a subsidy burden of US\$2.82b.

Increased fuel prices coupled with the shortage of US dollars have made it difficult for Bangladesh to pay oil suppliers. This has driven fuel supply shortage, widening supply-demand deficit, and power cuts. The sentiment has worsened as the value of Bangladesh's Taka currency fell by over a sixth during the last 12 months through May 2023, and dollar reserves declined by a third to a seven-year low in April 2023.

This situation offers a strong potential for renewables in Bangladesh, which have shorter construction periods, can supply electricity at competitive costs and reduce dependence on fuel imports. IEEFA estimates that the annual investment required for enhancing renewable energy capacity to 40% of Bangladesh's power generation capacity by 2041 is lower than the subsidy burden of US\$2.82b.

Developers have ranked Bangladesh as an attractive market based on its resource potential, power demand-supply fundamentals, and a bankable PPA, where the Bangladesh government guarantees the off-taker's obligations. However, renewable projects, which typically require large land parcels, are constrained by the land acquisition situation in Bangladesh.

Bangladesh's long-term issuer and senior unsecured ratings were downgraded to B1 from Ba3 (Moody's). Ongoing dollar scarcity and deterioration in foreign exchange reserves are challenging for developers looking to invest and finance their projects. The current situation and the weakening credit worthiness of the off-taker have paused international commercial lender activities in Bangladesh. Developers with projects in the financing stage are exploring financing solutions from DFIs. While available, the cost of financing from DFIs has also gone up, given the macroeconomic risks.

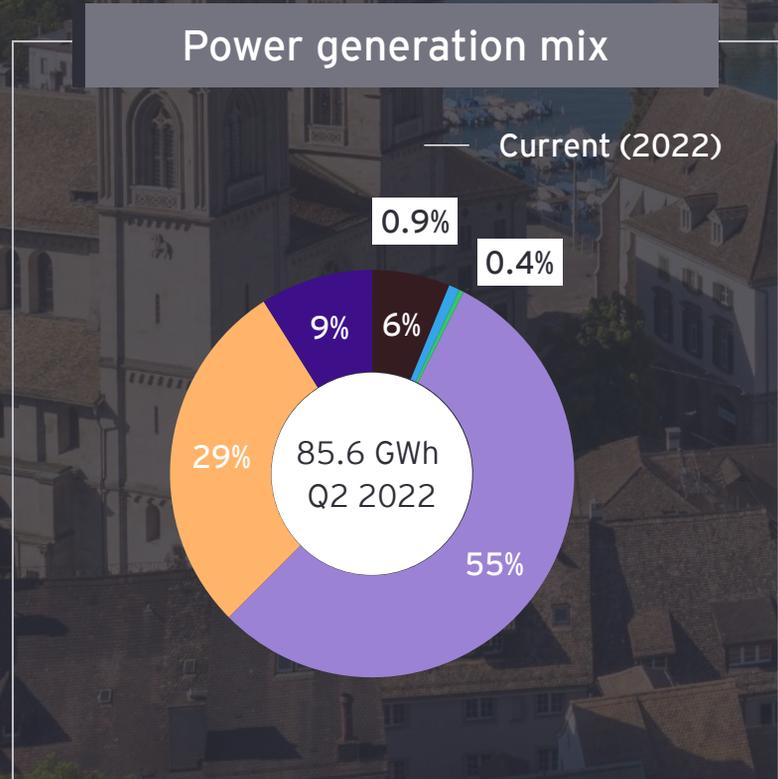
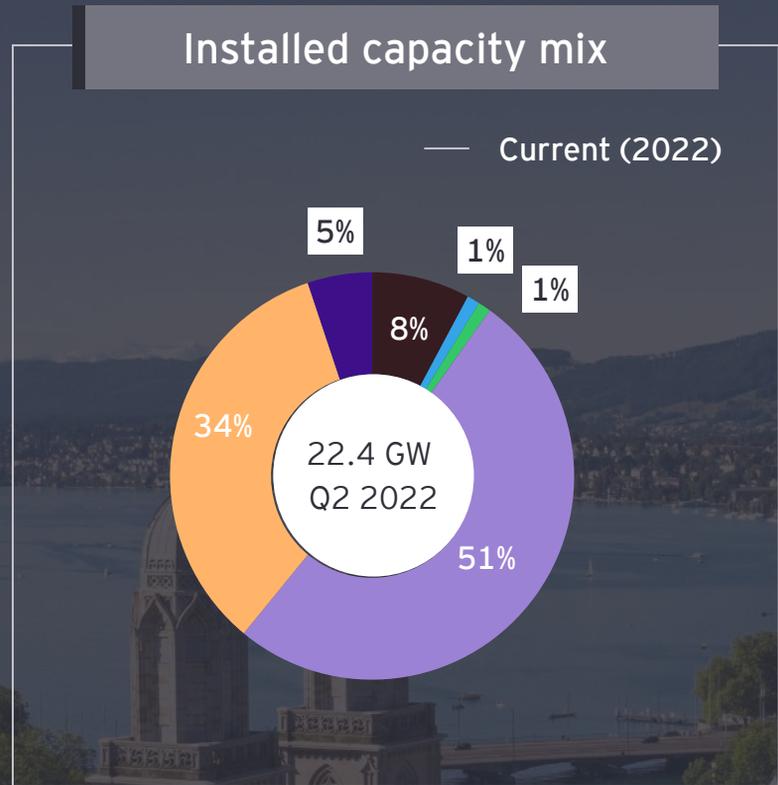
Specialized financing institutions like Infrastructure Development Corporation Limited (IDCOL) continue to pursue projects for financing in various currencies (Taka, USD, and Euro) with credit lines from MDBs. The market situation warrants additional assistance from multilateral and international development agencies for Bangladesh to fulfil its renewable energy ambitions.

Bangladesh

Snapshot of renewable energy deployment

- 0.5%
●--● Share of global GHG emissions
- 37%
●--● Share of CO₂ emission from power sector - 2021
- 90
MT
●--● Conditional CO₂e emissions reduction target by 2030
- Bangladesh has not communicated a net-zero target
●--● Net-zero target
- 960
MW
●--● Installed solar capacity - 2023
- 9
GW
●--● Targeted solar additions 2023-2030 (High load scenario)
- 2.9
MW
●--● Installed wind capacity - 2023
- Bangladesh has not set any target for wind energy
●--● Targeted onshore and offshore wind additions
- Not announced
●--● Peak GHG emissions

Source: National Solar Energy Road Map 2021-2041, Power System Master Plan 2016 (Updated 2018), Perspective Plan Of Bangladesh 2021-2041, Emissions Database for Global Atmospheric Research 2022, Bangladesh Power Development Board Annual Report 2021-2022



Note: Bangladesh has not published details on projected installed capacity and power generation mix for non-renewables.

- Coal
- Hydropower
- Renewables
- Gas
- Oil
- Import

Renewables include solar, wind, biogas and biomass

Bangladesh

Snapshot of domestic loans and bond markets

Bangladesh domestic bond market



Outstanding LCY and FCY bonds - March 2023



of total outstanding bonds are government securities



Only currency used for green bond issuance



Total value of green bond/sukuk issued - 2021



Total numbers of green bond/sukuk issuance to date



Total value of green bond used to finance solar projects

Bangladesh domestic loan market



Total term loan disbursement as of 3Q2022



Total amount of green finance mobilized as of 3Q2022



Central bank mandates 5% of all bank loans must be dedicated to green finance

Investment in renewable energy sector



Total investment realized in renewable energy sector from 2016 - 2021



Total investment required for renewable energy project implementation to meet unconditional target (2021-2030)



Total investment required for renewable energy project implementation to meet conditional target (2021-2030)

Note: Indirect investments regarding renewables development such as grid expansion are not calculated in this report.

Source: EY Research, Bangladesh Bank, SAJIDA Foundation, Beximco, Climatescope by Bloomberg NEF, Ministry of Environment, Forest and Climate Change - Bangladesh

Bangladesh

Overview of key barriers to renewable energy

Stakeholder feedback suggests the following areas as financial and non-financial barriers to the deployment and financing of utility-scale solar and wind energy projects in Bangladesh. Contribution and cooperation by more than one stakeholder group may be required to address or mitigate these barriers to some degree.

Ranking	Area	Solar/ wind	Description	Addressed by
Non-financial barriers				
High	Land acquisition		Highlighted as the most pressing challenge for developers given the fragmented ownership, lack of land title records, flood risk in a densely populated Bangladesh	Policy makers
Medium and low	Regulatory and policy landscape		Uncertainty related to auction and tender timelines have reduced investor commitment to prepare for the projects actively	Policy makers
	Supporting infrastructure		Not an immediate challenge but developers express skepticism around grid's ability to sustain expected increase in projects	BPDB
	EPC/Supply chain		No domestic supply chain, equipment and expertise to be sourced from overseas, with a corresponding increase in project costs	Private sector
Financial barriers				
High	PPA bankability		While the PPA and government support are generally considered bankable, the weakening credit worthiness of the electricity off-taker and Bangladesh's recent rating downgrade is impacting lenders' appetite and driving up the cost of financing	Policy makers
Medium and low	Domestic lending		The domestic lending landscape lacks depth regarding the number of active lenders and tenors are slightly shorter	MDB, Lenders
	International lending		While project financing is available from MDBs/DFIs, the appetite from international commercial banks has reduced in light of current economic conditions	MDBs
Other barriers				
Not identified	Pre-development process and expenses		Pre-development process (apart from land acquisition process) has not been identified as a challenge	
	Local content requirement		Local content requirements for solar and wind energy are not imposed in Bangladesh. This has not been identified as a barrier by the stakeholders	

Bangladesh

Non-financial barriers

Land acquisition



Land acquisition remains the most pressing challenge for developers.

Land acquisition is highlighted as the biggest challenge to renewable energy projects due to availability and cost. This challenge can be attributed to a lack of suitable large land parcels, given the flood risk, competing usage such as agriculture and residential, and fragmented ownership. In a densely populated country like Bangladesh, few unencumbered continuous land parcels are not marked for agricultural use.

Further, Bangladesh has several systemic factors which complicate all land transfers.

As per a law and advisory firm, Bangladesh has no comprehensive land titles issued by the authority. Instead, ownership is proven by sale and purchase deeds registered with a local authority called the sub registry. Each deed contains a narrative of historic ownership. That title and its historic chain is normally substantiated by supporting evidence from the land surveys done by authorities going back to 1880, surveys recorded at the time who held which land and found intermittent records or "Mutation Khatians." The long permitting process and missing or incomplete land records requiring judicial intervention and, consequently long lead times are other issues highlighted by the stakeholders.

Additionally, Bangladesh has a limit on the size of land ownership. It is hard to find large parcels of continuous land with few owners. Developers have quoted that to acquire 200 acres of land, you may be required to deal with 150-200 landowners, compared to 10-20 owners in other jurisdictions.

Given the challenges, developers report local landowners have increased land prices. This has made the land a large cost item for project developers.

Source: SREDA Bangladesh

An alternative option is to use the government land on a lease basis. However, lenders have cited legal process challenges that may limit step-in rights for the lenders and may limit the ability of lenders to take full control of the project.

Regulatory and policy landscape

More regulatory clarity is needed to spur renewable off-take in Bangladesh.



Despite the Renewable Energy Policy being formulated in 2008, the first utility-scale project only came online in 2018, after a decade. The pace of renewables deployment has been slow. The current installed capacity of renewables was 1,194 MW as of June 2023. Solar comprised of 960 MW of which on-grid solar is 594 MW, off-grid solar is 365 MW and the remaining is Hydro. Another 1800 MW is under various stages of implementation and planning.

BPDB has procured certain projects through auctions, while others are procured through unsolicited bids.

Under the draft, Integrated Energy and Power Master Plan (IEPMP), expected to be released this year, Bangladesh has set a clean energy target of 40% by 2041. Stakeholder feedback indicates uncertainty related to auction and tender timelines, and unclear processes have reduced investor commitment to prepare for the projects actively.

Bangladesh

Non-financial barriers (cont'd)

Supporting infrastructure



Supporting infrastructure and overcapacity.

Based on Stakeholder feedback, the market is skeptical about the grid's reliability as it is yet to be tested whether the aging grid, constructed for conventional fuel sources, can handle the growing quantum of intermittent renewable energy.

EPC/Supply chain

Undeveloped local supply chain for EPC.



The local supply chain for solar and wind energy projects is not very well developed. Machinery and equipment need to be shipped from overseas, which adds to the project costs and, consequently, the tariff that can be achieved.

Bangladesh

Financial barriers

PPA bankability



The weakening creditworthiness of the electricity off-taker and Bangladesh's recent rating downgrade has impacted PPA bankability.

External energy price shock on imported fossil fuels and the depreciation of the Taka are exerting pressure on BPDB's finances. It is reported that BPDB has experienced delays in payments to project owners who, in turn, have had difficulty converting Taka into USD. This has raised concerns amongst investors and lenders.

According to IEEFA Bangladesh (February 2023), Bangladesh's average power generation cost is expected to cross double digits in Taka during FY2022-23 compared to BDT 8.84/kWh (US\$0.082) in FY2021-22. This will lead to a revenue shortfall for BPDB despite recent electricity price hikes, The subsidy burden of the power sector during FY2021-22 was BDT297b (US\$2.7b), which may further rise in FY2022-23.

Bangladesh's current sovereign rating downgrade indicates the country's weakening credit profile and foreign reserves. Sovereign risk can typically be addressed using political risk insurance from multilateral agencies like MIGA, which provides a four-point cover. However, PRI agencies have indicated that the availability of currency inconvertibility and transfer restriction insurance would currently be limited until the overall macroeconomic condition improves.

The contractual framework for renewable energy projects is underpinned by the PPA with the Bangladesh Power Development Board (BPDB), and an Implementation Agreement (IA) with the Ministry of Power, Energy and Mineral Resources. Under the contractual arrangement, the Bangladesh government guarantees the BPDB's obligations. The combination of PPA and IA are generally considered by domestic and international lenders to be suitable and conducive to project finance solutions.

Some lenders have only cited the potential need to strengthen the clause protecting the project against curtailment.

Despite an appropriate contractual structure and risk allocation, appetite from lenders to deploy capital is limited until the country's financial situation improves.

Domestic and International lending

Project financing solutions exist however country's macroeconomic situation have made solutions expensive or difficult to implement.



Payments under the PPA are denominated in Taka and indexed to USD, making USD the preferred funding source.

A portion of the financing could also be raised in Taka. However, developers have cited that the domestic lending landscape lacks depth regarding the number of active lenders and the quantum of loan amount offered. Domestic commercial lenders also lack the technical capacity to evaluate and finance renewable energy projects. The offered loan tenors are not greater than 5-10 years in Taka due to short deposit periods.

Given the emerging sector landscape and country risks, Multilateral financial institutions such as ADB, IFC, AIIB, and DFIs like GuarantCo have led USD-denominated non-recourse project financing.

Bangladesh

Financial barriers (cont'd)

Domestic and International lending



Project financing solutions exist however country's macroeconomic situation have made solutions expensive or difficult to implement. (cont'd).

International commercial banks have started considering finance for renewable energy projects in Bangladesh; the cost of financing is comparatively higher than MDB/DFI-led financing due to the higher credit risk premium and the cost of political risk insurance. Also, whether such a pool provides sufficient market depth to support financing more than a few initial projects remains to be seen.

State-owned non-banking financing institutions like Bangladesh Infrastructure Finance Fund Limited (BIFFL) and Infrastructure Development Company Limited (IDCOL) are often cited as resourceful financial institutions providing non-recourse financing. Funds are available in Taka, USD, and Euro, with credit lines from DFIs. There is sometimes a requirement for domestic companies to provide guarantees, which small or local developers struggle with.

Though Bangladesh Bank has formulated green banking guidelines, the lack of capacity of banks and financial institutions and the underdeveloped equity and bond markets hamper the expected growth of green projects in Bangladesh.

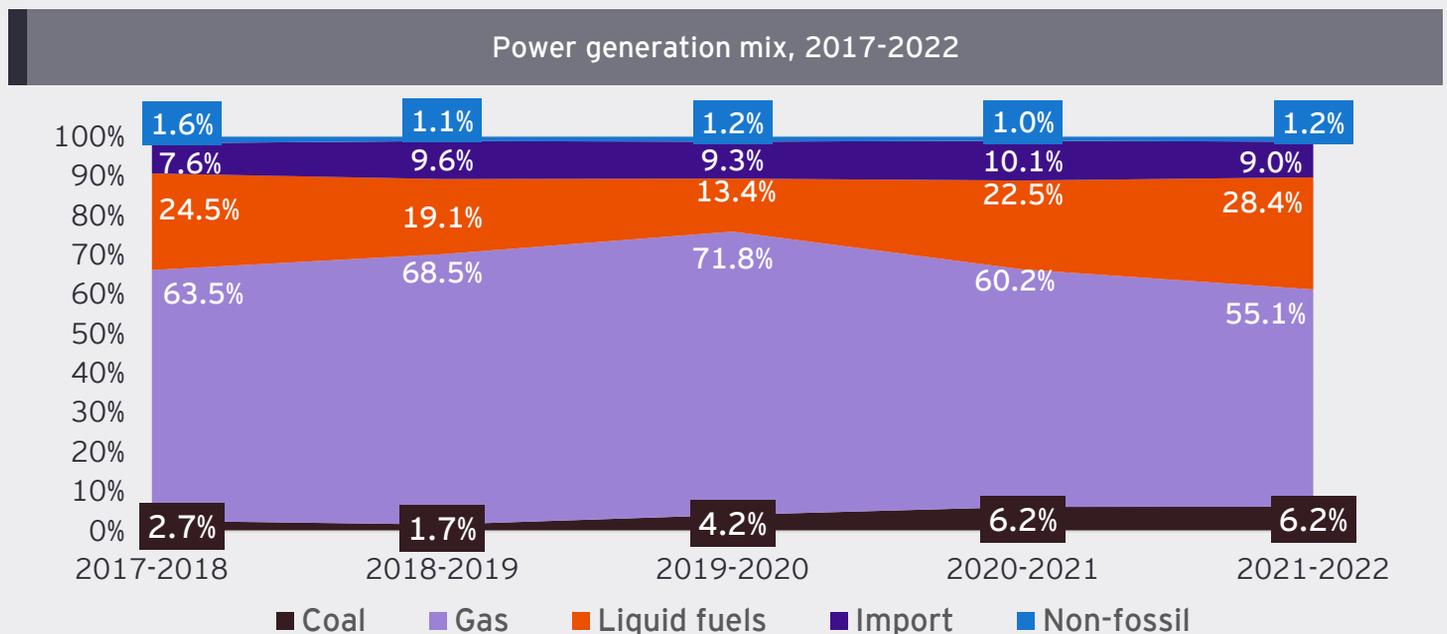
Stakeholders have indicated that USD-taka swaps are too expensive. In April 2023, Taka devalued against USD for the second time in less than a year. In the first six months of FY23, Taka was devalued by 11.3% against the USD - the highest among the neighboring countries - as the central bank introduced a floating exchange rate in September 2022 amid the prevailing foreign exchange crisis.



Growing proportion of coal in Bangladesh's energy mix

Bangladesh is a country that has been heavily reliant on domestic and imported fossil fuels for electricity generation. By June 2022, 62% of total electricity generated was from domestic fuels (natural gas and coal) and 28% from imported petroleum fuels. Even though Bangladesh had set the goal for total electricity generated from RE to be 5% and 10% by 2015 and 2020 respectively, the actual contribution of RE to the generation mix was only 0.3% (on-grid, excluding hydro) based on BPBD Annual Report 2021-2022 and 3.5 including off-grid RE.

In recent years, due to the falling numbers of domestic production for natural gas, the proportion of coal and liquid fuels in Bangladesh's power mix have increased significantly.



*Liquid fuel refers to furnace oil and diesel, while non-fossil refers to hydro and solar PV

Fossil fuel reliance has made Bangladesh highly susceptible to global supply chain shortages and price fluctuations. In 2023, the country experienced frequent power shortages that amounted to a total of 114 days between January and May. The newly-minted Maitree and Payra coal plants had also ran out of coal to continue operation in June. Warm and dry weather leads to higher power demand while the seven-year low forex reserves made it difficult for the country to pay for fuel imports.

With the levelized cost of energy from utility-scale solar falling lower than average power generation cost for 2021-2022, there is growing support for the country to shift toward solar power. To promote regional cooperation, Bangladesh will develop plans to maximise floating solar installations while utilizing the record-low solar tariffs by conducting RE auctions in neighboring countries.

Source: S&P Global Commodity Insights, SREDA National Database of Renewable Energy, Bangladesh Power Development Board Annual Reports, Reuters, Bangladesh Power Development Board Annual Report 2021-2022, Mujib Climate Prosperity Plan

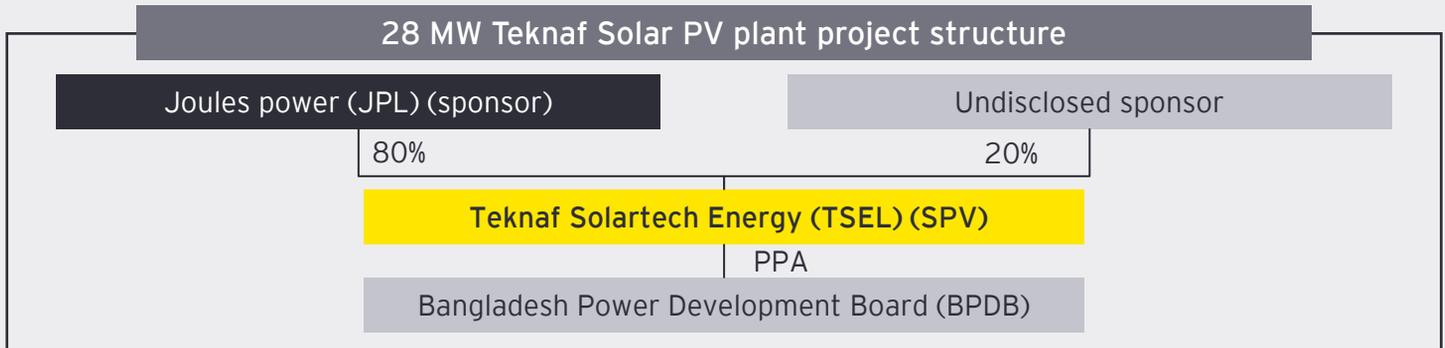


Financing structure in Bangladesh

Typical financial structure offered by commercial lenders

Tenor	Coupon Rate	Key terms
<ul style="list-style-type: none"> ▶ 12 - 15 years 	<ul style="list-style-type: none"> ▶ 9% BDT financing ▶ 8% USD financing 	<ul style="list-style-type: none"> ▶ Gearing ratio: 75:25

Case Study: Teknaf Solar project, Bangladesh's first 15-year project financing



Financial Close	<ul style="list-style-type: none"> ▶ May 2019
Facility Amount	<ul style="list-style-type: none"> ▶ US\$25m
Lenders	<ul style="list-style-type: none"> ▶ Standard Chartered Bank (US\$15m) <ul style="list-style-type: none"> ▶ US\$11m US Dollar tranche ▶ US\$3.5m Taka equivalent tranche ▶ Local banks (US\$10m Taka equivalent) <ul style="list-style-type: none"> ▶ One Bank - BDT458m ▶ Saudi-Bangladesh Industrial and Agricultural Investment (Sabinco) - BDT183m ▶ Shahjalal Islami Bank - BDT183m
Tenor	<ul style="list-style-type: none"> ▶ Standard Chartered Bank - 15-year tenor for each tranche ▶ Local banks - 11-year tenor for each tranche including 1 year grace period
Gearing	<ul style="list-style-type: none"> ▶ 70%
Guarantee	<ul style="list-style-type: none"> ▶ GuarantCo guaranteed 90% (13.5m) of dual-currency financing for Standard Chartered ▶ Offered a combined credit and liquidity guarantee, mitigating both payment default risk and liquidity risk for Standard Chartered
PPA tariff	<ul style="list-style-type: none"> ▶ 20-year PPA at USDc 13/kWh

Source: IJGlobal, GuarantCo

Bangladesh

Market recommendations

Stakeholder consultation have indicated the following priorities and ideas would support the market deployment:

Recommendations addressing non-financial barriers



1. Provide government assistance in easing the land acquisition process for renewable energy developers.

Challenges in identifying suitable land hinder the uptake of large-scale renewable energy projects, assistance from the government is required.

The government may want to explore taking the lead in identifying and earmarking large parcels of suitable land prior to calling for tenders to ease the land acquisition process. Government and policymakers could consider consolidating multiple smaller land parcels and creating land banks dedicated to renewable energy projects. This can provide developers with easier access to land for their projects.

2. Given that Bangladesh is in the early stages of renewable energy deployment, it has an opportunity to set a clear, predictable and transparent framework for procurement and incentives from the start.



Renewable energy capacity addition is the most favorable option for Bangladesh's power sector to reduce reliance on imported fossil fuels. Stakeholders have indicated that the government would benefit from setting a year-wise action plan backed by a monitoring mechanism to track progress. Think tank IEEFA estimates that an annual investment between US\$1.53b and US\$1.71b is required from 2024 up to 2041, not including the cost of grid modernization and storage facilities, to meet 40% renewable target by 2041. This investment is less than the subsidy burden of the power sector in FY2022.

In addition to mobilizing investments from various channels, the government needs to deploy policy measures to transform electricity transition goals toward renewable energy to free up financial resources, which otherwise end up as subsidy payments.

Should the first few projects, currently at an advanced stage of development and financing, successfully achieve commercial operation and stable operations, it would give a strong signal to the market and increase interest from a broader set of investors and lenders.

Bangladesh

Market recommendations (cont'd)

Recommendations addressing financial barriers



3. Support from international development agencies in the form of risk insurance and grants/subsidies is key to enabling the financing of renewable energy projects.

Developers and lenders have indicated the need for political and/or commercial risk cover from Export Credit Agencies, MDBs, or other financial institutions such as GuarantCo (e.g., local currency infrastructure guarantees and loans) to enable renewable energy financing in Bangladesh and mitigate sovereign risk.

International development agencies may also assist developers by providing financial instruments such as grants or subsidies to cover the c.2% guarantee fee needed for the issuance of AAA bonds denominated in Taka.

Additionally, based on stakeholder feedback, USD-taka swaps are expensive to procure on a commercial basis. A grant/subsidy to cover the expensive swap rates may also be useful to the developers.

National Renewable Energy Laboratory (NREL) and USAID worked to assess wind resource potential in Bangladesh with the aim of accelerating large-scale wind energy deployment in the country. Based on stakeholder feedback, North Bangladesh shows more suitability, but wind masts of 50-60m height are needed, for which instruments such as technical grants and convertible loans may be needed for such masts. Such grants are only released with approvals and may have long lead times. However, no such approval is required if the assistance is provided through US\$1m-US\$2m of preference shares or convertible equity, for which only BIDA or Bangladesh Bank approval is required to lend.



3.7

Pakistan

Pakistan

Overview of clean energy financing landscape

Pakistan remains a highly energy insecure country as 41% of its current installed capacity is produced from imported fuel. Despite achieving overcapacity in power generation, the country struggles with the provision of uninterrupted electricity at an affordable price.

The high dependency on imported fossil fuels not only burdens the economy by worsening the current account deficit, causing higher inflation and deteriorating the exchange rate but it also causes environmental hazards such as global warming. The country's oil import bill, in 2022, skyrocketed to around US\$ 23.32b, which was 29% of the total import bill - registering a massive increase of 20% relative to the previous year. Pakistan was ranked 31st largest crude oil producer in 2021 and its consumption is expected to reach approximately 180 million barrels by 2025, and over 205 million barrels by 2030 (GOP, 2021).

More than 90% of Pakistan's generation capacity added over the last two decades was thermal in nature, while renewables (non-hydro and excluding bagasse) account for a meagre 7% in total power generation mix.

To diversify its energy mix and tackle the issue of climate change, the Government of Pakistan, in 2019, set an ambitious target of producing 30% of its energy from renewable sources. If materialized, this plan would help the country achieve energy security, reduce greenhouse gas emissions and ensure fuel savings equal to US\$5b over a period of 20 years. After the recent devastating floods and the commodity super-cycle which wreaked havoc on the economy, the need to pursue the development of renewable energy in the country has become even more pronounced.

It must be acknowledged that the Renewable Energy sector in the country has gained momentum during the last decade on the back of favorable policies and incentives provided by the subsequent governments of the country. Nonetheless, the Renewable Energy sector still faces significant barriers due to which it has been unable to reach its full potential. The availability of funds for Renewable Projects remain the biggest hurdle.

Long-term private finance is a pre-requisite for supporting structural transformation required for transitioning toward a clean energy economy. The financial system in Pakistan is marked by low levels of financial participation and development. The banking sector of the country controls over 75% of all financial assets and only the largest corporate groups have access to formal finance channels. The top 20 corporations account for 30% of all lending and 50% of total corporate lending. Moreover, the six largest banks dominate more than 50% of the banking market.

Due to the current economic malaise and structural weaknesses in the financial system of Pakistan, infrastructure financing in the country faces a dearth of funds. Large-scale energy project financing is secured only based on sovereign guarantees provided by the Government of Pakistan. With the emergence of DFIs such as InfraZamin which can provide credit guarantees for renewable projects based on their relevant credit ratings, the renewable energy sector has gained the attention of private capital. Nonetheless, financing available for infrastructure projects in the country remains insufficient. Due to limited fiscal space, the Government of Pakistan is unable to undertake many infrastructure projects, which necessitates private participation in development of the country's infrastructure.

Source: NTDC, 2020, Indicative Generation Capacity Expansion Plan IGCEP 2047 Main Report
Sustainable Development Policy Institute, 2021 and Annual State of the Renewable Energy Report Pakistan 2021

Pakistan

Overview of clean energy financing landscape (cont'd)

The State Bank of Pakistan initiated the “Renewable Energy Financing Scheme” to facilitate the development of renewable energy sector in Pakistan. The scheme, which has been recently extended but is dysfunctional due to limited fiscal space in the country’s budget, aimed at attracting investments in the renewable energy sector by providing concessionary financing and offsetting costs associated with risks. By June 2021, the scheme funded 717 projects with the capacity of 1082 MW worth PKR53 b. The central bank’s initiative encouraged several private banks to develop their own product structures for renewable project financing.

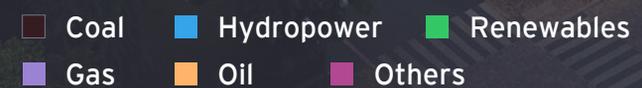
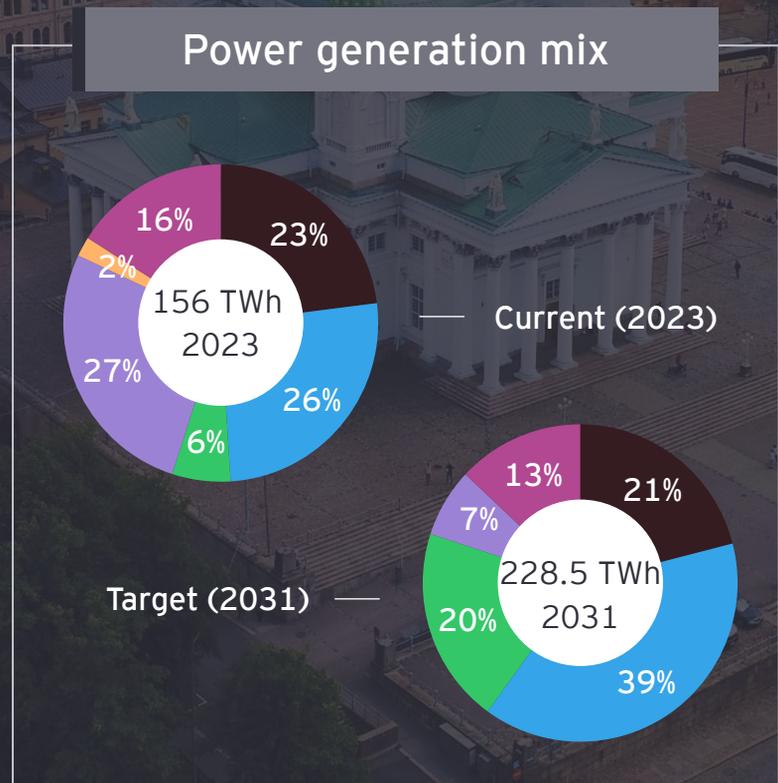
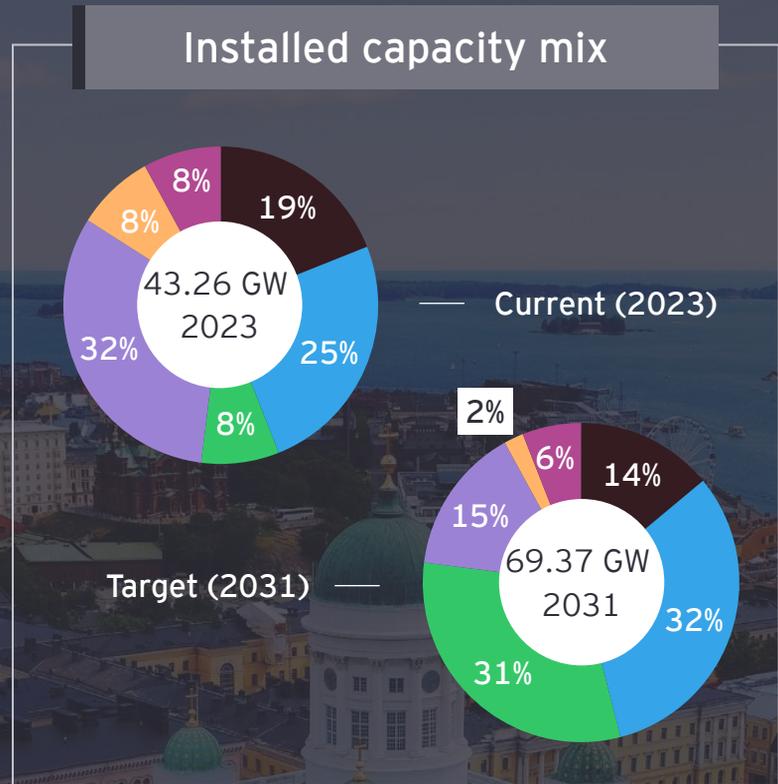
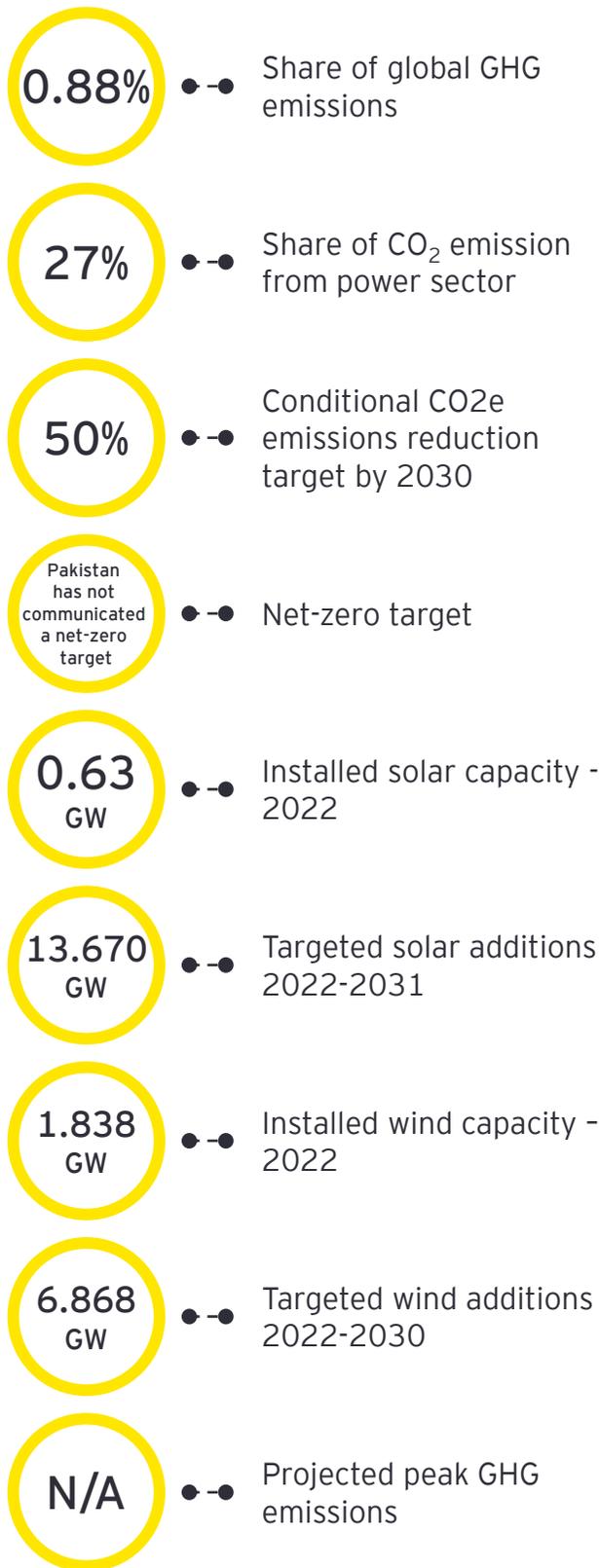
Several local and international institutes, banks and Non-Bank Finance Companies have invested in the country’s major renewable energy projects through equity, loans, and guarantee structures. Some notable financial institutions which have invested in the renewable energy sector of Pakistan are Bank Al-Habib Limited, The Bank of Punjab, JS Bank Limited, Meezan Bank Limited, Allied Bank Limited, Bank Alfalah Limited, Faysal Bank Limited, Habib Bank Limited and Soneri Bank Limited.

Despite considerable investments made in the Renewable Energy sector by local and international financial institutions, the sector is still unable to reach its full potential due to several financial and non-financial barriers discussed subsequently in this report.

Source: NTDC, 2020, Indicative Generation Capacity Expansion Plan IGCEP 2047 Main Report
Sustainable Development Policy Institute, 2021, Annual State of the Renewable Energy Report Pakistan 2021

Pakistan

Snapshot of renewable energy deployment



Renewables include solar, wind, biogasse

Source: NTDC, 2020, Indicative Generation Capacity Expansion Plan IGCEP 2047 Main Report
 Sustainable Development Policy Institute, 2022, Annual State of the Renewable Energy Report Pakistan 2021, Emissions Database for Global Atmospheric Research 2022
 MoCC, 2021, National Climate Change Policy, Ministry of Climate Change, Government of Pakistan

Pakistan

Snapshot of domestic loans and bond markets

Pakistan domestic bond market

US\$
1.7b

Total amount of investment bonds issued in 2023

77%

Sovereign bonds as a proportion of total bonds outstanding as of 2023

CCC+

S&P credit rating for sovereign bond as of Dec 2022

US\$
500m

Total amount of green bond issued as of March 2021

1

Number of green bond/sukuk issued to date

EUR

Green bond issued is Euro-denominated

Pakistan domestic loan market

US\$
106b

Outstanding loans in banking system (excluding consumer loan) - June 2022

US\$
240m

Outstanding loans for solar power generation - June 2022

US\$
20m

Outstanding loans for wind power generation - June 2022

Investment in renewable energy sector

US\$
1.9b

Total investment realized in renewable energy sector from 2016 - 2021

US\$
72.3b

Total investment required to meet Government Commitments until 2030

US\$
35.7b

Total investment required in wind and solar power to meet Government Commitments until 2030

Note: Indirect investments regarding renewables development such as grid expansion are not calculated in this report.

Source: EY Research, Green Finance Platform, State Bank of Pakistan, Climatescope by Bloomberg NEF, ADB, S&P Global, FRED St Louis Fed

Pakistan

Overview of key barriers to renewable energy

Stakeholder feedback suggests the following areas as financial and non-financial barriers to the deployment and financing of utility-scale solar and wind energy projects in Pakistan. Contribution and cooperation by more than one stakeholder group may be required to address or mitigate these barriers to some degree.

Ranking	Area	Solar/ wind	Description	Addressed by
Non-financial barriers				
High	Regulatory and policy landscape		Target to increase RE's energy sector share from 5% to 30% by 2030 could be challenging given the economic crisis and liquidity crunch	Policy makers
	Supporting infrastructure		The renewable energy share is only 5%, and the current transmission network cannot support increased power from variable RE sources	NTDC
Medium and low	Land acquisition		Due to bureaucratic hurdles in land registry and transfer and potential post-acquisition disputes, land acquisition could face delays from litigation and an inefficient judicial system	Policy makers
Medium and low	EPC/Supply chain		Since most equipment is imported, the SBP's recent import restrictions could hinder the renewable energy sector's growth	Policy makers
Financial barriers				
High	Domestic financing		With the end of the SBP's RE financing and the liquidity crisis, renewable funding has reduced. Project financing relies on Pakistan's sovereign guarantees, limiting small and local developers. FIs are also wary of non-collateralized loans and small developers	Lenders
	International financing		International commercial banks shy away from funding RE projects due to high macroeconomic and political risks	Lenders
Medium and low	PPA bankability		PPA tariff renegotiation in 2020 hurt PPA bankability and reduced investor confidence	Policy makers
Other barriers				
Not identified	Local content requirement		Local content requirements for solar and wind energy are not imposed in Pakistan. This has not been identified as a barrier by the stakeholders	

Pakistan

Non-financial barriers

Regulatory and policy landscape



Financial crisis and economic uncertainty

Pakistan is facing a severe liquidity crunch as the country's foreign reserves have fallen to critically low level of US\$4.46b which covers less than a month of imports. To stop further devaluation of money and avert a possible default, the State Bank of Pakistan imposed restrictions on imports and repatriation of profits overseas. Furthermore, the SBP's concessionary financing scheme for renewable energy projects, recently extended under new terms is largely dysfunctional due to limited fiscal space, and KIBOR rate has reached the unprecedented high of 21%, which have made infrastructure projects financially unviable. As a result, whatever little funds were available for renewable energy projects have dried up, supply of necessary equipment and components for development of renewable projects have become short, and investors' confidence is severely hurt.



Lack of credit worthiness

Many up and coming, small and local developers lack institutional history and do not have access to any local equity which makes it difficult for them to undertake renewable energy projects considering their high capital cost structure. Furthermore, financial institutions including banks find it too risky to finance emerging local developers.

Financial Institutions prefer contractor profiles with well-established experience in construction, longstanding credit history and relationship with FIs, and support from the leading suppliers. Ultimately, short supply of financing from lenders produce long lead times to conclude renewable energy projects.

Single buyer model



The current modus operandi in Pakistan follows the single buyer model where CPPA-G, a state-owned entity, is the monopoly with total control over power trading and is also the sole off-taker of all electricity generated. The current market structure has created problems such as high tariffs, excess capacity, lack of accountability and transparency, and corruption. The persistence of this market structure has hindered the development of competition and reformation of power sector of the country through delays in implementation of Competitive Trading Bilateral Contracts Market (CTBCM).

The absence of a competitive market impedes the determination of efficient prices which remains one of the biggest barriers to development of renewable energy in Pakistan.

Absence of competitive markets



Pakistan aims to implement new procurement mechanisms through renewable energy auctions and CTBCM. The plan for competitive bidding for solar and wind projects was first devised in 2014 by NEPRA. Although auctions were mandated as the source of procurement for Renewable Energy, the lack of good auction design remains a major concern. The subdued response to a Request for Proposal (RFP) issued by Alternative Energy Development Board (AEDB) for a 600 MW solar power scheme in Muzaffargarh is an indication of the need for a robust auction design.



Undeveloped wheeling business

Wheeling is a process that optimizes efficiencies by transmitting electricity from one location to another through the existing transmission and distribution network. This allows for the efficient movement of electricity, often from areas with excess generation capacity to areas with higher demand or deficit. Wheeling enables the optimization of available resources, enhances system reliability, and can contribute to reducing overall costs of electricity generation and consumption. It must be noted that wheeling is considered the initial stage in establishing competitive markets.

Wheeling involves the use of the power transmission infrastructure to transport electricity between different entities, such as power producers, distribution companies, and consumers, while adhering to the regulatory and tariff frameworks set by the relevant authorities. It is aimed at facilitating the exchange of electricity and maximizing the utilization of the existing power infrastructure for the overall benefit of the power system and the consumers.

Wheeling offers several advantages, including providing equal access to all market participants through a non-discriminatory business-to-business framework, attracting investments, advancing the wholesale market, and eliminating government assurances. However, for wheeling to make financial sense, the associated charges should be determined based on the economic principle of marginal cost rather than incorporating inefficiencies such as theft, stranded costs, non-payment, and improper cross-subsidies into the tariff, all of which jeopardize the development of competitive markets.

The wheeling business has still not gained momentum in Pakistan. Distributive Companies (DISCOs) have almost always taken a strong stance against wheeling by arguing that their investments in infrastructure would become under-utilized if open access is made available to consumers which would allow them to switch to other electricity providers. Consequently, the formulation of an appropriate regulatory framework for wheeling and its implementation have been slow in the country.

Without the implementation of a competitive framework for wheeling, renewable energy would be unable to reach its full potential in Pakistan.

Supporting infrastructure

Suboptimal grid



The current grid is highly inefficient and unreliable, and may prove to be insufficient to absorb the increased production of variable renewable energy (VRE) in the power network of the country. To achieve the ambitious 30% target for VRE by 2030, additional transmission lines will need to be laid to connect large-scale solar and wind parks in the gigawatt scale.

Significant investment is needed to upgrade the transmission system and implement new automation and control systems which remains the biggest challenge for the cash-strapped country.

Pakistan

Non-financial barriers (cont'd)



Transmission and distribution losses and low recoveries

Due to the inefficient grid, much of the Transmission and Distribution (T&D) network of the country, especially of rural areas, remain overloaded during peak times, which results in increased load shedding and maintenance charges. The constant lack of stability in grid results in technical problems, particularly for distributive energy generators.

Large-scale thermal power generators have higher capacity (typically 300 - 600 MW), in the form of their own sub-stations and interconnections at high voltage lines, to absorb grid fluctuations.

However, small-scale distributive energy generators (typically with total capacity of 50 - 100) with limited resources face greater risk as grid fluctuations can result in more equipment failures and tripping issues, which increases the operational (maintenance) and capital expenditures of small-scale distributive energy generators.

Low recoveries due to power theft and unpaid bills is also a major cause of concern for the DISCOs as they translate into loss of revenue.

The DISCOs hemorrhaged a huge sum of money during FY2022 because of high T&D losses (17.13%) and low recoveries (90.51%) (State of the Industry Report 2022, NEPRA).

Land acquisition

Lack of coordination between federal and provincial entities



The coordination among federal and provincial entities remains limited. There exists an absence of cooperation, coordination, and delays, which hampers progress and dampens investor confidence. It must be noted that eighteenth amendment in the constitution, through devolution of power, has given greater powers to the provinces, which may have profound consequences for any Renewable Energy project. For instance, Land acquisition for power projects is a provincial matter while planning is a federal subject. Such an arrangement may create hinderances and delays in the establishment of renewable energy projects.

Pakistan

Financial barriers

PPA bankability



Renegotiation of contracts

In 2020, the power producers signed MoUs with the Government of Pakistan to resolve the issue of power sector circular debt. The renewable energy providers had to take a cut on tariff for more than 15 years of their remaining contracts. The realization that sovereign independent agreements with the government could be renegotiated has been a major blow to investor confidence and negatively affected the future potential to attract FDI.

Asset - liability mismatch



There is also a stark asset-liability mismatch as the financing for infrastructure projects is required for 15-25 years while the total deposits beyond 5 years stand at only 1.2% of the total deposits. Considering the required infrastructure financing of US\$101b for transitioning to clean energy by 2030, securing funds for renewable energy infrastructure projects through the current funding pool of term deposits may not be possible. Furthermore, the Investment-to-Deposit ratio (IDR) of the banks is 71%, which means that Pakistani banks tend to prioritize income generation through investments in (risk-free) government securities instead of focusing on lending to the private sector. Until and unless, the infrastructure asset class is made more attractive than the government securities, the local banks may always exhibit reluctance in funding the renewable energy projects.

Domestic and international lending



Circular debt

The inefficient grid, T&D losses, low recovery rate, and compounding on accrued liabilities translate into circular debt.

Circular debt occurs when one entity facing problems in its cash inflows holds back payments to its suppliers and creditors due to which problems in the cash inflow of one entity spill onto to other segments of the value chain (Ali and Badar, 2010).

In context, circular debt is the net unfunded outstanding liability position of the power distribution companies (DISCOs) to the Central Power Purchasing Authority-Guarantee (CPPA-G), which translates into delayed settlement of payment obligations by the CPPA-G to the power generation companies (GENCOs). Due to this financing gap, the CPPA-G is compelled to borrow. Pakistan's circular debt has crossed the PKR4 trillion mark (US\$14b) and plagues the entire power value-chain of the country.

Source:

NEPRA, 2022, Annual State of the Industry Report

Syed Sajjad Ali and Sadia Badar, 2010, Dynamics of Circular Debt in Pakistan and its Resolution



Financing structure in Pakistan

Typical financial structure offered by commercial lenders

Tenor	Coupon Rate	Key terms
<ul style="list-style-type: none"> ▶ 10 - 15 years 	<ul style="list-style-type: none"> ▶ 3 months LIBOR + 4.25% for foreign loan (a risk premium of 4.25% has been the norm for tariff structuring in Pakistan) ▶ 3 months KIBOR + 1.75% for local loans 	<ul style="list-style-type: none"> ▶ Gearing ratio: 70:30

Case Study: Atlas Solar Limited (formerly Zhenfa Pakistan New Energy Company Pvt. Ltd.)

Project company	Zhenfa Pakistan New Energy Company Pvt. Ltd.
Sponsors	<ul style="list-style-type: none"> ▶ Zenfa Energy Group Co. Ltd. ▶ Zhenfa New Energy Science and Technology Co. Ltd.
Capacity	▶ 100 MWp
Project location	▶ Rakh Chaubara, District Layyah, Punjab
Land area	▶ 650 acres
Concession period	▶ 25 years from COD
Capacity utilization factor	▶ 21.51%
Annual energy production	▶ 168.6 GWh per annum
EPC contractor	<ul style="list-style-type: none"> ▶ Zhengjiagang SEG PV Co. Ltd. (offshore) ▶ HydroChina International Engineering Co. Ltd. (onshore) ▶ Zhenfa Science & Technology (design)
Financial close	February 2021
Project cost	US\$91.088m
Debt	70% - Three-fifths of foreign funding while the remaining is contributed by the country's leading commercial bank
Lender(s)	<ul style="list-style-type: none"> ▶ British International Investment (Formerly CDC Group plc) ▶ Habib Bank Limited
Gearing	80:20
COD	April 04, 2022
PPA tariff	USDc 3.7390/kWh



The Super Six Wind Projects

The Super Six initiative is a unique undertaking aimed at constructing six wind power projects in Pakistan. This endeavor aims to generate affordable and environmentally friendly electricity, addressing the nation's urgent energy needs and lessening its dependence on costly imported fossil fuels. With a total capacity of 310MW, the Super Six facilities are projected to produce over 1,000 gigawatt-hours of electricity each year, and it is anticipated that the program will lead to a reduction of around 650,000 tons of carbon dioxide emissions annually.

All the Super Six wind projects have been developed by domestic companies and are operational now.

Location	Jhimpir Wind Corridor, Thatta District, Sindh
Total investment	US\$450m
Gearing ratio	75:25
Foreign lenders	<ul style="list-style-type: none"> ▶ IFC ▶ Deutsche Investitions- und Entwicklungsgesellschaft (DEG, part of KfW Group of Germany)
Domestic lenders	<ul style="list-style-type: none"> ▶ Bank Alfalah Limited ▶ Bank Al-Habib Limited ▶ Meezan Bank Limited
IFC's contribution	US\$86m
Debt from other lenders	US\$234m
Financial Close	November 15, 2019
Combined Capacity	310 MW
Individual Capacity	Five 50 MW farms and one 60 MW scheme
Annual Energy Production	1,000 GWh
No. of companies awarded	5
Developers	ACT Group, Artistic Milliners (Pvt.) Limited, Din Group, Gul Ahmed Group, Younus Brothers Group

The Super Six projects are projected to bring about a reduction of over 40% in power costs compared to the current average generation expenses. This is expected to stimulate greater investments in renewable energy within the country. IFC, a prominent investor in Pakistan's power sector, was responsible for funding the country's initial wind power project in 2011 and played a pivotal role in establishing the financial structure for independent power producers focusing on hydro and wind energy. Through this initiative, IFC's investments will extend to encompass a total of 11 wind power projects in Pakistan. In parallel, the World Bank is collaborating with the government to facilitate policy reforms aimed at enhancing the sustainability of the energy sector and implement the country's latest framework for renewable energy policies.

Pakistan

Market recommendations

Stakeholder consultation have indicated the following priorities and ideas would support the market deployment:

Recommendations addressing non-financial barriers



1. Institutional reforms.

The Government of Pakistan needs to undertake institutional reforms aimed at reducing red tape and bureaucracy, shortening documenting process, and cutting down redundant procedures which would help improve ease of doing business and create an environment favorable to local and international investor participation in the renewable energy sector of the country. The provision of single-window solution to relevant stakeholders must be a priority.

2. Implementation of competitive markets framework.



The Government must ensure the implementation of competitive markets framework and create a conducive environment to let the wheeling business gain momentum in the country. In accordance with NEPRA's suggestion, wheeling must be merged with the operationalization of CTBCM. Enabling an open access regime along with wheeling would help foster competition in the energy sector of the country, which would assist in attracting private capital in the development of renewable energy.



3. Enter Public Private Partnerships (PPPs) for improving the transmission and distribution network.

Pakistan requires significant investment for transitioning toward sustainable clean energy. Investments worth billions of dollars are needed to establish renewable energy parks and improving the power infrastructure such as transmission network. The country needs US\$101b by 2030 and an additional US\$65b by 2040. The Transmission and Distribution network needs considerable improvement and upgradation to evacuate energy produced from variable renewable energy. An estimated US\$20b is required to upgrade the transmission network by 2040 (Nationally Determined Contributions, 2021).

Since availability of fiscal support for infrastructure projects remains limited, the government may work through PPPs to undertake investments in the transmission network of the country.

Pakistan

Market recommendations (cont'd)



3. Enter Public Private Partnerships (PPPs) for improving the transmission and distribution network. (cont'd)

The government can work with a private partner and secure funding from a development partner to improve the country's transmission and distribution network. This model would allow the mitigation of risk through the combination of government concessional equity, and technical expertise and financial resources of the private partner.

4. Indigenize mechanical and electrical equipment to make Renewable Energy projects more affordable.



Currently, the mechanical and electrical equipment for solar and wind power parks which are mainly imported are categorized as luxury items. The Government must reclassify them as essential items which would improve the supply of solar panels and wind turbines and drive down costs. Efforts should be made for localization of parts and equipment required for development of renewable power projects in the long-term. A strong domestic supply chain would help make the transition to clean energy affordable and more sustainable.

Recommendations addressing financial barriers



5. Contain the circular debt.

The upgradation of the country's transmission and distribution network would also lower the transmission and distribution losses, which would help contain the circular debt. The Government must further strive to control circular debt through a crackdown against power theft and defaulters. This could be achieved by investing in capacity building of the relevant public institutions and improving communications and management. The Government must refrain from trying to solve the issue of circular debt through subsidies and bailouts as they only inflate the fiscal deficit and distorts the market. Despite giving bailouts in the past, the issue of circular debt withstands. Finally, the Government must prioritize the privatization of Distribution Companies (DISCOs), which would also align with the IMF's conditions and help the country resolve the issue of circular debt.

Pakistan

Market recommendations (cont'd)



6. Reinstate SBP's concessionary financing scheme and improve in the asset-liability match for funding the renewable energy projects in the country.

There is an urgent need to reinstate and augment the previous SBP's concessionary financing scheme. The State Bank of Pakistan may also set a minimum threshold of investments for the commercial banks which they will have to make in the Renewable Energy sector.

Furthermore, comprehensive regulatory and institutional frameworks should be put in place to leverage public funds through blended finance. Appropriate policies must be formulated to facilitate the development and growth of DFIs such as Karandaaz, InfraZamin and Pakistan Credit Guarantee Company Limited, which can provide support to infrastructure finance in the country through investment and risk mitigation instruments including blended finance and guarantees.

Moreover, the State Bank of Pakistan must embark upon the uphill task of making substantial improvement in treasury management to meet the outstanding infrastructure financing targets. The initial step is to get the asset class right and then stretch the liabilities on a term basis. Once this is done, funds from pension funds and insurance companies by providing them appropriate incentives.

7. Incentives to attract Foreign Direct Investment and adherence to sovereign agreements.



As the country is going through one of the worst economic and financial crises and the Government faces limited fiscal space; efforts must be made to attract FDI in the country's greenfield projects in the renewables sector.

Moreover, attractive tariff for foreign investors must be devised. In early 2023, the underwhelming response to a Request for Proposal (RFP) issued by Alternative Energy Development Board (AEDB) for a 600 MW solar power scheme in Muzaffargarh highlights the presence of a high-risk environment and a low baseline tariff as the main factors discouraging the addition of new renewable energy through auction mechanisms. According to Hanea Isaad, an Energy Finance Analyst, the benchmark tariff of 3.4108 Usc/KWh was deemed to be too low by the investors. The Institute for Energy Economics and Financial Analysis (IEEFA) suggests an optimum benchmark tariff to range between 4.3 - 5.8 Usc/KWh for solar power in Pakistan, which is contingent upon the type of financing involved.

Furthermore, the Government must adhere to investment agreements, in letter and in spirit as renegeing on contracts sends negative signal to the markets and hurt investor confidence.

Pakistan

Market recommendations (cont'd)



8. Role of International Financial Institutions and Development Financial Institutes.

As the case studies exhibit, the International Financial Institutions may play a role similar to what the World Bank and IFC have been doing in the Renewable Energy sector of Pakistan. IFI's may either make direct investments in the sector or they make provide guarantees to help mobilize funds from domestic and other international financial institutions. The DFIs may assist the country on policy reforms to enhance the energy sector's sustainability and the implementation of the relevant energy policy frameworks.

A photograph of a traditional Japanese temple, likely the Kinkaku-ji (Golden Pavilion) in Kyoto. The temple features a prominent yellow-tiled roof with ornate decorations and a dark wooden structure. In the foreground, there is a pond with lily pads. The sky is blue with some light clouds. A yellow square with the number '3.8' is overlaid on the image.

3.8

Japan

The Japan Government is targeting to reach 46% of emission reduction by 2030 and net-zero in 2050 as described in the Sixth Strategic Energy Plan. To achieve this target, a maximum introduction of renewable energy will be encouraged, which means capacity addition of 23GW for solar and 10.4GW for wind by 2030. Besides, the outlook for power generation mix in FY2030 is shown in the next page. The ratio of renewable energy in the energy mix is set to double by FY2030 from FY2019 level.

Japan renewable energy market started with the government's introduction of FiT (feed-in-tariff) scheme in 2012. Since then, large number of solar PV plants have been installed. Government is now promoting new FiP (feed-in-premium) system along with new market structures (e.g., wholesale energy market, balancing market and capacity market). The FiP system is more market-based system compared with the FiT system, which allows power producers to freely sell their electricity in the market and makes them eligible to receive a premium over and above the market price. This is one of government efforts to transition the sector to move away from FiT scheme and compete in the liberalized market.

Financial markets are generally widely available for developers, given the significant Yen deposits and strong appetite for renewable energy projects from financial institutions.

Compared to a cumulative investment of US\$114.3b realized from 2016 to 2021, investment needed to meet the Clean Energy Strategy by 2030 are estimated at US\$1.2t. Cumulative green bond issuance and green loan issuance stood at US\$37.3b in 2021 and US\$3.3b in 2023 respectively, but this does not mean there is lack of liquidity in RE space as market participants see green certification of bonds/loans is not necessarily

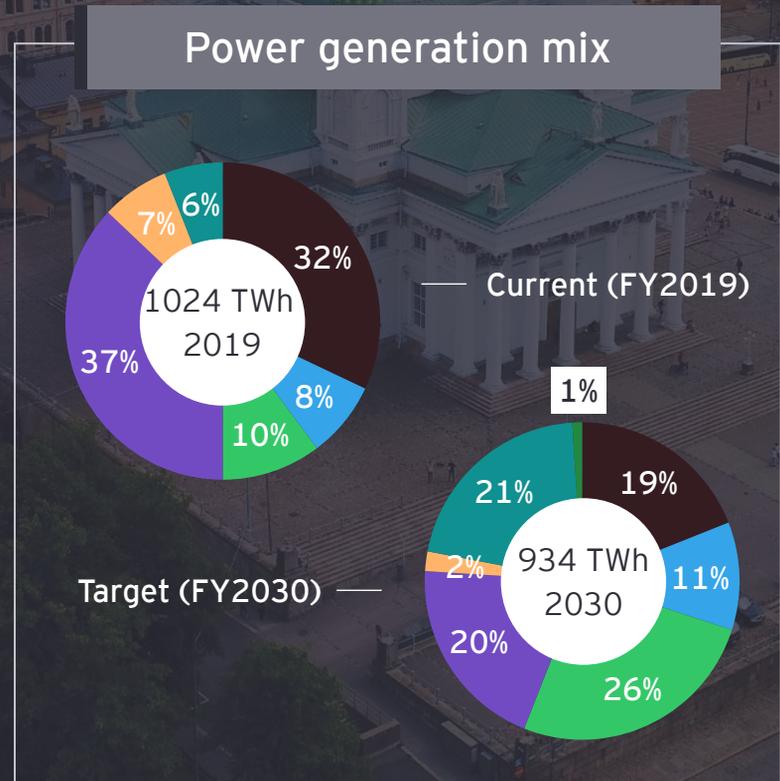
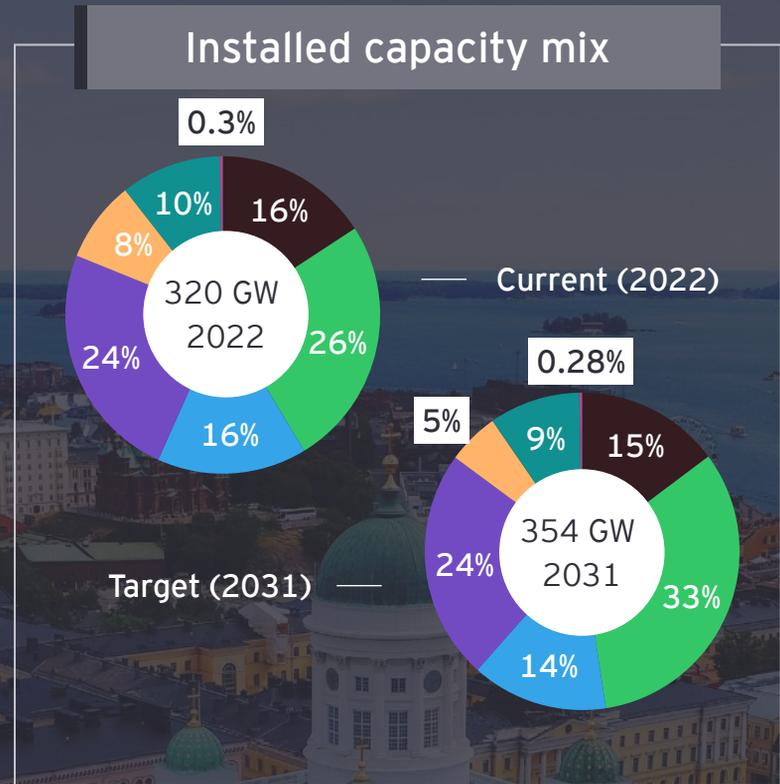
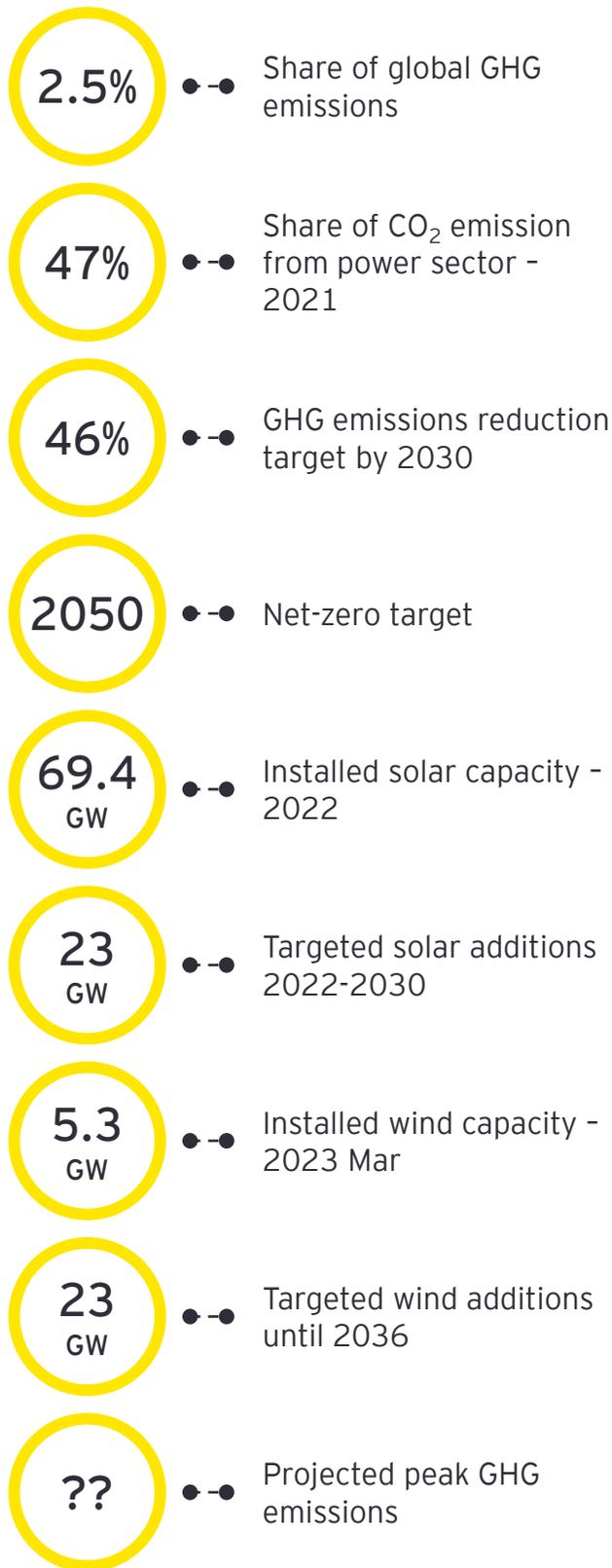
required to finance RE projects. Especially, financing to solar and onshore wind projects is rather mature in terms of risk assessment while offshore wind financing is still nascent.

Japan aims to have 10 GW of offshore wind capacity by 2030, however, project finance deals for offshore wind in Japan is still limited, aside from Akita and Noshiro port project in Akita prefecture and Ishikari port project in Hokkaido prefecture. Akita and Noshiro port project led by Marubeni Corporation, secured project finance in 2020 and started commercial operation in December 2022. Ishikari port project is led by Green Power Investment Corporation, secured project finance in 2022 and expected to start commercial operation by the end of 2023. Both projects have secured 20 years of FiT payment of JPY 36/kWh. Further, offshore wind auctions so-called "Round1" for 3 sea areas were closed and all the areas were awarded by Mitsubishi Corporation, in which the lowest price was JPY 11.99/kWh (FiT price). It is now more challenging to ensure the project profitability in this price-competitive market. Besides FiT is no longer available in the coming rounds of offshore project bids. The key to secure project finance for offshore wind projects will be securing long term/fixed price CPPA to ensure project profitability even in the volatile market environment and minimize market risk of wholesale/balancing market.

Japan mature bonds and loans markets is expected to have sufficient capacity to support such an investment scale. Challenges highlighted by the market participants are mostly related non-financial barriers and the development lifecycle of renewable energy projects, as further described herein.

Japan

Snapshot of renewable energy deployment



Renewables include wind, solar, biomass, geothermal and waste

Source: Aggregation of Electricity Supply Plans for FY2022 (OCCTO), Net-zero target: [Targets | Climate Action Tracker](#), Emissions Database for Global Atmospheric Research 2022, Power sector emission : [Data Explorer | Climate Watch \(climatewatchdata.org\)](#) , Agency for Natural Resources and Energy

Japan

Snapshot of domestic loans and bond markets

Japan domestic bond market



Outstanding LCY and FCY bonds - March 2023



Rank in Asia based on market capitalisation of bond market



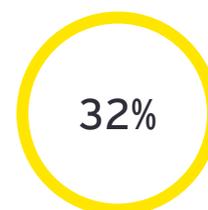
Preferred currency for green and sustainable bond issuance



Cumulative green bond issuance as of 2021



Global ranking in cumulative green bond issuance



of proceeds from green bond issuance allocated for energy projects

Japan domestic loan market



Total loan outstanding in Japan's banking system - March 2023



Total green loans issued from 2017 to 2Q2023



Total green loans issued for renewable energy sector from 2017 to 2Q2023

Investment in renewable energy sector



Total investment realized in renewable energy sector from 2016 - 2021



Global ranking in terms of clean energy investment in 2021



Total investment required to meet Clean Energy Strategy until 2030

Note: Indirect investments regarding renewables development such as grid expansion are not calculated in this report.

Source: EY Research, AsianBondsOnline, Climate Bonds Initiative, Ministry of Environment - Japan, Climatescope by Bloomberg NEF, The Government of Japan, CEIC Data

Japan

Overview of key barriers to renewable energy

Stakeholder feedback suggests the following areas as financial and non-financial barriers to the deployment and financing of utility-scale solar and wind energy projects in Japan. Contribution and cooperation by more than one stakeholder group may be required to address or mitigate these barriers to some degree.

Ranking	Area	Solar/ wind	Description	Addressed by
Non-financial barriers				
High	Pre-development process and land acquisition		Limited land availability and lengthy permission process	Policy makers
Medium and low	Regulatory and policy landscape		Market risk in FiP scheme, limited demand and high price of Corporate PPA	Policy makers
	Supporting infrastructure		Curtailment risk, liberalization of transmission business and grid capacity enhancement	Policy makers /OCCTO /Developer
	EPC/Supply chain		Higher cost of electricity, lack of CPPA off-takers for offshore wind projects	Policy makers /Developer
Financial barriers				
Medium	PPA bankability		Weak RE policy, unclear legal/accounting treatment of CPPA	off-taker/ Advisor
Other barriers				
Not identified	Local content requirement		There is no stringent rule for local content requirement in Japan	
	Domestic lending		Domestic lending market is well established and have enough capacity	
	International lending		As JPY liquidity is high, there is almost no international lending required in Japan	

Japan

Non-financial barriers

Pre-development expense and land acquisition



Limited land availability and lengthy permission process

Given Japan geographical constraints, the availability of suitable land for large-scale renewable energy development is becoming a constraint at the current stage of installed generation capacity.

Renewable energy developers are now looking at forest or agricultural areas for new development, which require a larger number of permits and application processes.

The applications for the forest development permit and conversion of agricultural land permit are bottlenecks of the development process as they require evidence of landowners' agreement. Although the environmental impact assessment (EIA) process would on average take c. 2-3 years, it is more controllable by developers.

When a project is located within a protected forest area, the developer needs to obtain a release of protection status, applying to the local forest administration authority, regional government and relevant national governmental agency. The process is not streamlined between each body and oftentimes needs resubmission. For this type of projects, land lease with the government is only concluded after the release of protection status.

The convoluted process surrounding land permitting and approval has made the pre-development process both risky and costly for developers, and it has also delayed the deployment of projects.

Regulatory and policy landscape



Market risk in FiP scheme, limited demand and high price of Corporate PPA

FiP in Japan is a scheme that government will pay the difference between strike price and wholesale market price in a certain period calculated by an equation defined in the regulation (FiP premium). Government will only pay the premium when wholesale market is below the set strike price but does not require generators to pay back the difference when the market is above the strike price. This way, developers can benefit from FiP premium when the market goes down below the strike price while also gain profit when the market goes up above the strike price. This is intended to incentivize developers to generate more energy when wholesale market price is high and less energy when it is low, in the context of promoting efficient operation of electricity market while also accelerating deployment of RE energy.

However, FiP scheme has just been introduced from FY2023 and there still be very limited precedent projects that are financed. In addition, FiP scheme involves exposure to volatility of the wholesale energy market. Base rate of premium is defined by previous year's market price and not directly linked to the current market price. This makes it difficult for financiers to predict stable cash flow of the project and hence makes it difficult to procure non-recourse finance.

CPPAs have often been cited as an important piece to fill the gap between a liberalized market and the need to ensure stable cashflows of the projects. Typical CPPA term includes fixed price and long-term contracts, which enhances the ability of the projects to access the debt market. CPPA can be concluded with developers which also keep the right to receive FiP premium.

Japan

Non-financial barriers (cont'd)



Regulatory and policy landscape (cont'd)

However, as RE cost in Japan is still higher than other sources of energy e.g., coal/gas fired plant or nuclear plant, thus CPPA price is high. This makes it difficult for the developers to find corporates willing to accept a higher price for green electricity. As the Japan Government is reducing FiT/FiP premium every year to make developers independent from subsidy schemes, the maturing of the CPPA scheme and a convergence of tariffs is key for the deployment of RE and access to the debt market.

In the FiP scheme, renewable electricity producers can sell their environmental value (RECs). This potentially solves the problem of low profitability of RE in Japan. However, Japanese RECs market is still in its infancy with limited volume of transactions and low price. It will require further development to foster the interest of buyers. This is cited as one of the reasons for renewable energy projects being less competitive than conventional generation assets.

More generally, there are scarce capacity of transmission line for RE to connect to the grid, as grid is designed to connect large power plants to large load centers, and not facilitate distributed generation like RE.

Government is rethinking how it regulates system operation businesses and business operation of transmission lines. Transmission system is now operated as a more integrated system connecting each regional transmission lines, monitored by OCCTO (Organization for Cross-regional Coordination of Transmission Operators, JAPAN). Transmission business is required to be legally divided from generation/distribution businesses so that its operation is independent from specific utility companies, thus promoting competition and healthy development of liberalized electricity business. However, there is a discussion in the advisory group to the cabinet office that division of ownership is also needed along with stricter operation of the electricity business law. It has less importance in terms of financing to RE project as to what extent the transmission business is liberalized, but from a bigger picture of overall liberalization of electricity business including generation, transmission and distribution and retail business, or electricity market reform including introduction of wholesale, balancing and capacity market, both of which ultimately contribute to promote deployment of RE, there should be more stringent governance and rules in the operation of electricity business in Japan.

Supporting infrastructure



Curtailment risk, liberalization of transmission business and grid capacity enhancement

After several years from introducing FiT scheme, specific areas in Japan with strong irradiation have become too densely built with solar farms, which has caused curtailment (e.g., Kyushu area). As curtailment hours increase, lenders see the projects less bankable. Developers need to assess curtailment risk to predict profitability and bankability of the project. To minimize curtailment risk, there should be enhancement of grid capacity between each geographically divided transmission and distribution area or deployment of grid scale battery storage facility.

Japan

Non-financial barriers (cont'd)

Supporting infrastructure



Curtailment risk, liberalization of transmission business and grid capacity enhancement (cont'd)

For the operation of the transmission and distribution system, there needs to be more efficient use of the system considering increasing connection request from RE developers. To accommodate such requests, Government is promoting ways to use it in a more efficient manner, e.g., non-firm connection to the grid by generators where vacant capacity of transmission line could be used as long as reliability and safety of the system is maintained.

Another interesting development in the private sector comes from new players, like Hokkaido North Transmission and Fukushima Transmission, which have started to enter the transmission business. They are not traditional utility companies and entered the business in response to high demand from renewable developers. They have obtained sufficient funding, including project finance support by cashflows from renewable projects to be connected to their transmission lines, and certain governmental support. This is another form of liberalization of the traditional business and a way to enhance grid capacity for the deployment of RE. Government has to promote more and back these developments for the entry of new transmission players.

As to some offshore wind projects in development in the Hokkaido area, another challenge lies in transmission capacity. Current transmission capacity between Hokkaido island and mainland of Japan is limited to 0.9GW and only expected to expand to 1.2GW by 2028.

However, when Hokkaido projects coming online, there will be GWs of capacity to be consumed, which cannot be absorbed by inland demand and transmission capacity to the mainland. OCCTO is planning to expand the transmission capacity from Hokkaido to Tohoku and greater Tokyo area, but detailed plan is not established and unclear.

EPC/Supply chain

Higher cost of electricity, lack of CPPA off-takers for offshore wind projects.



Japan Government is strongly promoting the development of offshore wind power, and public tenders for 3-4 areas are called every year since 2020. Since it is still an early development stage, there are several challenges for the tendering scheme. In the area of Akita Prefecture, the public tender process was delayed by about one year due to a re-evaluation of the public tender process after Round 1 of the public bid process.

The evaluation criteria changed in Round two. The upper limit of the offering price dramatically decreased compared with Round 1 down to JPY 19/kWh for monopile projects and JPY 29/kWh for jacket project, capacity allocated to one bidder is restricted to 1GW totaling all tender areas at each round of bids, the speed to deploy generation capacity and stable supply of electricity became greatly appreciated in the evaluation of bids.

EPC/Supply chain



Higher cost of electricity, lack of CPPA off-takers for offshore wind projects. (cont'd)

While there should be enhancement of the criteria after the experience of Round one, the timing of launching Round two has coincided with high inflation derived post Covid and the turbulence in commodities market which also hit hard on Japanese consumer price index (CPI) and weakening Yen compared to other global currency. Developers try to minimize the cost of electricity by every efforts, but it is difficult for them to match the limit set. There was request to link the offering price to CPI or other index, but regulation does not allow it as such mechanism is rarely seen in public bidding in Japan. Higher cost of electricity of offshore wind in Japan is partly because lack of supply chain of related industry in Japan. After players like Mitsubishi Heavy Industry or Hitachi exited from wind turbine businesses, there are no OEM player in the country and developers can only procure turbines, major component in terms of project cost, from outside the country in foreign currency.

Rising cost of electricity also affects the availability of corporate off-takers through CPPAs. In addition to scarce demand for CPPA for traditional solar/onshore wind, the higher cost of electricity of offshore wind, which stand at around JPY 29/kWh compared to JPY 16/kWh for onshore wind and less than JPY 10/kWh for solar (*based on FiT tariff on 2022), makes it hard to find willing corporate off-takers.

Round three of the tendering process is going to launch, and developers also hope the government to improve tendering system and eliminate lack of predictability for the tendering scheme that may affect developers' business planning as well as the risk evaluation by financial institutions.

PPA bankability



Weak RE policy of private off-taker, Unclear legal/accounting treatment of CPPA

As discussed in previous pages, in the deregulated market and when subsidy scheme is going away, CPPA is the key for developers to ensure project profitability and to secure finance. However, off-takers' policy on RE procurement is also generally weak. While there are quite a few RE100 declared companies in Japan, the primary candidates of such off-takes will be international tech companies e.g., Amazon, Apple or Google which have global standards on emitting GHGs or Japanese leading retailers e.g., Lawson or Aeon. However, even Japanese RE100 companies procure RECs mainly from the RECs market where RECs price is relatively low to fulfill obligation to reduce GHGs, not procuring CPPAs.

There are lots of obstacles for such companies to conclude CPPA, namely higher cost of electricity, lack of knowledge on the market, and ambiguous determination of CPPA in terms of legal understanding and accounting treatment. In Japanese accounting system, CPPA could be treated as lease or derivative transaction depending on its contractual structure. When it is structured as physical PPA, it is likely to be treated as "lease," while structured as virtual PPA it is more likely to be treated as "derivative". When it is treated as derivative, fair value evaluation would be necessary every fiscal year, which is untested in the Japan market and potentially be big burden for the off-takers. JICPA (The Japanese Institute of Certified Public Accountants) still does not issue clear guidance on how it is treated while they have commented that it can be like RECs in accounting understanding.



Financing structure in Japan

Equity investment is primarily coming from developers for green field projects, while financial investors e.g., insurance company, DBJ, local banks or leasing companies also invest in brown field projects in addition to developers. When investing in RE projects, investors utilize GK-TK/LPS/preferred equity/subordinated debt as investment scheme aside from company share issuance depending on their risk appetite, regulation to be applied and lender acceptance.

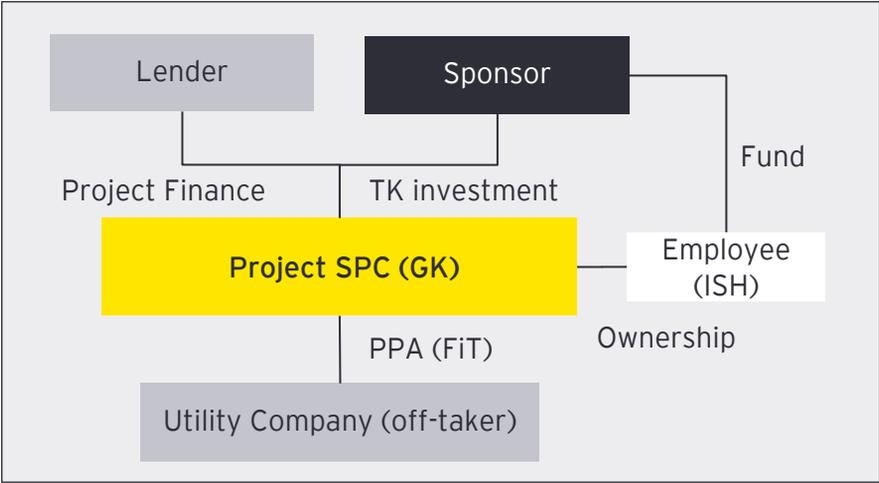
There is difference between big utility companies and RE developers in terms of equity investment capacity coming from respective credit ratings. Utility companies typically develop projects from their own equity unless they need equity partners and without utilizing banks. On the other hand, RE developers, who typically started business after the introduction of FiT scheme in 2012, prefer maximizing leverage so that they could use their limited equity capital efficiently.

As for debt financing, primary source of finance is coming from local banks, mega banks (MUFG, SMBC, Mizuho) or other banks who can well control project finance arrangement process, while corporate loan to equity holder level is also used for smaller projects. Despite strong appetite for RE, international lenders and MDBs are less active in Japan, because of their higher procurement cost of Yen compared to local players and local banks' strong position in the market.

Typical financial structure for investing in RE in Japan is GK-TK structure as shown in below chart. Godo-Kaisha (GK) is limited liability company in Japanese jurisdiction. Tokumei-Kumiai (TK) is one of the ways to invest money in pass-through structure, where TK investor does not hold voting right. In this scheme, sponsors can maximize tax benefit by assigning profit/loss of GK directly to TK investors without having to pay corporate tax at GK, while ensuring bankruptcy remote utilizing Ippan-Shadan-Houjin (ISH) as GK owner employee. Sponsors will only pay dividend tax.

Although GK-TK is the most popular structure used in Japan, some players prefer LP investment through LPS (Limiter Partnership) because of their limited ability to take control over the project. In contrast, offshore wind projects are required to take stronger control over the project by the investors as specified in the public bidding rule.

Typical investment structure in Japan using GK-TK scheme



Typical financial conditions offered by commercial lenders

- Tenor
 - ▶ 19 - 19.5 years
- Interest Rate
 - ▶ 1.5-1.6%, all-in with IRS
- Gearing Ratio
 - ▶ Gearing ratio: 80:20

Japan

Market recommendations

Stakeholder consultation have indicated the following priorities and ideas would support the market deployment:

Recommendations addressing non-financial barriers



1. Centralized entity to coordinate local permit/conduct land acquisition process and provision of access to pre-development capital.

To reduce the length of the permitting process, setting up a centralized entity to support collecting and providing information on the local permitting process, executing technical research, land acquisition with or on behalf of the developers would shorten the development process. For example, government can establish an agency to do such processes for onshore solar/wind at a reasonable cost and time utilizing centralized information system. This could eliminate the duplication of processes by different developers, government entities and private participants including landowners or technical consultants. A similar attempt has just started for the offshore wind sector called “centralized assessment process” which conducts EIA process on developers’ behalf. Government is accelerating overall digital transformation of administrative system and information disclosure e.g., GIS (geographic information system) data for EIA, and it can further accelerate such move to establish centralized permitting system.

A potential financial solution to address the costly permit/land acquisition process is to provide access to low-cost development capital in the form of loans/convertible debt to smaller developers to ensure interest in pre-development stage

2. Increase REC value and transaction volume by government policy.



The newly introduced FiP scheme may leave projects exposed to residual electricity market price risk. CPPA scheme is gaining attention as an appropriate model for post-FiT world. However, CPPA transactions are yet to materialize in numbers because renewable energy still is not competitive enough compared to conventional energy in Japan. A greater monetary value attributed to RECs is required for renewable energy to compete.

For example, government can set higher minimum transaction price for RECs traded in Renewable Energy Value Trading Market and Energy Supply Structure Enhancement Law Obligation Fulfillment Market operated by JEPX (Japan Electric Power Exchange) currently available in Japan.

Japan

Market recommendations (cont'd)

2. Increase REC value and transaction volume by government policy. (cont'd)



In the Obligation Fulfillment market, electricity retailers can use RECs acquired to fulfill the mandatory requirement for them to achieve 44% of RE by 2030, in accordance with Energy Supply Structure Enhancement Law. Law enforcement is still weak, without proper penalties. Thus, transaction volume is small compared to the other market. Energy Value Trading Market's latest result is 4.4 billion kWh for JPY 0.3-4.0/kWh in May 2023.

On the other hand, Energy Supply Structure Enhancement Law Obligation Fulfillment Market's latest result is 0.9 billion kWh for JPY 1.3/kWh in the same month. Government can introduce earlier and stringent requirement for retailers to fulfill its obligation in the above law, to increase demand/price for RECs and promote RE deployment.

In the mid to long term, the market system will need to be more simplified, including potential integration of the two markets currently operated, so that more participants can join the market and provide abundant liquidity. Government can also introduce stronger carbon tax to make RE competitive compared to fossil fueled generation.



3. Proper incentive scheme to increase transmission capacity and deregulation of the T&D sector.

To promote RE deployment, additional transmission and distribution capacity and efficient operation of the system is necessary. Government has introduced connect and merge including non-firm connection and N-1 control of the system in such effort. Revenue cap system is also implemented from FY23 as an appropriate incentive scheme for regulated grid operating entities. It has changed total cost method which was previously applied to the entities. Government is also discussing to start charging part of sleeving cost from generators while reducing amount to be collected from consumers which currently owe all such cost, expecting that will give grid operators stronger incentive to connect RE to the grid.

In addition to government's current move above, further deregulation for private sector investment and incentive scheme should be discussed among the players. Similar projects to Hokkaido or Fukushima project will be needed to accommodate for drastic increase of RE in the system. In addition, OCCTO needs to prepare more concrete plan to accommodate for large capacity of offshore wind to come online in coming years especially in Hokkaido area.

Japan

Market recommendations (cont'd)

4. Simplify tender process and supply chain development for offshore wind projects.



Offshore wind is key for Japan to achieve its net-zero target. To promote the sector development, the Government may draw lessons from the first and second rounds of auction and streamline the tender process as much as possible, in addition to recommendation two and three which discussed how we can increase environmental value of RE and transmission line enhancement. The centralized assessment process has just started for simplification, and the bidding documentation should be more simplified as well.

Recommendations addressing financial barriers

5. Advisor's support and clear guidance on legal/accounting treatment of CPPA.



Although there are potential demand for RE by various consumers, they are not familiar with electricity business and scheme of CPPA. To promote CPPA in RE sector, advisor's help to understand market, technologies, contracts or effect on their must be required. Advisors in the field of law, technology or accounting can support to procure CPPA for such off-takers to achieve their sustainability goals.

RE policy of private companies should also be enhanced for promoting CPPA. The government currently have visions of reducing GHGs and achieving net zero in 2050, and to make the vision real through promoting CPPA transactions, clear rules or guidance is required for off-takes regarding legal or accounting treatment.

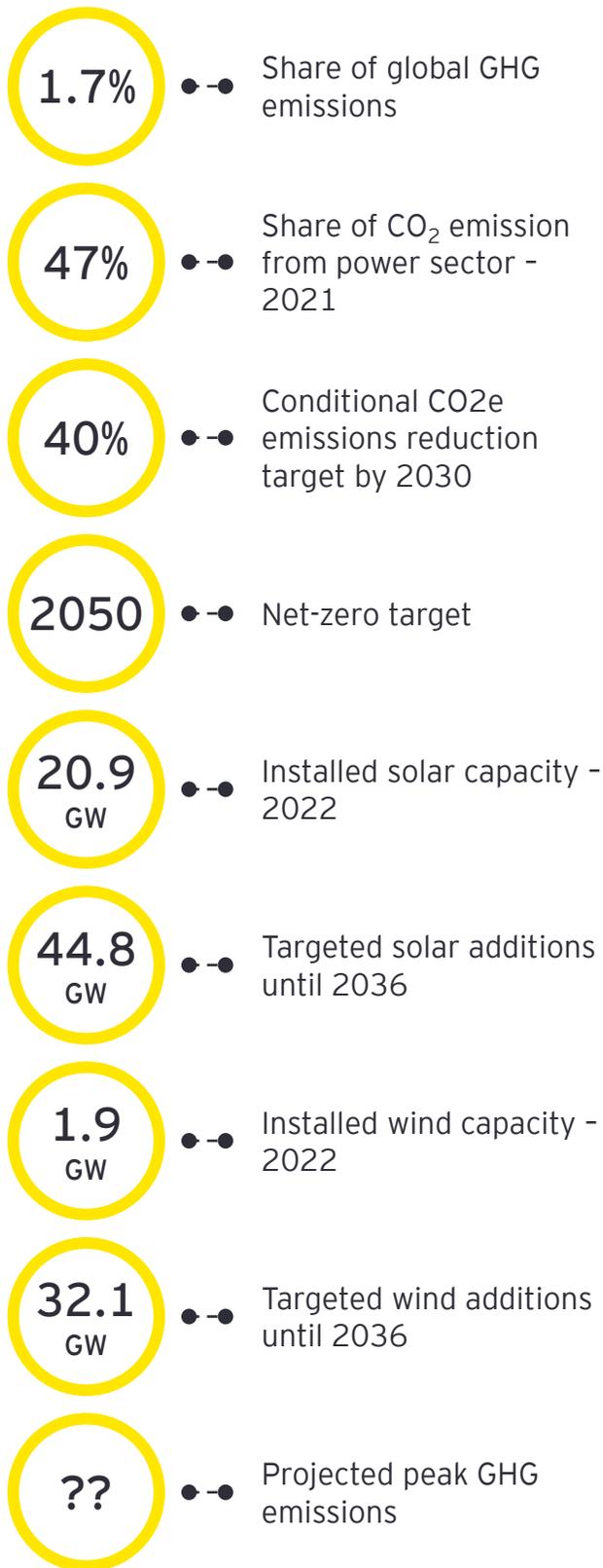
An aerial night view of a city, likely Seoul, South Korea, featuring a prominent skyscraper (the Lotte World Tower) illuminated against a twilight sky. The city lights are visible throughout the urban landscape.

3.9

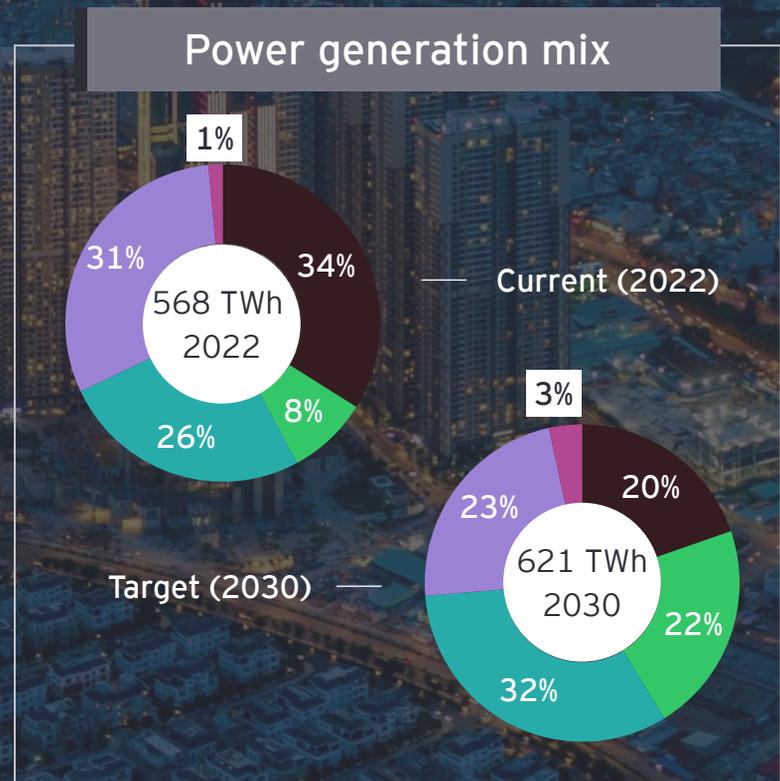
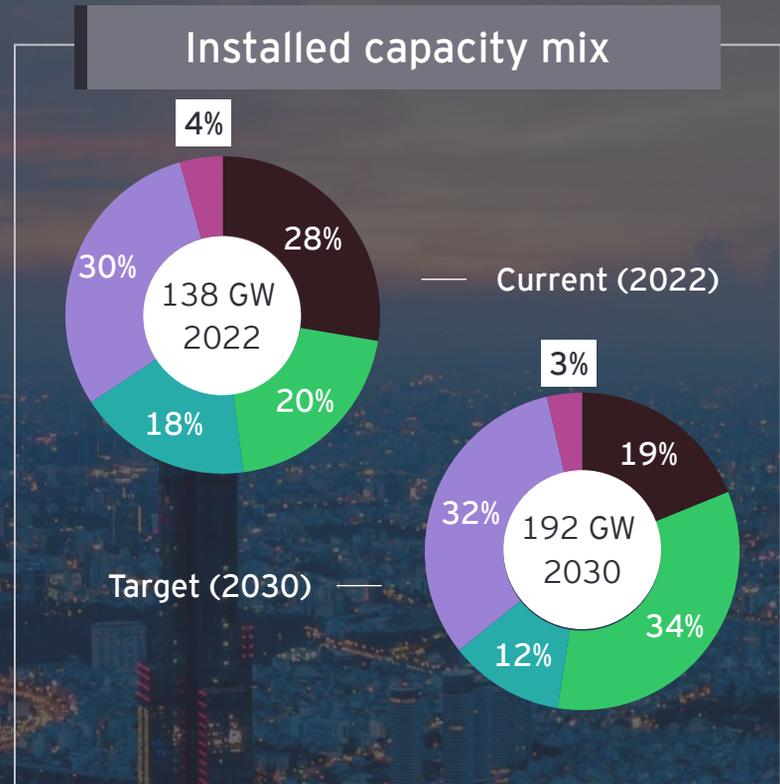
South Korea

South Korea

Snapshot of renewable energy deployment



Source: 10th Basic Plan for Long-term Electricity Supply and Demand 2020 -2034, Emissions Database for Global Atmospheric Research 2022, IEA Electricity Information 2022, IRENA RE Capacity Statistics 2023



■ Coal ■ Renewables ■ Nuclear
■ Gas ■ Others

Renewables include solar, wind, hydro, marine, waste and biofuels

South Korea

Snapshot of domestic loans and bond markets

South Korea domestic bond market

US\$
2.3t

Outstanding LCY and FCY
bonds - March 2023

2nd

Rank in Asia based on
market capitalisation of bond
market

KRW

Preferred currency for
green and sustainable
bond issuance

US\$
45.83b

Outstanding green bonds -
March 2023

3.76%

South Korea 10Y
government bond yield -
July 2023

US\$
36.7b

Amount of green bonds issued
in 2021-2022

South Korea domestic loan market

US\$
1.67t

Total loan outstanding in
South Korea's banking
system - March 2023

>US\$
106m

Amount of green loan issued
in 2022

Investment in renewable energy sector

US\$
21.4b

Total investment realized in
renewable energy sector
from 2016 - 2021

US\$
71.2b

Total investment required
to meet 9th Basic Plan's
2030 capacity target

US\$
8.9b

Average annual
investment required from
2023 - 2030

Note: Indirect investments regarding renewables development such as grid expansion are not calculated in this report.

Source: EY Research, AsianBondsOnline, Climate Bonds Initiative, Climatescope by Bloomberg NEF, Wood Mackenzie

South Korea

Overview of key barriers to renewable energy

Stakeholder feedback suggests the following areas as financial and non-financial barriers to deploying and financing of utility-scale solar and wind energy projects in South Korea. Contribution and cooperation by more than one stakeholder group may be required to address or mitigate these barriers to some degree.

Ranking	Area	Solar/ wind	Description	Addressed by
Non-financial barriers				
High	Pre-development expense and process		Ambitious renewable energy targets makes the market attractive, but developers cite challenges with lengthy permitting process as a concern	Policy makers
	Land acquisition		Land availability and acquisition process are cited as a key barrier for solar and onshore wind projects	Policy makers
Medium and low	Regulatory and policy landscape		Ambitious renewable energy targets makes the market attractive, but developers cite challenges with lengthy permitting process as a concern	Policy makers
	Supporting infrastructure		Challenges related to obtaining grid access for large-scale projects, market highlight need for investment in grid to deploy offshore wind projects	Policy makers
	Local content requirement		Skepticism surrounding removal of local content requirement and its implications on upcoming wind projects	Policy makers
Financial barriers				
Medium	Domestic lending		Developers face pressure on project returns due to the current interest rate environment for projects that have an allocated tariff and close to the financing stage	Lenders and MDBs
Other barriers				
Not identified	PPA bankability		PPA bankability has not been cited as a challenge	
	EPC/Supply chain		EPC/Supply chain has not been cited as a challenge	
	International lending		The market is denominated in KRW and international lenders are active either through their domestic branches or through the KRW/USD cross currency swap market	

South Korea

Non-financial barriers

Pre-development expense and process and Regulatory and policy landscape



Ambitious renewable energy targets makes the market attractive, but developers cite challenges with lengthy permitting process as a concern.

In January 2023, South Korea's MOTIE finalized the 10th Basic Energy Plan, prioritizing a return to nuclear energy. The government lowered renewable energy targets but maintained ambition, aiming for a total renewable energy capacity of 72.7 GW by 2030, requiring around 40 GW in new capacity additions.

Developers have cited that they face regulatory complexities and coordination challenges with dispersed government agencies at the national and local levels, including MOTIE, MOF, MOIS, etc., requiring dozens of permits and approvals. Lengthy and uncertain permitting processes lead to increased development costs and resource investment for developers. The lack of integrated licensing laws and permitting bodies creates obstacles to renewable energy deployment.

Developers quoted that solar project development is comparatively easier than onshore and offshore wind projects, which require assistance from local governments and

can take several years from permitting to construction commencement.

Market participants report that the permitting process for an offshore wind project currently takes more than 10 years. It is reported that 70 offshore wind projects in the country have received electric business licenses, which is only the initial stage of permitting. However, only four projects, totaling 548 MW - had been able to complete the permitting procedure in the last decade, and of those four projects, only two are operational. South Korea requires offshore wind developers to consult 29 legislation administered by 10 different ministries before a project can proceed.

Developers indicated that obtaining permits for large-scale renewable energy projects in Korea takes twice as long as in Europe.

Opposition from farmers and fishermen adds to uncertainties. Conditions for obtaining the Power Generation License are quoted as tough. The availability of substation bay interconnection remains uncertain until after applying for the license, with some previously approved projects blocking access.

Project development requires engagement across community groups, government agencies and industry to build a consensus and resolve possible conflicts on land use, environmental impact, health and safety issues, cultural sensitivities and disruption of economic activities. Developers and investors bear higher risks and costs for longer, impacting market attractiveness.

Permission	Legal ground	Relevant agencies
Permit for electricity generation business	Electric Utility Act	Ministry of Trade, Industry and Energy
Maritime traffic safety examinations	Maritime Safety Act	Ministry of Economy and Finance
Consultation on the results of ground surface inspection for cultural heritage	Act on Protection and Inspection of Buried Cultural Heritage	Cultural Heritage Administration
Environmental impact assessment	Environmental Impact Assessment Act	Ministry of Environment
Diaster impact assessment	Countermeasures against Natural Disasters Act	Ministry of Interior and Safety
...others		

South Korea

Non-financial barriers (cont'd)

Land acquisition



Land availability and acquisition process are cited as a key barrier for solar and onshore wind projects.

The mountainous terrain, high population density, and local resistance to converting agricultural land for energy infrastructure use make it challenging to acquire suitable land parcels for large-scale solar and onshore wind projects in South Korea.

This becomes more complex due to fragmented land ownership among multiple individuals, which requires long lead times to negotiate and reach an agreement on land acquisition. These factors contribute to the high cost of acquiring land, increasing project costs, and the end tariff.

South Korea mandates salinity tests on land identified for renewable energy projects. Such tests are required to assess the suitability of the land for renewable energy projects, as high salinity levels can lead to the corrosion of equipment and infrastructure. Such tests on land can have unpredictable results, adding uncertainty to the initial land aggregation efforts, especially for small local developers who also need to bear the cost of expensive salinity tests in addition to expensive land costs. This, at times, deters smaller developers from pursuing projects in South Korea.

Market practitioners report that due to limitations on acquiring optimal land, from a cost and area perspective, developers are pushed to place wind turbines closer than recommended by the technical advisors. Crowding of wind turbines leads to lower generation yield compared to the yield data submitted to lenders by the wind developers. This is a growing concern for the lenders, and given such deviations, lenders are reducing gearing and tenors for onshore wind projects.

Supporting infrastructure

Challenges related to obtaining grid access for large-scale projects, market highlight need for investment in grid to deploy offshore wind projects.



While no concern has been highlighted by stakeholders on the ability of the grid to handle increased intermittent energy from renewable energy projects, the constraint highlighted is related to the lack of visibility on the ability of the substations to accept the project capacity until after the application for a generation license permit has been submitted.

Stakeholders have suggested regional imbalances in solar PV have been exacerbated by the government's guarantee for grid access to small-scale solar PV (<1 MW), which is putting pressure on grid operations.

Market practitioners and analysts have cited that the planned grid infrastructure of 32 lines with 876.8 km is progressing slowly but does not fully correspond with the areas and timeline of expected renewables increase. With Jeolla province (both north and south) becoming a focus for development (better wind resources and strong local government support), timely transmission investments are needed to meet the offshore wind target of 12 GW by 2030.

South Korea

Non-financial barriers (cont'd)

Local content requirements



Skepticism surrounding removal of local content requirement and its implications on upcoming projects.

In December 2021, the Korean New and Renewable Energy Center (KNREC) introduced Local content requirement regulations.

The LCRs typically apply to offshore wind projects eligible for government support, such as those participating in the South Korean government's Renewable Energy Certificate (REC) system. The requirements may vary depending on the project's capacity, location, and other factors.

Offshore wind projects receive weighted RECs based on the distance between the shoreline and the closest generator to the shoreline. The projects receive more RECs if they have an LCR higher than 50%, which in turn, makes the project more profitable. RECs are tradable like cash in the market.

It is reported that the ministry is considering removing the subsidies available through REC weighting. While this means that companies would start looking for cheaper equipment from overseas manufacturers, it might also collapse the local equipment industry.

With demand for offshore wind equipment rising in the region, industry associations cite concern over disturbing local industry.

South Korea

Financial barriers

Domestic lending



Developers face pressure on project returns due to the current interest rate environment for projects that have an allocated tariff and close of financing

Developers consider the project finance market as efficient and functioning. Long-term project finance for solar and onshore wind projects denominated in KRW is available from domestic banks at acceptable terms on gearing, tenor, etc.

Stakeholder feedback also indicates that lenders prefer solar projects over wind projects, owing to familiarity with the solar sector and the higher probability of EPC contractors providing generation guarantees for solar projects. For wind projects, on the other hand, EPC contractors are unable to provide guarantees and reply more to Wind Turbine Generators (WTG) manufacturers for efficient plant performance.

Offshore wind projects are expected to be financed by international lenders due to the high capital requirement and technical know-how of international lenders in evaluating and structuring offshore wind projects.

Project sponsors have cited the current interest rate environment as a challenge for the projects close to financing after achieving a fully permitted status with years of development effort. Stakeholders have indicated that future auction rounds are expected to be priced better. However, current project returns face pressure due to macroeconomic conditions and the high cost of debt.

Korea Energy Agency

Korea Energy Agency (KEA) provides financial support, such as “NRE Building Subsidy” and “Soft Loans for New and Renewable Energy” in order to promote renewable energy consumption. Self-generating renewable energy could be subsidized by the KEA programs:

- ▶ “NRE Building Subsidy” is provided for part of the installation cost of RE facilities.
- ▶ “Soft Loans for New and Renewable Energy” provides long-term, low interest loans to those installing RE facilities



Funding provided by international lenders is USD denominated, against KRW denominated PPA, leading to higher forex hedging costs

International banks have been actively participating in the market, either through their domestic branches or via the KRW/USD cross currency swap market.

Although not highlighted as a barrier by stakeholders, the funding from international lenders, being USD-denominated against KRW-denominated PPAs, leads to increased forex hedging costs, driving up the overall project costs.



Financing structure in South Korea

Typical financial structure offered by commercial lenders

Tenor	Coupon Rate	Key terms and conditions
<ul style="list-style-type: none"> ▶ Tenors of 12 years Typically 2-3 years tail from end of PPA period for solar projects, shorter tenor for wind projects 	<ul style="list-style-type: none"> ▶ 6% - 6.6% 	<ul style="list-style-type: none"> ▶ 85% - 90% gearing for solar vis-à-vis 75% - 80% gearing for wind

Case study : Wind energy projects in South Korea

Parang Project:
FC of Total Eren wind farm

- Parang Project :** Total Eren enters South Korean renewable energy market with its first wind farm
- ▶ In July 2022, Total Eren, a leading international IPP, achieved financial close (FC) of “Parang Project” - 16.7 MW wind farm, together with its partners WEEN E&S (WEEN) holding 5% stake and Korea Midland Power (KOMIPO) holding 25% stake in the project
 - ▶ Electricity generated by the project to be supplied to the Korean electricity market, while RECs to be delivered to KOMIPO through a 20-year REC Agreement, hence hedging the market risk.
 - ▶ Project secured financial close of KRW55b (~ US\$44.5 m) of long-term financing from a local private equity fund specialized in lending and investing in onshore wind projects in Korea, and whose investors are local financial institutions
 - ▶ COD expected in Q1 2024

CIP and EQUINOR plan offshore wind investments

- CIP and EQUINOR** plan Korean offshore wind investments
- ▶ As announced recently in June 2023, the two companies will develop offshore wind power generation complexes and also build offshore wind manufacturing facilities in the country and explore collaborations with local firms
 - ▶ CIP said it will invest US\$350m in South Korean offshore wind projects including the 99 MW Jeonnam 1 project. The money will also allow CIP to grow its local team and accelerate the localization of content

South Korea

Market recommendations

Stakeholder consultation have indicated the following priorities and ideas would support the market deployment:

Recommendations addressing non-financial barriers



1. Policymakers should provide the private sector with a clear roadmap outlining the procurement plan for large-scale renewable projects, which is currently unclear in the 10th basic plan. Specific supporting mechanisms are required as targets alone cannot ensure the installation.

- ▶ Stakeholders have noted that the policymakers should implement a predictable, long-term, stable regulatory policy framework to streamline permitting guidelines and make the process efficient, with efforts that could include:
 - ▶ More predictability for salinity test
 - ▶ Streamline the Development Permit process by reducing the back and forth between local and national level. Consider setting up a “one-stop-shop” vehicle for integration of licensing laws.
 - ▶ Greater upfront transparency on the availability of substation capacity and projects in the queue ahead of applying for the Power Generation License
 - ▶ Leverage local connections (e.g., public service officers) to match the project development timeline with the new grid completion timeline.
 - ▶ Relaxing “distance rules” between the project site and the nearest roads or dwellings or applying consistent distances set at the national level rather than set at the local level
 - ▶ Qualification criteria in the Power Generation License to be clarified and streamlined (e.g., credit rating at the SPV level is not practical)

2. Provide access to low-cost development capital to ensure interest in pre-development stage.



Given the complex and lengthy permitting process, especially for onshore and offshore wind projects, and geographical constraints that complicate land acquisition, there is a pressing need in the market for access to pre-development capital. This is essential to mitigate risks and address high development cost of these projects.

A potential financial solution to bridge this gap would be to provide access to low-cost development capital in the form of loans/convertible debt to smaller developers to ensure interest in pre-development stage.

South Korea

Market recommendations (cont'd)

Recommendations addressing financial barriers

Recommendations addressing financial barriers



3. Increase private sector participation through investments or partnerships with public entities can help increase financing availability and decrease the cost of capital.

Financial incentives like tax credits, subsidies, grants, etc. by the government can encourage investment in renewable energy projects, making them more attractive to investors.

Expanding access to international capital markets through international investors or green bonds issuance can lower the cost of capital and increase financing options for developers.

Stakeholders have also indicated that to mitigate the risk of short-term tenor loans, for example in the case of onshore winds, if developers require term loan for 15 years tenor, but banks are willing to lend only for up to 10 years, then philanthropic and development organizations may have a role to support the developers by either elongating the remaining tenor or guaranteeing the tail end of longer tenor.

Based on stakeholder feedback, lenders may be reluctant to fund offshore wind projects in South Korea despite the significant potential until they get comfortable with the risk profile. There may be a need for capacity training and building of domestic banks to finance offshore wind projects. Sponsors of the 99 MW Jeonnam 1 offshore wind project CIP (49%) and SK E&S (51%) have recently received funding from foreign lenders, based on existing relationship with CIP.



Conclusion

The environmental and economic benefits of green energy development can no longer be ignored. Governments around the world have acknowledged the role the green energy sector can play in economic recovery post the COVID-19 pandemic. The report finds that there is tremendous investor interest and surplus private capital ready to be deployed in the clean energy sector. However, the clean energy transition can be accelerated and amplified only when certain challenges are addressed by the authorities, which will make the sector attractive for private investment.

Recovery in a post-COVID-19 environment requires coordinated action from various stakeholders. With greater collaboration between the public and private sector, economies can tap into the immense potential that clean energy projects can offer to drive better economic, environmental and social outcomes. The choices today will shape the economies of tomorrow.

“

The pandemic offers Asian governments a unique opportunity to place the clean energy transition at the center of policymaking to drive the economic recovery and future growth.

Gilles Pascual
EY Asean Power & Utilities Leader



04

Appendix

List of acronyms (1/4)

Acronyms	Explanation
ADB	Asian Development Bank
AIIB	Asian Infrastructure Investment Bank
ASEAN	Association of Southeast Asian Nations
BESS	Battery Energy Storage System
BII	British International Investment
BIIFL	Bangladesh Infrastructure Finance Fund Limited
BKPM	Badan Koordinasi Penanaman Modal
BPDB	Bangladesh Power Development Board
BPP	Biaya Penyediaan Pokok (Power Generation Cost)
CFPP	Coal-fired Power Plant
CIMB	Commerce International Merchant Bankers
CIP	Copenhagen Infrastructure Partners
COD	Commercial Operation Date
CPI	Climate Policy Initiative
CPPA-G	Central Power Purchasing Authority-Guarantee
CTBCM	Competitive Trading Bilateral Contract Market
DFI	Development Finance Institutions
DISCO	Distribution Company
DOE	Department of Energy
DPT	Daftar Penyedia Terseleksi
DPP	Development Bank of the Philippines
DU	Distribution Utilities
EPC	Engineering, Procurement, and Construction
ERC	Energy Regulatory Commission
ESIA	Environmental and Social Impact Assessment
ETM	Energy Transition Mechanism
EIA	Environmental Impact Assessment
EVN	Vietnam Electricity
EVOSS	Energy Virtual One Stop Shop
FCY	Foreign Currency
FIP	Feed-in Premium
FiT	Feed-in Tariff
FMO	Nederlandse Financierings-Maatschappij Voor Ontwikkelingslanden N.V.

List of acronyms (2/4)

Acronyms	Explanation
FY	Financial Year
GFC	Green Climate Fund
GEAP	Green Energy Auction Program
GEAPP	Global Energy Alliance for People and Planet
GEOP	Green Energy Option Program
GENCO	Generation Company
GFANZ	Glasgow Financial Alliance for Net Zero
GGGI	Global Green Growth Institute
GHG	Greenhouse Gas
GITA	Green Investment Tax Allowance
GITE	Green Income Tax Exemption
GSS	Green, Social, and Sustainability
GTFS	Green Technology Financing Scheme
GW	Giga Watt
ICBC	Industrial and Commercial Bank of China
IDR	Investment-to-Deposit Ratio
IDCOL	Infrastructure Development Company Limited
IEEFA	Institute for Energy Economics and Financial Analysis
IEPMP	Integrated Energy and Power Master Plan
IFC	International Finance Corporation
INA	Indonesian Investment Authority
INR	Indian Rupee
IPG	International Partners Group
IRENA	International Renewable Energy Agency
IUPTLU	Izin Usaha Penyediaan Tenaga Listrik Untuk Kepentingan Umum
JBIC	Japan Bank for International Cooperation
JETP	Just Energy Transition Partnerships
JICN	Japan Green Investment Corp. for Carbon Neutrality
JV	Joint Venture
KDB	Korea Development Bank
KEA	Korea Energy Agency
KfW	Kreditanstalt für Wiederaufbau Bankengruppe
KKPR	Kesesuaian Kegiatan Pemanfaatan Ruang

List of acronyms (3/4)

Acronyms	Explanation
LCR	Local Content Requirement
LCY	Local Currency
LEAP	Leading Asia's Private Sector Infrastructure Fund
LSS	Large Scale Solar
MDB	Multilateral Development Bank
MEMR	Ministry of Energy and Mineral Resources
MOF	Ministry of Economy and Finance
MOIS	Ministry of the Interior and Safety
MOTIE	Ministry of Trade, Industry and Energy
MW	Mega Watt
MyRER NCT	Malaysia Renewable Energy Roadmap New Capacity Target
NEDA	New Enhanced Dispatch Arrangement
NEPRA	National Electric Power Regulatory Authority
NGCP	National Grid Corporation of Philippines
NREL	National Renewable Energy Laboratory
NSP	National Strategic Project
O&M	Operation and Maintenance
OCCTO	Organization for Cross-regional Coordination of Transmission Operators
PCRET	Pakistan Council of Renew Energy Technologies
PDP VIII	Power Development Plan 8
PHP	Philippine Peso
PKKPR	Persetujuan Kesesuaian Kegiatan Pemanfaatan Ruang
PLN	Perusahaan Listrik Negara
PPA	Power Purchase Agreement
PPP	Public-Private Partnerships
PSA	Power Supply Agreement
PV	Photovoltaic
RCBC	Rizal Commercial Banking Corporation
RE	Renewable Energy
REC	Renewable Energy Certificate
RUU EBT	Rancangan Undang Undang Energi Baru Terbarukan
RUPTL	Rencana Usaha Penyediaan Tenaga Listrik
SBP	State Bank of Pakistan

List of acronyms (4/4)

Acronyms	Explanation
SESB	Sabah Electricity Sdn Bhd
SIS	System Impact Study
SMBC	Sumitomo Mitsui Banking Corporation
SMI	Sarana Multi Infrastruktur
SMPP	Solar Merchant Power Plant
SMP	System Marginal Price
SOFR	Secured Overnight Financing Rate
SPPKP	Surat Pengukuhan Pengusaha Kena Pajak
T&D	Transmission and Distribution
UK	United Kingdom
US	United States
VND	Vietnamese Dong
VPPA	Virtual Power Purchase Agreement
VRE	Variable Renewable Energy
WBG	World Bank Group
WESM	Wholesale Electricity Supply Market
WHAUP	WHA Utilities and Power PLC
WTG	Wind Turbine Generator

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