Asia-Pacific Economic Cooperation



## Workshop Summary Report

# APEC Capacity-Building Workshop for New and Renewable Energy Policy *"RE Policies and Investments: Are We on the Right Track?"*

October 2026




Asia-Pacific
Economic Cooperation

# Workshop Summary Report

# APEC Capacity-Building Workshop for New and Renewable Energy Policy

## APEC Energy Working Group

## October 2026

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Disclaimer: The views expressed and the conclusions reached in this report are those of the author based on the discussions arising from the workshop and not necessarily the consensus view of APEC member economies.

## Foreword

As global efforts towards addressing climate change intensify, APEC economies have a vital role to play in shaping the global response given their size and economic importance. APEC economies have particularly acknowledged the need to decarbonize their electricity grids.

However, in pursuing their decarbonization goals, each economy will have its own opportunities and unique challenges to overcome. This only emphasizes the need for strong policy development surrounding New and Renewable Energy Policy (NREP).

In response, the first of the APEC Capacity Building Workshop for New and Renewable Energy Policy was conceived as a mechanism to support member economies in implementing low-emission power sources. This workshop builds on the success of the APEC Peer Review on Low-Carbon Energy Policies and promotes greater knowledge sharing and understanding amongst member economies to facilitate the implementation of new and renewable energy. To achieve this, the Capacity Building Workshop was focused on four key areas:

- Technology and business models
- Investment and communication
- Policy and regulatory frameworks
- Collaboration and continued engagement.

We would like to thank the APEC Expert Group on New and Renewable Energy Technologies (EGNRET) for supporting this project. We also extend our gratitude to Thailand, for hosting the event and for the warm welcome received. Additionally, we extend our thanks to all member economies who were able to attend and participate and the key insights offered, given the challenges that were involved with travelling during this period when conflict in the Middle East was ongoing.

APERC believes the key outcomes of this Capacity Building Workshop can be translated into actionable policy decisions and is ready to assist member economies to achieve this. APERC is determined to continue delivering meaningful workshops and is always open to suggestions for new themes to explore in future workshops that would further contribute towards APEC's decarbonization goals.



**Dr Kazutomo IRIE**
Chairman and President
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## Acknowledgements

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The report was made possible through the discussion and collaboration of the people named below:

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**The Consultant Team (Asia Clean Energy Partners):**

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**Disclaimers**

The information and statements in this report reflect the outcomes of the workshop and may change in the future depending on unexpected external events or changes in the new and renewable energy policy agendas of particular economies.

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## Abbreviations

| | |
|---|---|
| AEDP | Alternative Energy Development Plan |
| AEEE | Alliance for an Energy Efficient Economy |
| APAC | Asia Pacific |
| APEC | Asia Pacific Economic Cooperation |
| APERC | Asia Pacific Energy Research Centre |
| APS | announced pledges scenario |
| ASCENT | Accelerating Asia's Energy Transition through Blended Finance |
| ASEAN | Association of Southeast Asian Nations |
| AVPN | Asian Venture Philanthropy Network |
| BAU | business as usual |
| BCG | Boston Consulting Group |
| BESS | battery energy storage system |
| C&I | commercial and industrial |
| CAPEX | capital expenditure |
| CCUS | carbon capture utilization and storage |
| CEEW | Council on Energy Environment and Water |
| CFE | carbon free electricity |
| COP | Conference of the Parties |
| CPPA | corporate power purchase agreement |
| CREZ | competitive renewable energy zone |
| CSO | civil society organization |
| DFI | development finance institution |
| DPM | capacity supply agreement support program |
| DPPA | direct power purchase agreement |
| EAC | Energy attribute certificate |
| EELCER | Energy efficiency, low carbon and energy resiliency |
| EEP | Energy efficiency plan |
| MoU | memorandum of understanding |
| MSW | municipal solid waste |
| MW | megawatt |
| NEA | National Energy Authority Papua New Guinea |
| NEPC | National Energy Policy Council |
| NEROP | National Energy Roll Out Plan |
| EGEDA | Expert Group on Energy Data and Analysis |
| EGNRET | Expert Group on New and Renewable Energy Technologies |
| EMA | Energy Market Authority |
| ESCO | energy service company |
| ESIA | environmental and social impact assessment |
| EV | electric vehicle |
| EVN | Viet Nam Electricity |
| EWG | Energy Working Group |
| FiT | feed in tariff |
| FPO | farmer producer organization |
| GDP | gross domestic product |
| GHG | greenhouse gas |
| GIZ | German Agency for International Cooperation |
| GW | gigawatt |
| GWh | gigawatt hour |
| GWp | gigawatt peak |
| HVDC | high voltage direct current |
| IEA | International Energy Agency |
| IIHS | Indian Institute for Human Settlements |
| IRADe | Integrated Research and Action for Development |
| IRR | internal rate of return |
| ISO | International Organization for Standardization |
| JKM | Japan Korea Marker |
| KPI | key performance indicator |
| ktoe | kilotonne of oil equivalent |
| kW | kilowatt |
| kWh | kilowatt hour |
| kWp | kilowatt peak |
| LC3 | limestone calcined clay cement |
| LCOE | levelized cost of electricity or energy |
| LNG | liquefied natural gas |
| M&E | monitoring and evaluation |
| ML/day | million litres per day |
| NGO | non-governmental organization |
| NREL | National Renewable Energy Laboratory |
| OPEX | operating expenditure |
| PDP | Power Development Plan |
| PDP8 | Viet Nam Power Development Plan 8 |

| | |
|---|---|
| PFAN | Private Financing Advisory Network |
| PM2.5 | particulate matter with a diameter of 2.5 micrometres or smaller |
| PNG | Papua New Guinea |
| PPA | power purchase agreement |
| PPP | public private partnership |
| PRLCE | Peer Review on Low Carbon Energy Policies |
| PSA | power supply agreement |
| PV | photovoltaic |
| RE | renewable energy |
| REC | renewable energy certificate |
| REZ | renewable energy zone |
| RIE | Research Innovation and Enterprise |
| RISE | rapid and immersive skill enhancement |
| RPS | renewable portfolio standard |
| SAF | sustainable aviation fuel |
| SME | small and medium sized enterprise |
| SMR | small modular reactor |
| STEPS | stated policies scenario |
| THB | Thai baht |
| TPA | third party access |
| TWh | terawatt hour |
| UGT | utility green tariff |
| USD | United States dollar |
| VRE | variable renewable energy |

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## Executive Summary

**The APEC Capacity-Building Workshop for New and Renewable Energy Policy brought together stakeholders from across APEC economies to exchange experiences on renewable energy policy, investment, and implementation.** The workshop was held in Bangkok, Thailand, on 31 March 2026. Participants included policymakers, regulators, researchers, investors, developers, development partners, among others. Discussions focused on practical approaches for scaling up renewable energy deployment, strengthening enabling policy and regulatory frameworks, improving investment conditions, and addressing implementation challenges across different economic contexts.

**APEC economies have made significant progress toward their renewable energy and energy transition goals, although development remains uneven across the region.** Presentations during the workshop noted that APEC economies account for a large share of global renewable energy deployment, particularly in solar and wind power. The workshop also highlighted progress toward the APEC target to double the share of renewable energy in their energy mix by 2030, and the global target announced at COP28 to triple renewable energy capacity by 2030. However, fossil fuels continue to dominate electricity generation in many APEC economies, while renewable energy investment remains concentrated in a limited number of economies.

**Discussions emphasized that implementation challenges are becoming a more significant barrier than the cost of technology.** Although many economies have introduced renewable energy targets and policy support mechanisms, participants noted that challenges remain in areas such as permitting, transmission development, grid access, financing, institutional capacity, land and spatial planning, and project bankability. Discussions highlighted the importance of stable policy frameworks, transparent procurement systems, clear regulatory arrangements, and reliable grid connection procedures to support investment and project development.

**The workshop highlighted the growing importance of transmission, storage, system flexibility, and grid modernization as the share of variable renewable energy increases.** Discussions emphasized that renewable energy deployment should be considered together with broader power system planning and system reliability requirements. Participants also noted the importance of forecasting capability, demand-side flexibility, and improved grid management to support higher shares of solar and wind power.

**The workshop discussed a range of policy and business models to support renewable energy deployment under different market conditions.** These included corporate power purchase agreements (CPPAs), direct power purchase agreements (DPPAs), renewable energy zones (REZs), competitive procurement mechanisms, and demand aggregation models. Case studies and experiences shared during the workshop highlighted the importance of aligning policy design, transmission planning, market structure, and financing arrangements to support implementation.

**Financing and investment conditions were another major focus of the workshop discussions.** Participants noted that many economies continue to face challenges in mobilizing investment for renewable energy projects due to policy uncertainty, limited bankable project pipelines, weak transmission infrastructure, and perceived investment risks. Discussions also emphasized the role of development finance, concessional capital, blended finance, guarantees, and technical assistance in supporting project development and reducing investment risks, particularly in emerging and developing economies.

**The workshop concluded that further efforts are needed to strengthen implementation and accelerate renewable energy deployment across APEC economies.** Key areas identified during the discussions included improving enabling policy and regulatory frameworks, accelerating investment in renewable energy, grids, and storage infrastructure, strengthening permitting and planning processes, and supporting continued peer learning and regional cooperation among APEC economies.

## Key Outcomes and Recommendations

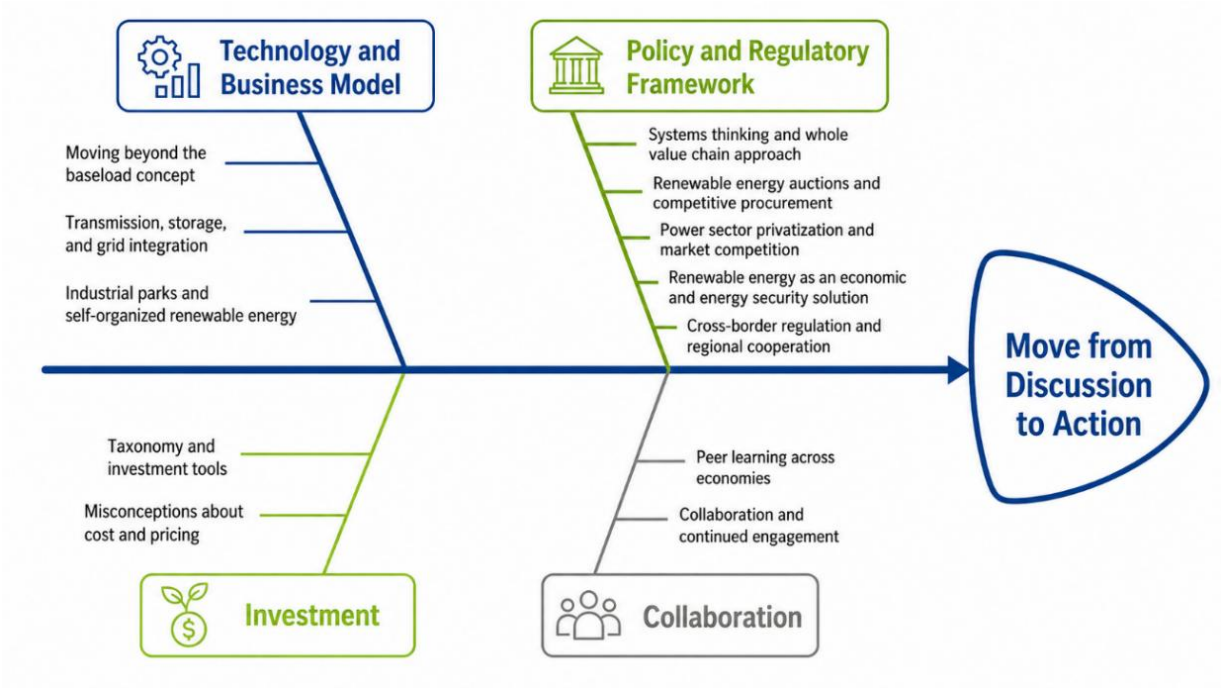



**Figure 1: Fishbone Diagram of Key Participant Takeaways from the Workshop**

**The workshop discussion generated practical recommendations from economy contributors and experts on how to move from dialogue to more effective implementation.** The recommendations are grouped into four themes as illustrated in Figure 1.

**Technology and business models**

- **Move beyond the traditional baseload concept:** Regulators and utility operators in APEC economies should shift from conventional baseload-oriented planning toward more flexible power system design. As the share of variable renewable energy increases, energy security will depend less on inflexible baseload generation and more on transmission capacity, storage, demand-side flexibility, forecasting, and effective grid management.
- **Strengthen transmission, storage, and grid integration:** Economies should prioritize investment in transmission networks, storage systems, and grid integration measures to enable renewable energy deployment at scale. Grid connection constraints remain a major barrier to project development and should be addressed through proactive grid planning, faster permitting, and coordinated infrastructure investment.
- **Support self-organized renewable energy models:** Large energy users, such as industrial parks, should be encouraged to organize renewable electricity supply for their own demand through rooftop solar PV, shared renewable energy systems, and direct procurement models. Regulators should create an enabling investment environment by providing clear rules for permitting, installation, and grid connection. This can help expand renewable electricity use in areas with concentrated demand and support the decarbonization of power consumption.

**Investment and communication**

- **Develop clear taxonomies and investment tools:** Policymakers should develop clear renewable energy taxonomies, investment frameworks, and practical tools to guide investors. These tools can clarify eligible technologies, reduce investment uncertainty, support cross-border investment, and improve access to finance.
- **Address misconceptions about the cost and pricing of renewable energy:** Stakeholders should improve communication on the actual costs, pricing structures, and long-term benefits of renewable energy. Clearer communication can strengthen the investment case, build public and investor confidence, and support more informed policy and business decisions.

**Policy and regulatory frameworks**

- **Apply systems thinking and a whole-value-chain approach:** Economies should adopt a whole-system approach to scaling renewable energy. This requires attention not only to technology deployment, but also to policy design, financing, workforce readiness, supply chains, permitting, grid infrastructure, and implementation capacity.

- **Position renewable energy as an economic and energy security solution:** Renewable energy should be framed not only as a climate solution, but also as an economic and energy security solution. Public and private decision-makers should consider its wider benefits, including cost-competitive electricity, improved energy access for remote communities, reduced exposure to fossil fuel price volatility, and stronger energy security.
- **Strengthen cross-border regulation and regional cooperation:** APEC economies should strengthen regional cooperation and cross-border regulatory frameworks to facilitate renewable energy investment, electricity trade, and knowledge exchange. This is particularly important for ASEAN and the wider APEC region, where regional power integration and cross-border investment are becoming increasingly relevant.
- **Expand renewable energy auctions and competitive procurement:** Policymakers and regulators should consider transparent auctions, open bidding, and other competitive procurement mechanisms to support renewable energy deployment. The Philippines' experience shows that competitive procurement can encourage market participation, improve investor confidence, and attract private sector investment.
- **Promote market competition where appropriate:** Where appropriate, economies should consider well-designed power sector reforms that promote market competition and support renewable energy procurement. The Philippines' experience suggests that, although privatization and market reform may initially face public hesitation, these reforms can improve competition and attract investment when supported by strong regulation, transparency, and consumer protection.

**Collaboration and continued engagement**

- **Strengthen peer learning across economies:** APEC should continue supporting peer learning platforms that allow economies to exchange experiences, compare policy challenges, and identify practical lessons that can be adapted to their contexts.
- **Maintain collaboration beyond the workshop:** APEC economies should sustain communication and collaboration after the workshop to maintain momentum. Continued engagement can support the exchange of policy updates, implementation challenges, and follow-up cooperation to accelerate renewable energy deployment at scale.

# 1 Workshop Background and Objectives

**The APEC Capacity-Building Workshop for New and Renewable Energy Policy (EWG 104 2025A) is a project funded by the APEC Support Fund under the EELCER sub-fund.** Intended to be held annually in the margins of an EGNRET meeting, the workshop aims to strengthen the capacity of APEC economies to develop and implement new and renewable energy policies.

The project succeeded the Peer Review on Low Carbon Energy Policies (PRLCE) which has completed five phases between 2012 and 2024. PRLCE was a **response to the Fukui Declaration in June 2010, which called on the APEC Energy Working Group to explore mechanisms to support economies in setting goals and action plans for low-emission power sources.** Building on the APEC Peer Review on Energy Efficiency, the project promotes peer learning, stakeholder engagement, and the exchange of policy experiences. Five phases of the project were completed between 2012 and 2024.

**The workshop kicked off in Bangkok on 31 March 2026.** It brought together experts, policymakers, and practitioners from APEC economies to share implementation experiences, emerging business models, and financing approaches for renewable energy deployment. The workshop focused on policy and market frameworks that can unlock financing, align technology and financing solutions with policy design, and identify priority actions for the next three to five years. It included three expert presentation sessions, two fishbowl discussions, and world café format discussion.

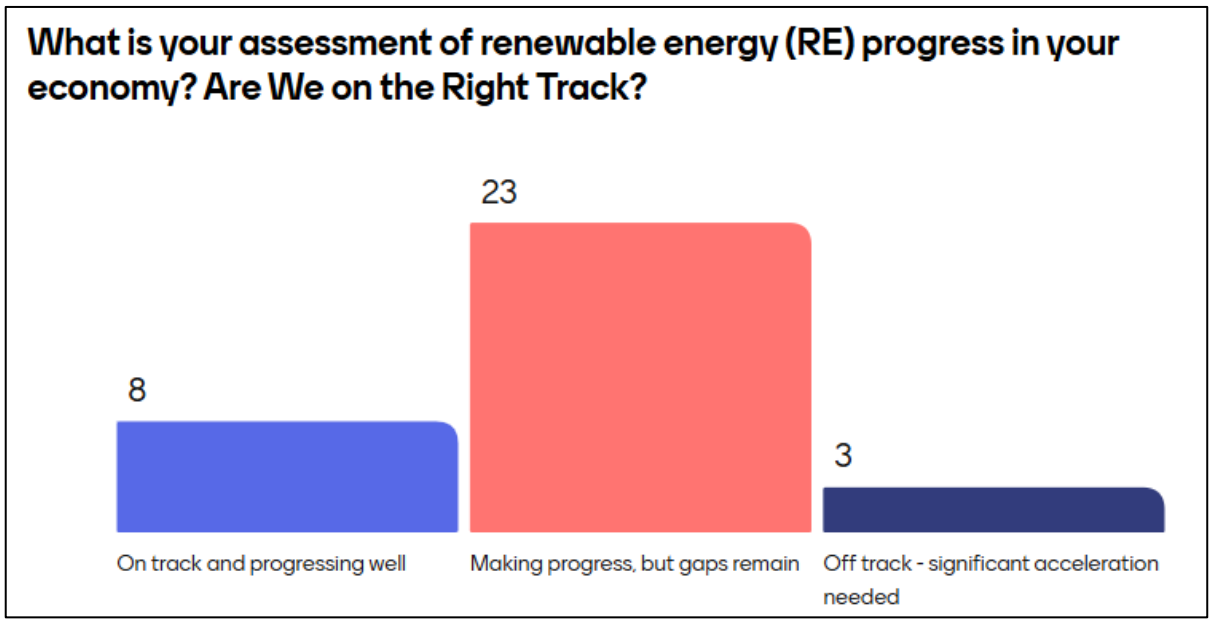
**This report summarizes the workshop discussions, including best practices shared by the host economy and APEC member economies, as well as recommendations from invited experts.** It also proposes ideas to improve existing new and renewable energy policies and support more effective policy development across APEC economies.




**Participants of APEC Capacity Building Workshop for New and Renewable Energy Policy "RE Policies and Investment: Are We on the Right Track?" on 31 March 2026, Bangkok, Thailand**

## 2 Scene Setter

**The figure below presents results from an audience poll conducted during the workshop.** The poll was used to encourage participation, stimulate discussion, and capture participants' initial views on the topic.




Source: Audience poll conducted via Mentimeter during the APEC Capacity-Building Workshop for New and Renewable Energy Policy, 31 March 2026

**Figure 2: Ice Breaker Interactive Survey and Result**

**The workshop opened with an interactive icebreaker to understand participants' backgrounds and views** on renewable energy policy, investment, and implementation across APEC economies. Participants came mainly from Asian economies, with some global representatives, and included policymakers, researchers, think tanks, investors, renewable energy developers, and consultants.

**The icebreaker showed that more than 60% of respondents felt their economies had made some progress in the energy transition**, around 20% reported strong progress, and less than 10% felt that significantly more effort was needed.

This was followed by two scene-setting presentations, one by Daniel Burlutsky from APERC and one by Peter du Pont from Asia Clean Energy Partners. These presentations helped establish a shared understanding of the workshop context and prepared participants for the subsequent discussions.

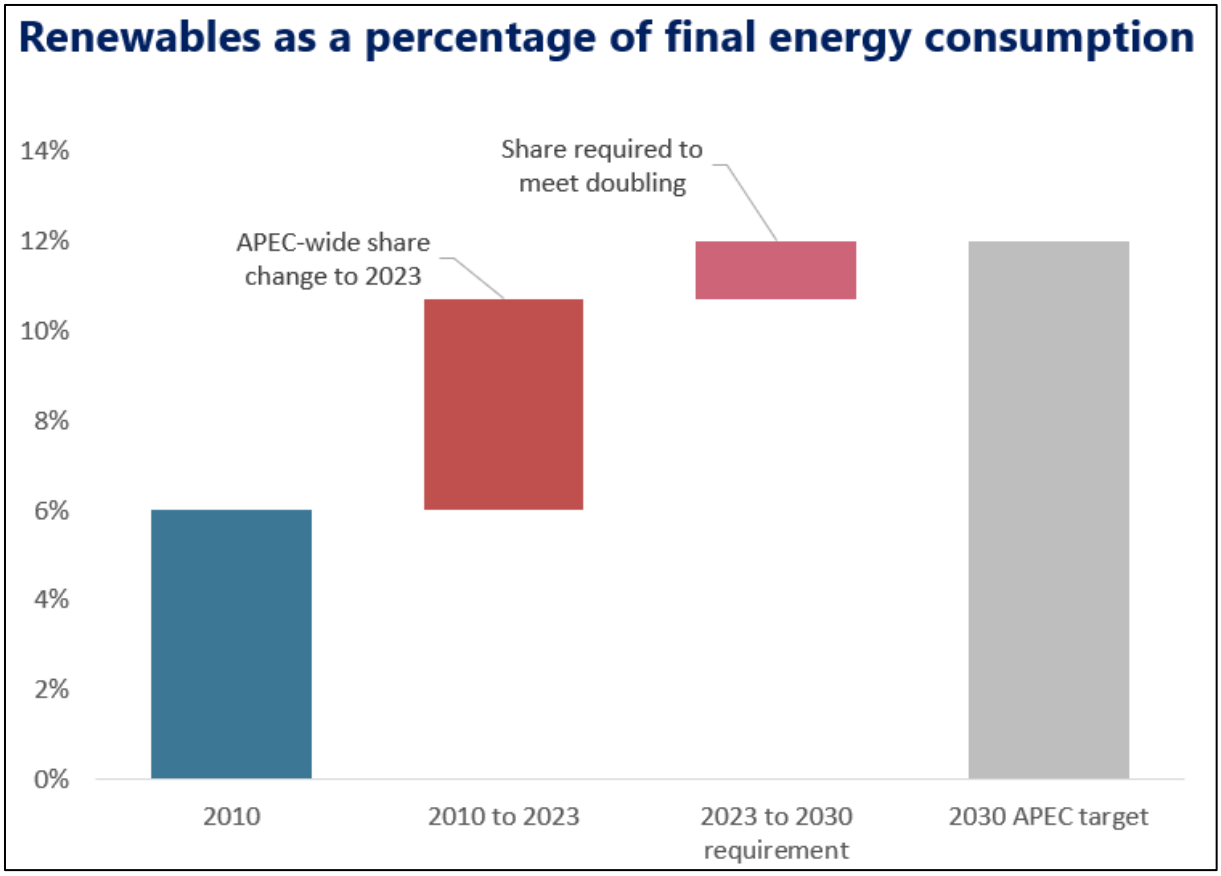
## 2.1 Setting the Scene Presentations

***by Daniel Burlutsky and Peter DuPont***

**APEC economies have made strong progress toward doubling the share of renewable energy in their energy mix by 2030 and may already be close to achieving this target**

**APEC economies are pursuing renewable energy development in line with two major goals.** The first is the APEC target to double the share of renewables in the APEC energy mix, including in power generation, from 2010 levels by 2030, as agreed under the Beijing Declaration at the 11th APEC Energy Ministers' Meeting in 2014. The second is the global goal announced at COP28 in 2023 to triple renewable energy capacity to 11,000 GW by 2030, which APEC Leaders supported under the Golden Gate Declaration.

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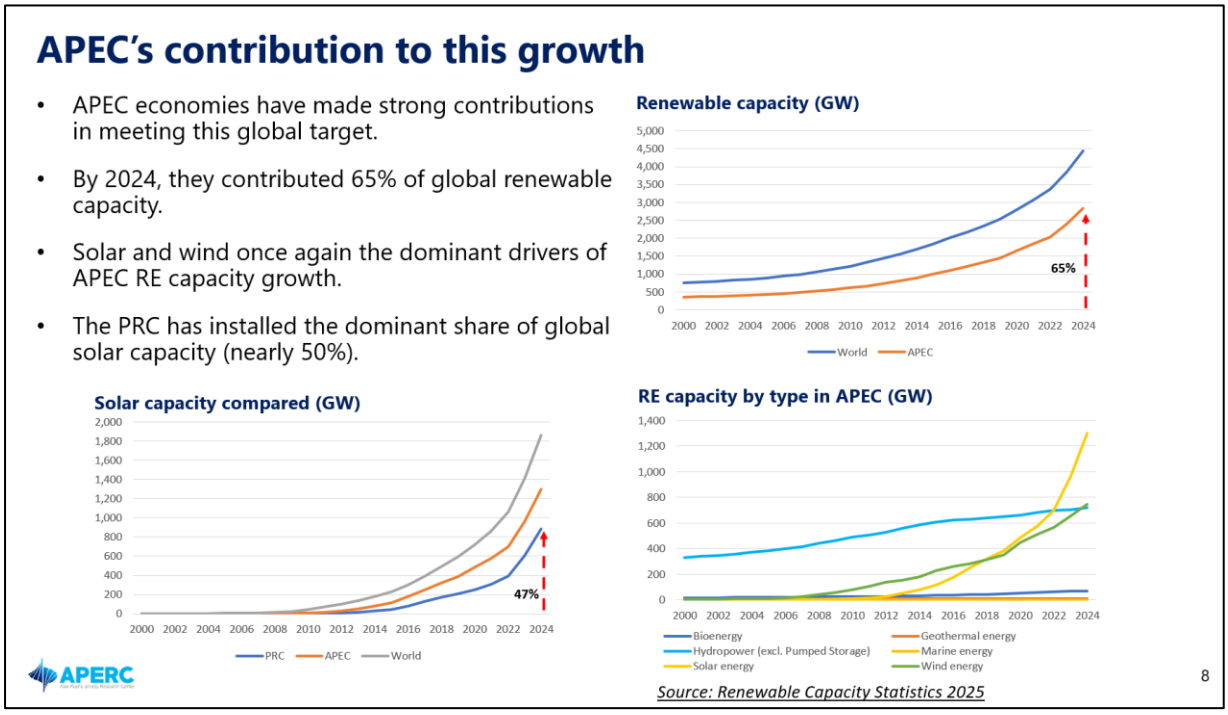



Source: EGEDA data 2025

**Figure 3: The APEC Target to Double the Share of Renewable Energy**

**Strong progress has been made towards these goals: APEC economies have advanced significantly in increasing the renewable share of their energy mix.** Based on the latest EGEDA data from 2023, it is possible that the doubling target has already been met. Globally,

renewable energy capacity reached 3,870 GW in 2023 and increased to 4,448 GW in 2024, representing 15% annual growth. To reach 11,000 GW by 2030, the world will need to maintain around 16% annual growth. APEC economies are making a major contribution, accounting for around 65% of global renewable capacity in 2024. Solar and wind remain the main drivers of growth, supported by falling solar module costs, policy support, and ease of deployment, with the People's Republic of China contributing nearly half of global solar capacity.




Source: Renewable Capacity Statistics 2025.

**Figure 4: APEC's Contribution to Global Renewable Energy Implementation**

Several opportunities can further accelerate renewable energy deployment across APEC economies, but continued progress will depend on addressing key policy, technical, and financial challenges.

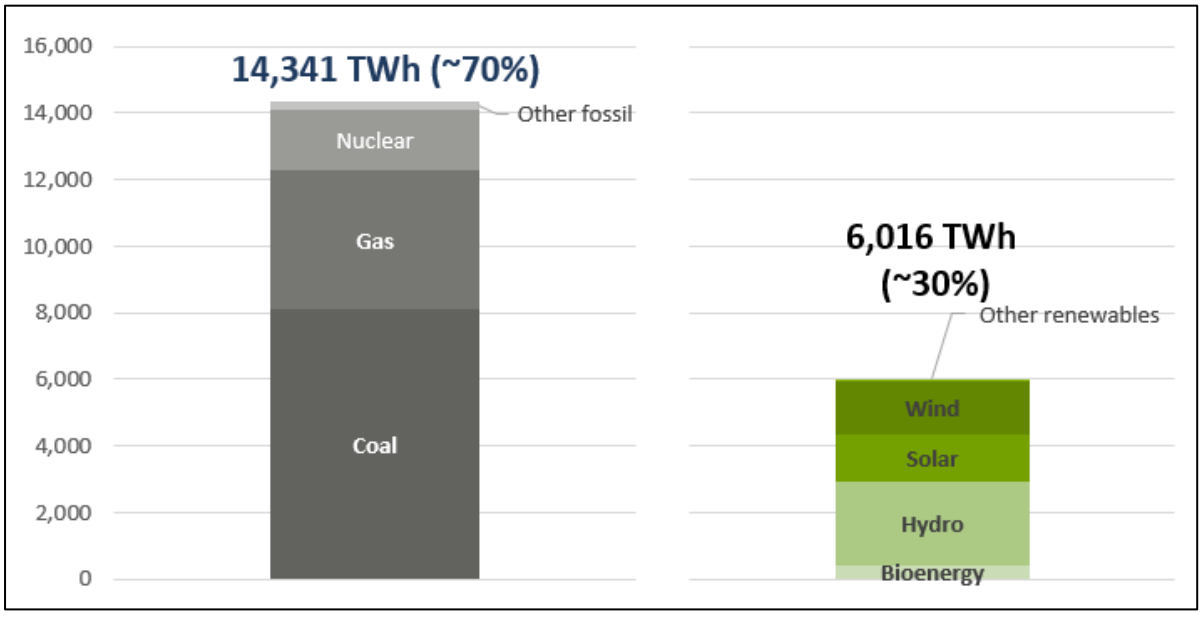
**Opportunities include maximizing solar and wind deployment, integrating renewable energy with storage, and developing technology-specific solutions such as offshore wind, bioenergy, renewable hydrogen, and CCUS.** Renewable energy can also strengthen energy security, while measures such as Competitive Renewable Energy Zones (CREZ), supportive policy frameworks, and improved access to finance can help scale up investment and implementation.

**However, policy and regulatory challenges remain.** In some economies, monopoly utilities and grid operators may slow renewable energy deployment due to potential conflicts of interest, particularly where incumbent utilities control both grids and generation assets. Although some economies have introduced auctions, targets, incentives, or renewable energy

plans, weak implementation, policy instability, permitting delays, and unclear grid access rules can still create uncertainty for investors. In economies without clear targets and regulatory frameworks, renewable energy investment may remain slow and difficult to scale.

**Technical challenges are also significant.** Renewable energy deployment must be supported by grid upgrades, storage, flexibility measures, and electrification to ensure that clean power can reliably support energy diversification and reduce dependence on fossil fuels. Some economies face land constraints due to dense populations, agricultural land-use priorities environmental limitations, or difficult terrain. Others need technical assistance in forecasting, storage, system operation, and grid congestion management. Limited system planning capacity and weak coordination between power supply and demand-side infrastructure can further delay integration and affect reliability.

**Financing challenges vary across economies.** Some advanced economies may have sufficient access to finance but still face cost overruns due to inflation, supply chain pressures, labour shortages, and complex project requirements. Emerging and early-stage economies may face higher financing barriers, including perceived investment risks, weaker institutions, limited bankable project pipelines, currency risks, and underdeveloped financial markets. In these cases, development finance, concessional funding, guarantees, and donor support will be important to reduce risks and mobilize private investment.



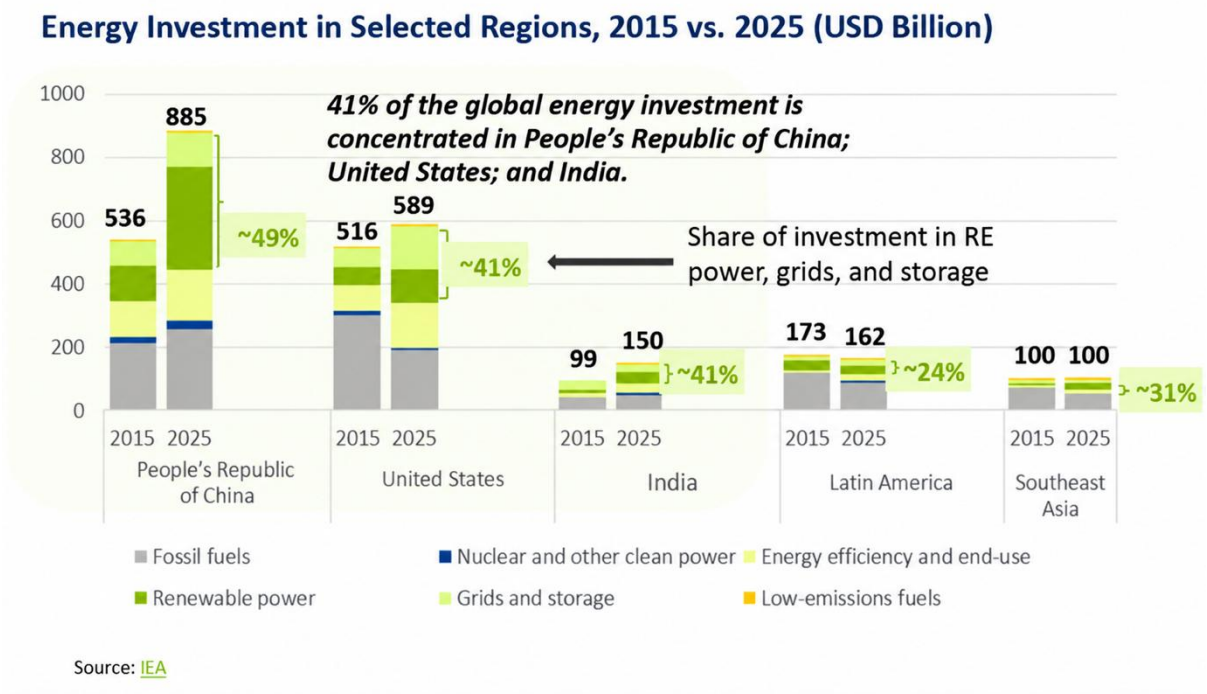

Source: Ember Data Explorer, accessed March 2026.

**Figure 5: Electricity Generation by Sources of 20 APEC Economies in 2024**

**Despite progress in building out renewable generation capacity, fossil fuels continue to dominate electricity generation in the Asia-Pacific region.** Coal remains the largest source of power generation among APEC economies, while renewables accounted for only around 30% of electricity supply in 2024 (see Figure 5). Renewable electricity generation is

still mainly driven by hydropower, followed by wind and solar PV. In 2024, wind and solar PV each generated around 1.6 thousand TWh, reflecting their growing role in the regional power mix.

**Figure 6 provides a snapshot of renewable energy development and investment trends across APEC economies.** It compares economies based on the share of renewable energy in installed capacity and electricity generation. In 2025, around half of APEC economies had a share of renewable electricity generation above the global average, but only a few had a level of installed renewable capacity above the global average. This suggests that while some economies are already generating a significant share of electricity from renewables, many still need to expand renewable capacity to support future growth.




Source: Energy Investment across Regions and Sectors, 2015 and 2025

**Figure 6: The Comparison of Energy Investment in Selected Regions in 2015 and 2025**

**The readiness of different APEC economies to integrate variable renewable energy varies widely.** Some need to focus on optimizing high shares of solar and wind through stronger grids, storage, and system flexibility. Others require enabling actions, such as clearer implementation regulations, technical standards, and market frameworks, to manage renewable energy integration effectively.

**Energy investment remains a major challenge.** Investment in renewable power, grids, and storage has increased across most regions, but it is highly concentrated in China; the United States; and India, which together account for more than 41% of global energy investment. In contrast, regions such as Southeast Asia and Latin America have seen relatively stagnant investment levels and continue to allocate a larger share of investment to fossil fuels. In Southeast Asia, renewable power accounted for 31% of investment, compared with 52% for

fossil fuels. This highlights the need to scale up investment in renewable energy, grids, and storage, particularly in emerging economies.

# 3 Session 1: Overview of Thailand's Renewable Energy Policies and Development Plan

***By Yaowateera Achawangkul, Division of Energy Research, Department of Alternative Energy Development and Efficiency, Ministry of Energy Thailand***

**The presentation provided an overview of Thailand's renewable energy status across electricity, heat, and transport, as well as the economy's energy transition pathway toward net-zero emissions.** It also covered updates to the draft Alternative Energy Development Plan 2024–2037 (AEDP 2024) and highlighted key policy mechanisms, including direct power purchase agreements (DPPA) enabled through third-party access (TPA), and biomass-based power generation.

### Key Summary of Renewable Energy Status in Thailand

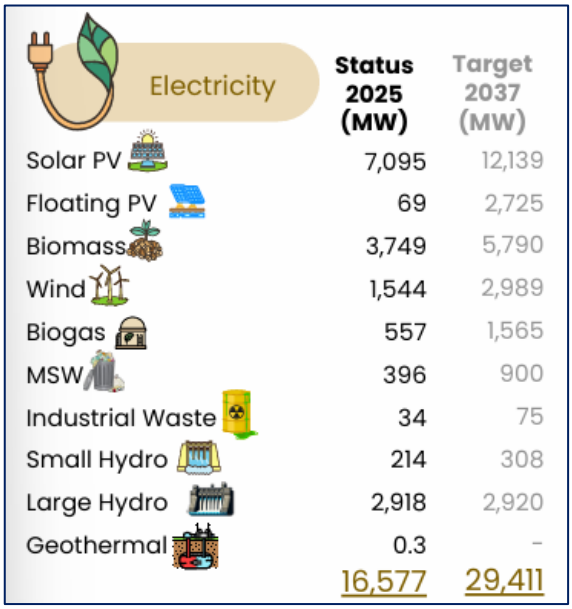
- Renewable Energy Status in Thailand (2025): accounted for 20.2% of electricity generation and 23.3% of heat consumption.
- Accelerated climate ambition: Commit to net-zero GHG emissions by 2050 (post-COP30), guided by the 4D1E framework.
- Enhanced renewable targets: Achieve a 37% renewable energy share by 2037 under AEDP 2024, with broad economic, social, and environmental benefits.
- Market-based mechanisms: Mobilize green investment through third-party access (PAA) direct power purchase agreements (DPPAs) and the Utility Green Tariff (UGT).
- Sector-wide actions: Scale up solar deployment, leverage biomass to address PM2.5, and advance emerging fuels such as sustainable aviation fuel (SAF) and hydrogen.

**Thailand's installed renewable electricity capacity—across solar, wind, hydropower, waste, and geothermal—currently stands at 16.6 GW. Under AEDP 2018, the target is to reach 29.4 GW by 2037.** The generation mix is expected to shift toward solar PV (including floating solar) and biomass, while wind capacity is projected to reach a level comparable to hydropower. Solar PV, including floating solar, reached 7.1 GW in 2025 and is expected to more than double to 14.8 GW by 2037. Biomass and biogas capacities were 3.7 GW and 0.6 GW in 2025, respectively, with targets of 5.0 GW and 1.5 GW by 2037. Wind capacity is projected to increase from 1.5 GW in 2025 to 3.0 GW by 2037.

Other renewable energy sources—including waste-to-energy (MSW in the draft AEDP 2018), industrial waste, and hydropower—are expected to grow more modestly, each contributing less than 1 GW of additional capacity.

**Renewable heat in Thailand is expected to increase by around fourfold by 2037, with biomass remaining the dominant source.** Total renewable heat consumption was 7,204 ktoe in 2025, of which biomass accounted for 6,354 ktoe (87.7%). Biomass use is projected to rise significantly to 23,000 ktoe (92%) by 2037. Biogas is the second-largest source, increasing from 669 ktoe in 2025 to 1,283 ktoe by 2037. In contrast, solar heat remains marginal—at 9 ktoe in 2025—and is expected to grow modestly to 100 ktoe by 2037, still small relative to other technologies.

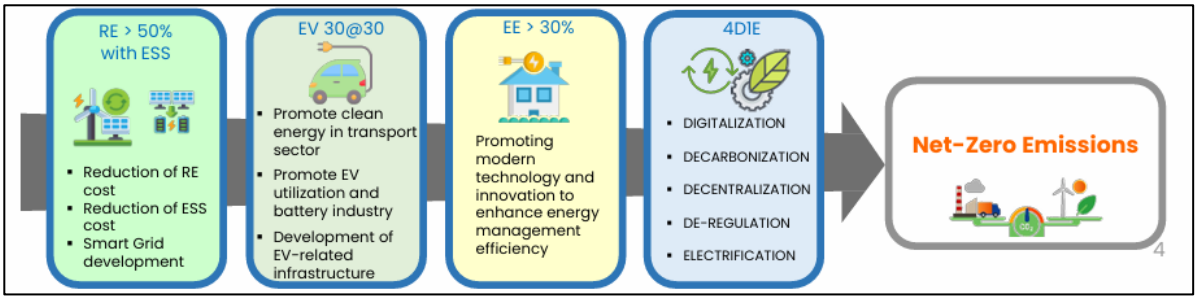
**The transport sector will require more than a doubling of ethanol and biodiesel use.** Biodiesel consumption is targeted to increase from 3.35 ML/day in 2025 to 8.00 ML/day by 2037. Similarly, ethanol is projected to rise from 3.44 ML/day to 7.50 ML/day over the same period. In addition, pyrolysis oil is introduced as a new fuel, with a target of 0.53 ML/day by 2037.




Source: Figure drawn from workshop presentation materials

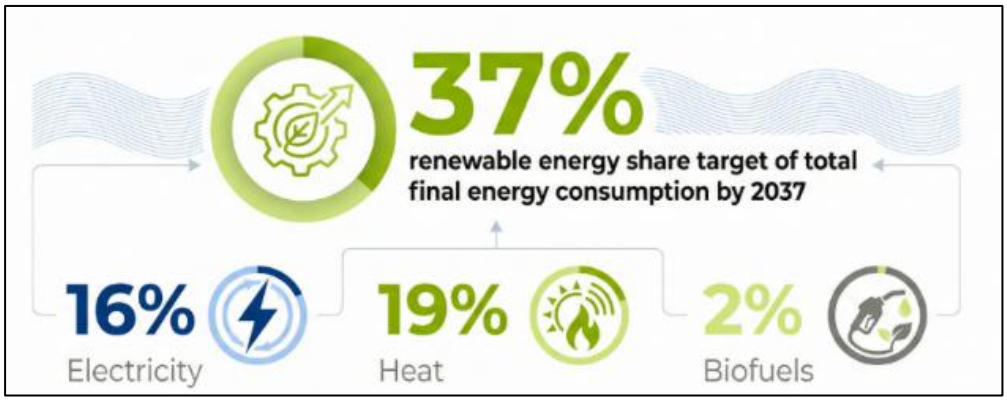
**Figure 7: Installed Capacity of Renewable Electricity in 2025 and Target in 2037 from AEDP 2018**

**Thailand has strengthened its GHG emission reduction target and advanced its net-zero emissions goal, as announced at COP30.** Under the updated targets, Thailand aims to reduce GHG emissions by 47% from BAU levels with international support (up from 40% at COP26). The economy has also advanced its net-zero target to 2050. Key technologies supporting this pathway include renewable energy expansion, energy storage, green mobility, CCUS, hydrogen, and small modular reactors (SMRs). The targets are supported by five key energy plans—the Oil Plan, Alternative Energy Development Plan (AEDP), Power Development Plan (PDP), Energy Efficiency Plan (EEP), and Gas Plan—which were approved on 4 August 2021.




Source: Figure drawn from workshop presentation materials

**Figure 8: Thailand Policy Direction**




Source: Figure drawn from workshop presentation materials

**Figure 9: Key Targets of Draft AEDP 2024**

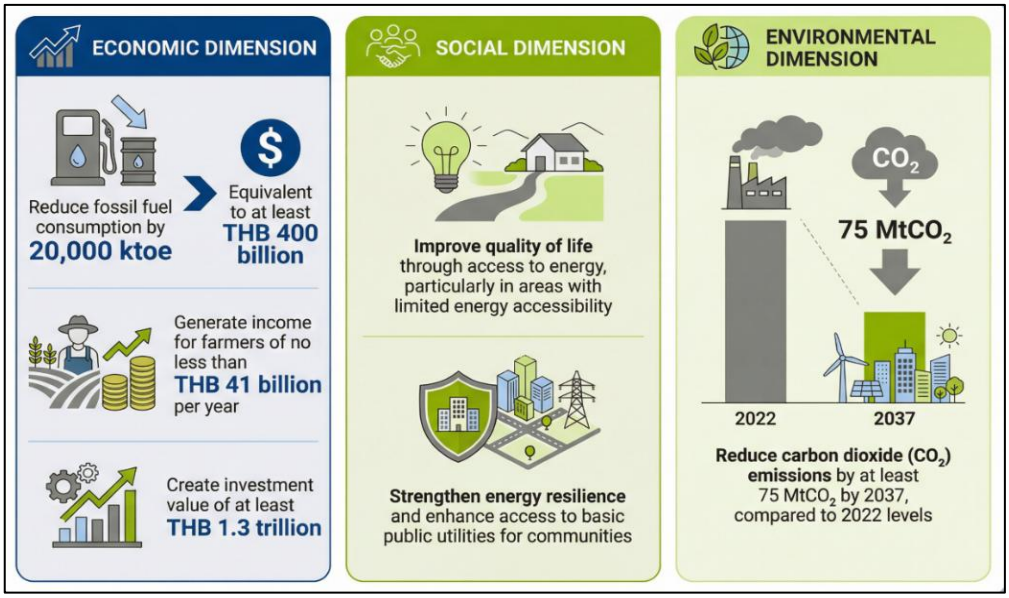
**The Draft AEDP 2024 sets a higher goal for RE in 2037. It increases the share of renewable energy in total final energy consumption compared to AEDP 2018 (from 30% to 37%).** It also expands the scope of RE sources included by adding hydrogen and sustainable aviation fuel (SAF). The target composition is 16% for electricity, 19% for heat, and 2% for biofuels.

Installed capacity targets for solar PV and wind are significantly increased under AEDP 2024, raising total renewable electricity capacity from 29,411 MW (AEDP 2018) to 73,286 MW by 2037. Renewable heat is targeted at 17,360 ktoe (slightly lower than AEDP 2018), while biofuels are set at 1,939 ktoe.

**Forces driving changes in the electricity sector.** The main driving factors include policy and regulation, energy security concerns, development of new and alternative sources of RE, and financial incentive mechanisms.

- **Policy and regulatory developments are facilitating the expansion of RE generation.** Promote renewable procurement through direct power purchase agreements (DPPAs) and the use of a utility green tariff (UGT).

- **Financial support mechanisms.** These include promotion of investment through tax incentives (e.g., for biomass-based power) and low-interest financing; support for fuel-switching from fossil fuels to renewable or alternative energy; revisions to relevant laws and regulations to facilitate deployment; and facilitation of access to green finance under appropriate environmental conditions.
- **Energy security and power system stability.** In light of growing concerns around fuel supply disruptions, energy security has become a priority. The government has enacted financial incentives for solar systems and consumer movement to purchase electric vehicles. In the power sector, the government of Thailand has been moving to strengthen power system reliability by promoting energy storage. Government measures also include support for decentralized and off-grid renewable energy systems in remote areas and introduction of digital-based renewable energy forecasting.




Source: Figure drawn from workshop presentation material

**Figure 10: Expected Benefits from Draft AEDP 2024 Targets**

**New and alternative sources of renewable energy.** Thailand has been promoting R&D and technology development for a range of new and alternative energy resources. These include green hydrogen for the power sector and for other energy-intensive industrial sectors, as well as renewable fuels for the heat sector. Activities across both areas are promoted through pilot and demonstration projects, capacity building, and financial support.

- **Sustainable Aviation Fuel (SAF).** Promotion of SAF in Thailand focuses on both domestic implementation and international engagement.
    - Domestical implementation includes assessments of the economic potential and impacts, development of carbon credit mechanisms to support SAF, and establishment certification bodies

    - International engagement includes reviews of life-cycle emission standards, negotiation of SAF utilization criteria from feedstocks (e.g., molasses, sugarcane, palm oil), and participation in SAF-related carbon trading discussions

- **RE for industrial heat applications.** Efforts to strengthen the use of renewable energy for industrial heat include promotion of systematic storage and aggregation of renewable fuels, and support for upgrading fuels for primary use or co-firing. Other actions include encouraging industry to use alternative sources for heat processes, include industrial waste, and support for business matchmaking initiatives between technology and service suppliers and industrial end users.
- **Hydrogen utilization:** Hydrogen is a key technology for power and alternative fuels in Thailand.
  2024–2027 (Preparation): Develop regulations and investment frameworks.
  2028–2034 (Pilot): Implement pilot projects across sectors.
  2035–2037 (Scale-up): Move toward commercialization.

**Key RE policies and initiatives in Thailand's power sector.** As noted above, two of the key policy initiatives include expanding renewable electricity procurement through the DPPA mechanism and the UGT tariff mechanism. These are focused to a significant extent on accelerating the uptake of solar PV, as well as biomass for electricity production.

- **DPPA:** On 25 June 2024, the National Energy Policy Council (NEPC) approved a pilot framework for renewable electricity trading through Direct Power Purchase Agreements (DPPA) using Third-Party Access (TPA) to the grid. The pilot targets 2,000 MW and aims to attract large-scale foreign investment, particularly from high-demand sectors such as data centers. The DPPA framework, TPA tariff structure—including wheeling, connection, ancillary services, imbalance charges, and policy costs—and grid access mechanisms are currently under preparation for further approval.
- **UGT 1 (non-source-specific):** the non-source specific UGT is provided mainly for hydropower produced by the Electricity Generating Authority of Thailand (EGAT). UGT was applied in 2025 to about 2,000 GWh of electricity generation in 2025. It applies to tariff types 3 (medium general service), 4 (large general service), and 5 (specific business services). EGAT plans to expand the availability to all tariff types from 2026 onward. Users enter annual contracts and pay the standard retail tariff (including Ft) plus a green premium.
- **UGT 2 (source-specific):** The source-specific UGT is provided for solar, solar and battery energy storage systems (BESS), and wind. There is about 4,850 MW installed capacity of these resources and around 8,000 GWh/year of generation. This UGT is available for tariff types 4 and 5. Users also sign annual contracts, with

costs including energy charges, wheeling charges (transmission and distribution), dependable capacity, and policy and service fees.

- **Biomass-based power:** Biomass-based power generation is being considered as a way to reduce open-field burning of agricultural residues and address related PM2.5 emissions. To support this, appropriate feed-in tariff rates could be introduced for electricity generated from sugarcane leaves and tops. Effective implementation will also require stronger coordination among relevant agencies, including the Ministry of Energy and the Ministry of Industry.
- **Solar power:** Thailand's solar power measures include separate approaches for residential rooftop solar, community solar, and solar installations on government buildings. These measures combine tax incentives, fixed feed-in tariffs, and public-private partnership models to support wider solar deployment across different user groups.
- **Residential solar PV:** Thailand is targeting the installation of on-grid solar PV systems of up to 10 kWp across 90,000 households between March 2026 and December 2028. The scheme is supported through tax incentives, allowing homeowners to deduct actual equipment and installation costs up to THB 200,000. The program is expected to stimulate approximately THB 10.8 billion in economic activity and reduce emissions by around 0.26 million $tCO_2e$ per year.
- **Community solar — "1 sub-district, 1 power plant":** The community solar program aims to develop ground-mounted solar projects, with each site capped at 10 MW, and scale total capacity up to 1,500 MW. Electricity generated under the program will be sold at a fixed feed-in tariff of THB 2.1679/kWh for 25 years. Participating communities are expected to receive direct electricity discounts of THB 0.4–0.8/kWh, while the program as a whole is projected to mobilize around THB 30 billion in investment and create more than 1,785 jobs.
- **Government solar rooftop:** The government solar rooftop model follows a public-private partnership approach and is currently awaiting finalization of the regulatory framework. Under this model, private entities would invest in and operate solar installations on government buildings. The approach is expected to reduce public-sector electricity costs while lowering the long-term maintenance burden for government agencies.

# 4 Session 2: Business Models and Policies for Scaling Up New and Renewable Energy

**Session 2 was conducted in a "fishbowl" format, which enables interactive, multi-directional dialogue and avoids one-way discussions.** It began with scene-setting presentations on the renewable energy policy landscape, including assessment approaches.




**Session 2 Business Models and Policies for Scaling Up New and Renewable Energy with Fishbowl**

Three experts— Dimitri Pescia (Agora Energiewende), Jennifer Leisch (NREL Foundation), and Ananth Chikkatur (XanhTerra)— made scene-setting presentations for ten minutes each. Boru Chen of Chinese Taipei complemented the discussion by outlining Chinese Taipei's renewable energy ambitions and highlighting regulatory and spatial challenges in scaling these technologies.

**Key Summary of Business Models and Policies for Scaling Up New and Renewable Energy**

- **Renewables require system redesign, not just deployment.** Wind and solar have unique characteristics (e.g., variability, location constraints) that require new approaches to grid planning, flexibility, and system operation.
- **The "baseload" paradigm is becoming obsolete.** Modern power systems increasingly rely on flexibility and can operate reliably with high shares of renewables.
- **The main barrier is no longer cost, but effective implementation.** Challenges have shifted toward policy design, permitting, grid integration, and financing.
- **Policy design and bankability are both critical to scaling.** Revenue certainty, grid access, and bankable contracts are essential to translate renewable energy targets into actual project deployment.
- **Multiple mechanisms must work together.** Corporate PPAs, auctions, renewable energy zones, and demand aggregation models are complementary tools for scaling renewable energy.
- **Transmission and planning are key enablers.** Proactive grid development (e.g., RE zones) is necessary to overcome the "chicken-and-egg" problem between generation and transmission.
- **Demand-side and market-based approaches are increasingly important.** Corporate demand, industrial park aggregation, and evolving procurement mechanisms are driving large-scale renewable energy deployment.

## 4.1 Unlocking Wind and Solar Deployment: A Diagnostic Tool to Overcome Renewable Energy Policy Barriers

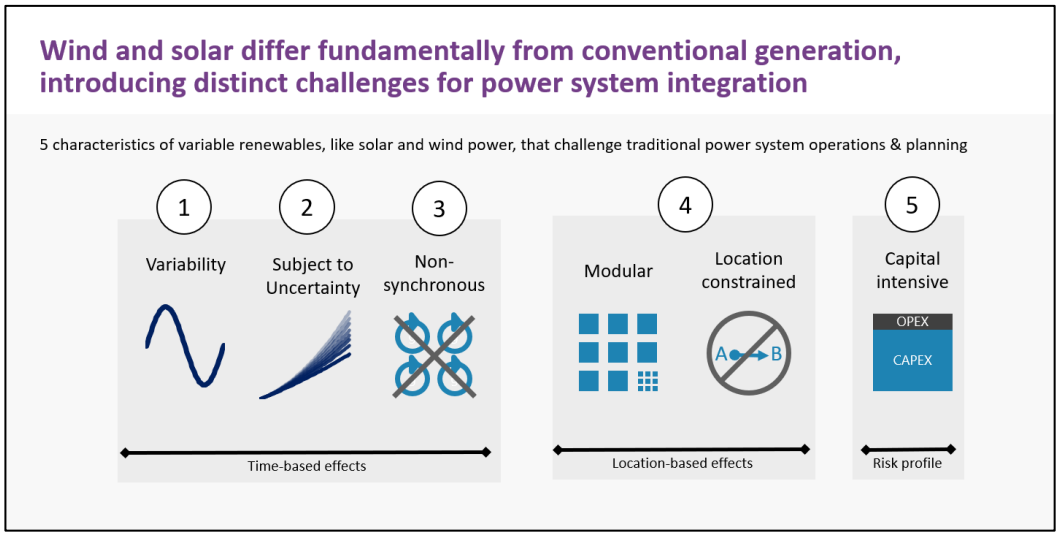
***By Dimitri Pescia, Agora Energiewende***

### Importance of solar and wind for RE scale-up

**Solar and wind technologies have unique characteristics and require new approaches to system planning, grid integration, and policy design.** Wind and solar are the fastest-growing renewable energy technologies, driven by their cost competitiveness and key roles in electrification, energy security, and decarbonization. Global wind power generation is approaching 2,500 TWh per year, while solar generation has surpassed 1,500 TWh per year.

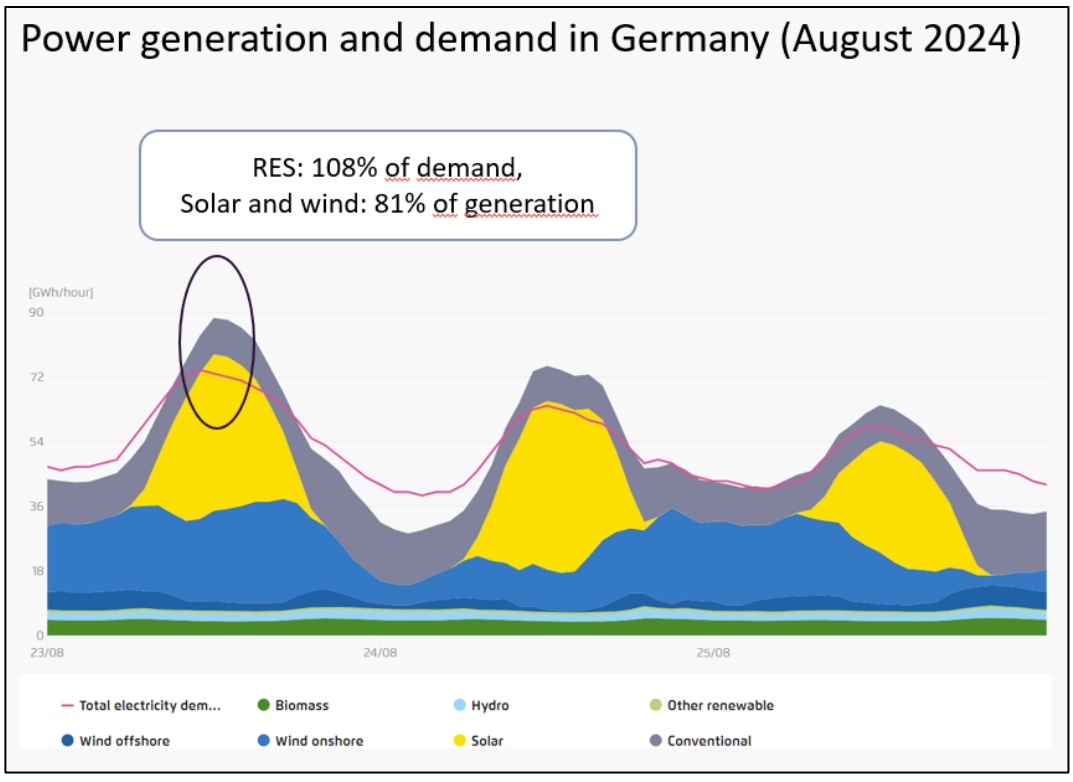
There are five unique characteristics that require a shift in how power systems are designed and operated:

- **Variability**: Electricity is generated only when primary resources (solar irradiance or wind) are available.
- **Uncertainty (forecastability):** Output is weather-dependent and uncertain, especially in the day-ahead timeframe. However, forecast accuracy improves significantly closer to real time. *(In some weather systems, such as thunderstorms, rainfall may be accompanied by wind.)*
- **Non-synchronous generation:** VRE technologies (solar PV and most wind) are inverter-based and do not inherently provide rotational inertia like conventional generators. This can affect system stability but can be managed with advanced grid technologies (e.g., synthetic inertia, grid-forming inverters).
- **Modularity:** Renewable energy technologies are highly modular and scalable, enabling deployment from small distributed systems to large utility-scale projects.
- **Location constraints:** Renewable energy resources are site-specific and often located far from demand centers, requiring transmission expansion and grid integration planning.
- **Capital-intensive structure:** Costs are dominated by upfront capital expenditure (CAPEX), while operating costs (OPEX) are relatively low due to minimal fuel and maintenance requirements.




Source: Figure drawn from workshop presentation materials

**Figure 11: Five Characteristics of VRE**




Source: Agorameter, 2026.

**Figure 12: Power Generation by Technologies (Stacked Areas) and Demand (Line) Illustrated Solar and Wind Could Cover 81% of Electricity Demand**

***KEY MESSAGE: The concept of baseload is becoming obsolete. Modern power systems increasingly rely on flexibility and are no longer planned or operated around a baseload paradigm.***

## Experience from Germany

**An example from Germany shows that, during certain hours, renewable generation exceeded 100% of domestic demand, with excess electricity exported to neighboring economies.** At peak periods, wind and solar supplied around 80% of total generation, while conventional plants, including nuclear, adjusted output to maintain system balance. This illustrates that modern power systems can operate reliably with high shares of renewables, although further acceleration of deployment is still needed.

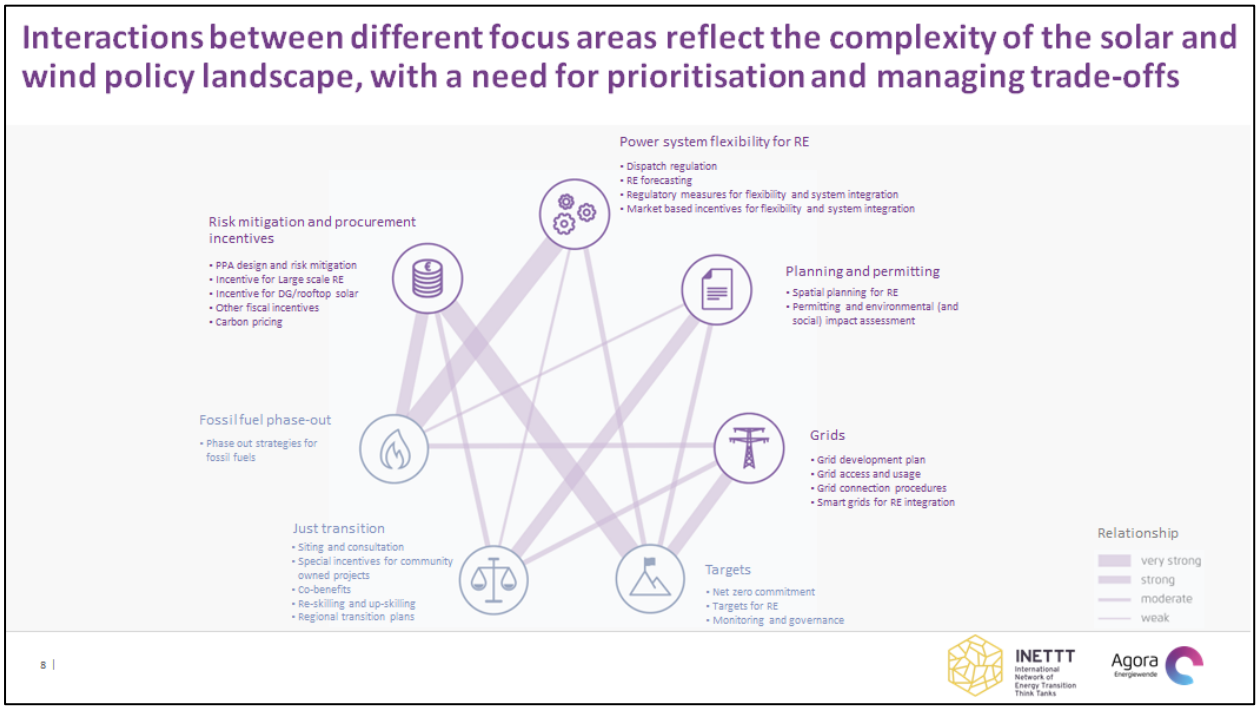
> *"From my perspective, we are off track (on VRE installed capacity) if we are serious about the long term. We should not aim for a threefold increase by 2030, but rather fivefold, as many economies are still significantly lagging behind."*
>
> **Dimitri Pescia (Agora Energiewende)**

**The barriers to renewable energy deployment are shifting, with increasing challenges arising from complex policy and regulatory frameworks that require careful prioritization and trade-offs.** High upfront costs are no longer the primary constraint. Instead, streamlined permitting and transparent procurement mechanisms (e.g., clear tariff structures) are critical to improving project bankability. Looking ahead, grid modernization and flexibility mechanisms are essential for integrating higher shares of renewable energy, while fossil fuel phase-out strategies and clear transition policies are needed to support long-term energy transition goals.

## Agora's quantitative assessment framework

**The quantitative assessment framework developed by Agora Energiewende highlights key dimensions influencing solar and wind deployment.** It focuses on four core areas—grids, planning and permitting, power system flexibility, and risk mitigation and procurement incentives—alongside three enabling areas: fossil fuel phase-out, just transition, and sustainability.

**The framework emphasizes strong interlinkages across these dimensions—for example, between procurement design, system flexibility, and transition policies.** It also highlights the importance of considering stakeholders affected by fossil fuel phase-out and aligning these transitions with grid flexibility planning to support effective renewable energy integration.




Source: Figure drawn from workshop presentation materials

**Figure 13: The Linkages between Dimensions of Renewable Energy Deployment**

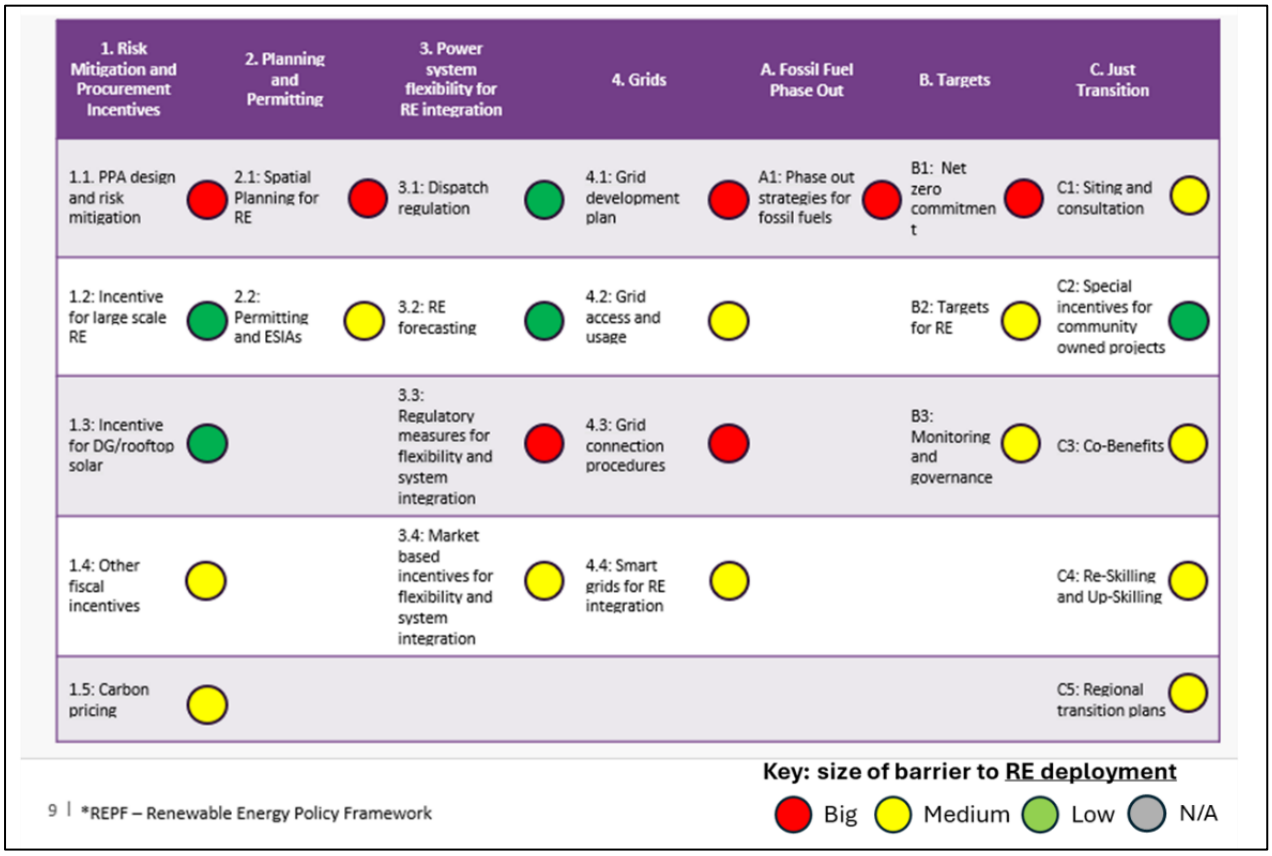
***KEY MESSAGE: Three case studies from Japan; Republic of Korea; The Republic of the Philippines highlight differing challenges and levels of readiness across each economy in the energy transition.***

## Case study from the Philippines: grid transmission network

The economy faces permitting delays, largely due to insufficient transmission network development. While dispatchment regulations and forecast ability show relatively low barriers, grid development plan and connection procedures remain a key bottleneck.

*Existing coal power contracting structures create system inflexibility and undermine renewable energy integration.* This is particularly the case for power supply agreements (PSAs) with minimum offtake and capacity payment clauses. This highlights the need for greater flexibility in contract design and fossil fuel phase-out strategies.

*Procurement reform is therefore a key lever for change.* Revising existing PSAs and procurement practices is essential to enable a more flexible and renewable-compatible power system. At the same time, strong risk mitigation measures and incentives for large-scale renewables, rooftop solar, and community-based projects provide positive momentum and support a just transition.




Source: Figure drawn from workshop presentation materials

**Figure 14: Policy Assessment for the Philippines**

## Case study from the Republic of Korea

**The Republic of Korea faces different challenges compared to the Philippines.** While the economy has a strong net-zero commitment and advanced smart grid capabilities, several barriers remain.

**Risk mitigation and procurement incentives are at a moderate level, covering large-scale renewables, rooftop solar, and system flexibility.** However, other fiscal incentives remain a barrier. Regulatory ambition could also be strengthened; for example, the Renewable Portfolio Standard (RPS) target of 15% by 2026 could be increased to accelerate deployment.

**Spatial planning and grid development remain key constraints.** Transmission expansion has not kept pace with renewable generation, as reflected in high barriers to grid planning and connection, leading to curtailment. In addition, renewable energy siting is not yet fully integrated into municipal land-use plans, contributing to community opposition.

*The new administration in Korea has signaled a strong commitment to the energy transition and is developing measures to address these challenges.*

## Case study from Japan

**Japan shows moderate readiness across several dimensions, including risk mitigation, grid development, and target setting.** However, the economy still faces challenges in permitting, Environmental and Social Impact Assessment (ESIA) processes, grid expansion, and fossil fuel phase-out.

**The lack of economic dispatch and limited available grid capacity lead to high curtailment rates, reducing the bankability of renewable energy projects.** In addition, land acquisition and permitting bottlenecks increase project costs and timelines. Strengthening solar and wind prioritization in spatial planning, along with establishing one-stop-shop permitting systems, could significantly reduce these barriers.

**Japan's renewable electricity target of 40–50% by 2040 could be more ambitious to fully capture cost reductions in renewable energy and battery storage.** Furthermore, the current net-zero strategy places strong emphasis on hydrogen while potentially underutilizing the role of direct electrification.

## Conclusions

**Overall, the energy transition is increasingly driven not only by climate goals but also by economic competitiveness and energy security.** Achieving this transition requires a fundamental redesign of energy systems and stronger, more integrated policy frameworks to enable rapid scaling of renewable energy.

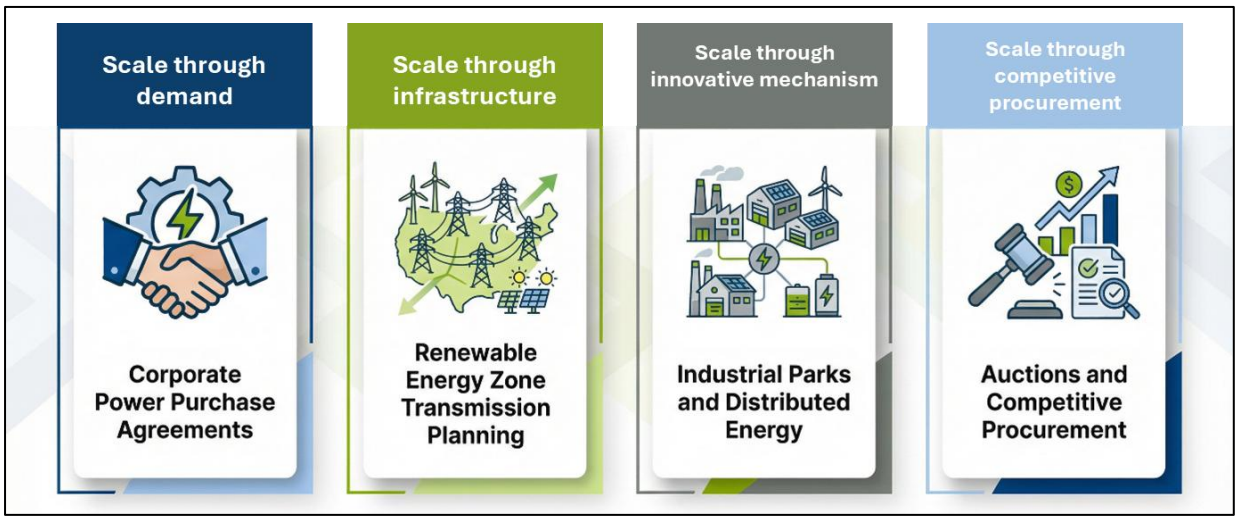
## 4.2 Scaling New and Renewable Energy Deployment

***By Jennifer Leisch, NREL Foundation***

***KEY MESSAGE: Multiple approaches can be applied in parallel within a single market, as they can be complementary.***

### The key challenges to RE scale-up

**The challenges of scaling renewable energy are no longer primarily technical.** The main constraint is the availability of supportive policy and regulatory design followed by other factors such as how well projects are structured, financed and delivered.



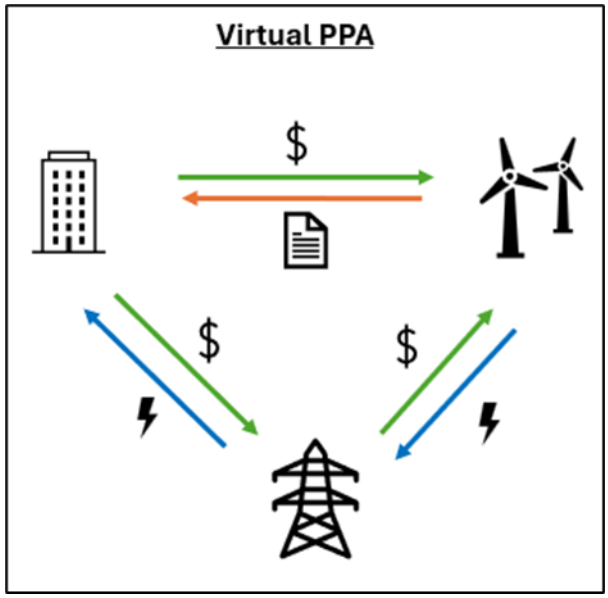

Source: Figure drawn from workshop presentation materials

**Figure 15: Approach to Scale**

### Corporate power purchase agreements (corporate PPAs)

A corporate PPA is a contract in which a developer sells electricity—and its associated attributes—to a commercial and industrial (C&I) buyer. These agreements are demand-driven development and can be structured as either physical or virtual, depending on the buyer's location, objectives, and risk tolerance. Corporate PPAs are increasingly a primary driver of new and renewable capacity. They have evolved from a niche procurement tool into a key driver of renewable energy deployment—shaping how energy systems are built, financed, and optimized, particularly in response to data center and AI-driven load growth

**Why CPPAs work**
Corporate PPAs are an effective mechanism because long-term contracts provide revenue certainty, enabling project financing and enhancing bankability.




Source: Figure drawn from workshop presentation materials

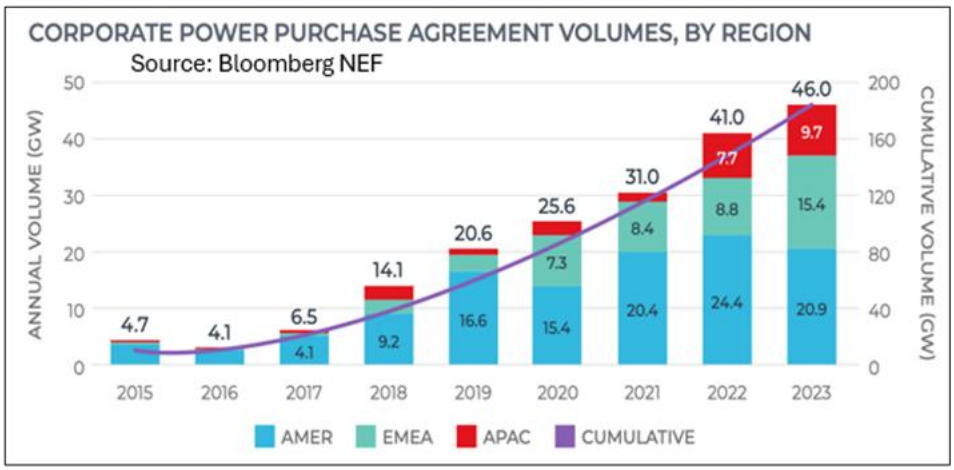
**Figure 16: Schematic of a Virtual PPA (or Third-Party Access PPA, depending on contract structure)**

**The implementation of corporate PPAs (CPPAs) should consider several key factors.**

- Structure and market context: Physical vs. virtual PPAs, depending on location and regulatory conditions
- Pricing and risk allocation: Fixed pricing vs. exposure to market volatility (e.g., basis risk, negative pricing)
- Volume and reliability: Intermittency, load matching, and the need for storage or firming solutions
- Contract terms: Tenor, credit requirements, and key provisions (e.g., curtailment, flexibility)
- Strategic alignment: Alignment with the buyer's decarbonization goals, financial objectives, and risk tolerance

***KEY MESSAGE: Corporate PPAs (excluding China) have accounted for approximately one-quarter of global wind and solar capacity additions in recent years, making them a major driver of new renewable deployment.***

This growth is largely driven by hyperscale electricity users, particularly data center operators, which have strong demand for large-scale renewable energy procurement, reaching over 300 GW of total contracted capacity.




**~300+ GW**
**total contracted corporate PPA capacity globally**

Source: Figure drawn from workshop presentation materials

**Figure 17: CPPA Volumes**

**There is also increasing demand for 24/7 carbon-free electricity (CFE).** This means that companies aim to match their electricity consumption with renewable generation on an hourly basis, rather than annually. As a result, the market is evolving from standalone solar and wind PPAs toward more advanced structures, including hybrid projects with storage to provide more consistent energy supply.

**Several emerging challenges remain for renewable energy procurement.** However, several emerging challenges remain. These include price volatility and negative pricing risk, interconnection delays, increasing contract complexity, the need for firming solutions (e.g., storage or dispatchable supply), uncertainty around wheeling charges, and complexities in renewable energy certificate (REC) or energy attribute certificate (EAC) accounting and 24/7 matching.

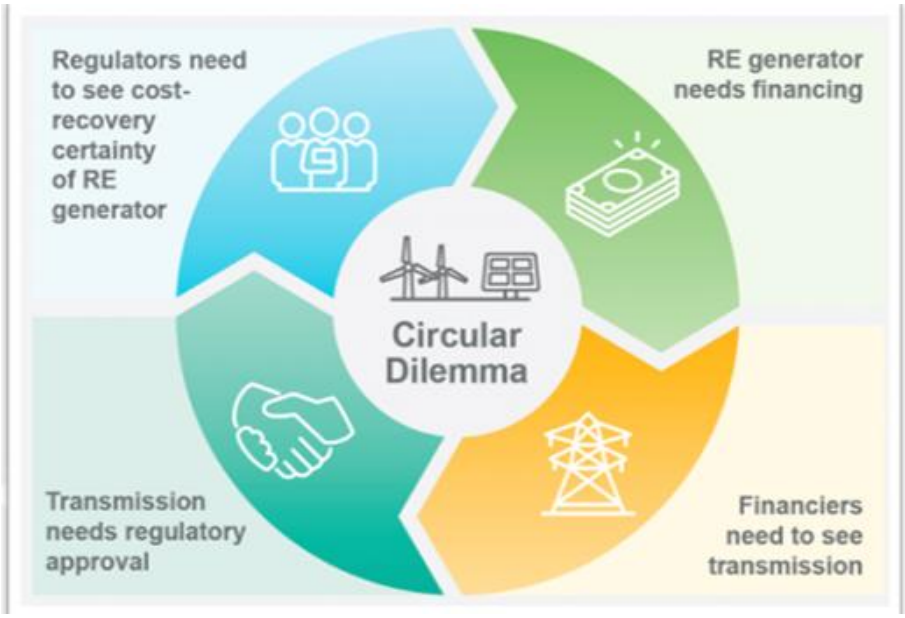
## Renewable energy zones (REZ)

**A renewable energy zone is an infrastructure-led mechanism, which involves proactive transmission planning for RE deployment to accelerate large-scale RE development.** This approach involves identifying high-resource zones, preparing transmission infrastructure and permitting in advance, and coordinating multiple projects within a single region. It helps reduce development risks, address the mismatch between generation and transmission timelines, and speed up deployment.

***KEY MESSAGE: The circular dilemma highlights the importance of proactive transmission planning and early permitting readiness to support timely renewable energy deployment.***

**The development of renewable energy faces a "circular dilemma."** Regulators require assurance of cost recovery before approving transmission investments, while renewable

developers need grid access to secure financing, and transmission projects require regulatory approval to proceed.




Source: Ready for Renewables: Grid Planning and Competitive Renewable Energy Zones (CREZ) in the Philippines. 2020

**Figure 18: The Circular Dilemma of Renewable Energy Development**

**This challenge is further compounded by mismatched timelines.** Transmission development can take over 10 years, whereas renewable energy projects can be built in just 2–3 years. This reinforces the need for proactive transmission planning and early development.

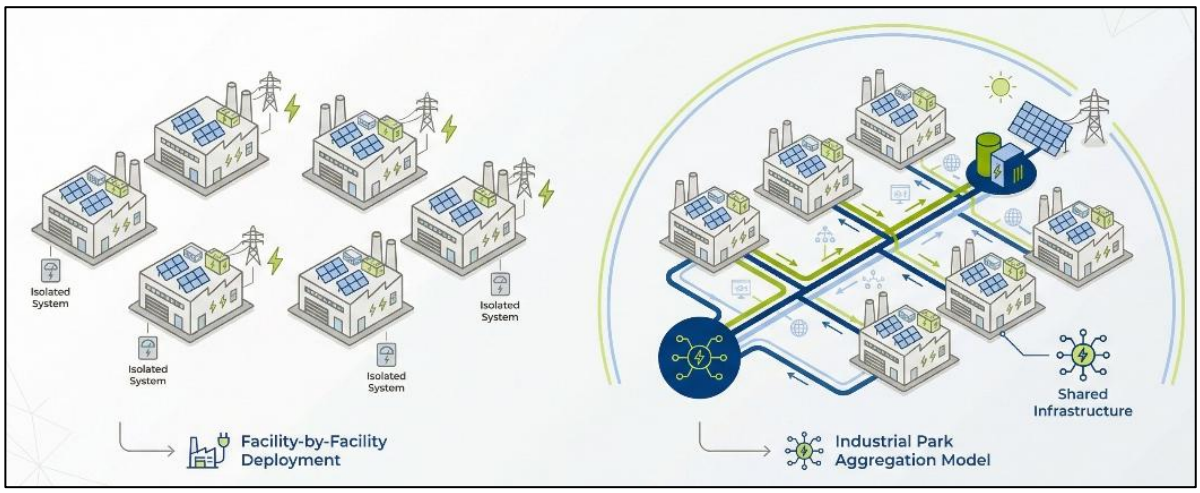
## Case study from the Philippines

Competitive Renewable Energy Zones (CREZs) identify areas with high-quality renewable energy resources and strong development potential. In an archipelagic system with complex grid constraints, CREZ helps prioritize locations for renewable energy deployment. In the Philippines, more than 25 zones with over 150 GW of wind and solar potential have been identified. These zones have been integrated into the National Transmission Development Plan, which guides transmission upgrades and new infrastructure to support grid development.

CREZ is a proactive transmission planning approach that reduces development risk and enables large-scale renewable energy deployment**.** It also supports key policies, such as renewable energy targets and the Green Energy Auction Program, while improving system reliability, cost efficiency, and economies of scale for wind and solar.

## Demand aggregation model

**An aggregation model provides a strong opportunity to scale renewable energy in areas with concentrated demand, such as industrial parks.** Instead of targeting individual users, developers increasingly focus on entire parks, enabling large-scale deployment of distributed energy solutions such as rooftop solar, storage, and microgrids. These systems can be installed on-site or near-site and delivered through energy-as-a-service models or direct ownership by the industrial park. This approach reduces reliance on the grid, improves project economics, and accelerates renewable energy deployment—particularly in export-oriented industrial zones driven by multi-economy supply chain requirements.




Source: Figure drawn from workshop presentation materials

**Figure 19: Illustrations of Facility-by-Facility Deployment vs Aggregation Model**

**10 – 12 GWp**
**Rooftop solar potential from Viet Nam's industrial parks**

**The aggregation model enables clusters to consolidate fragmented demand into bankable scale as it is shown in industrial parks in Viet Nam.** The rapid expansion of export-oriented industrial parks in Viet Nam—reaching over 400 parks with around 40,000 companies—creates strong potential for scaling renewable energy. Instead of developing rooftop solar on a facility-by-facility basis, developers are increasingly targeting entire industrial parks, using shared infrastructure models. This aggregation approach improves project bankability and enables a more reliable green electricity supply for park-wide operations.

**This aggregation approach improves project bankability and enables a more reliable green electricity supply for park-wide operations.** The model is largely driven by multi-economy supply chain requirements for clean energy. However, key challenges for implementation remain, including construction standards, roof ownership, and the regulatory framework.

## Auctions: competitive procurements

**Competitive auctions have become the dominant mechanism for procuring large-scale renewable energy capacity globally (excluding China).** Governments and utilities use auctions to drive price discovery and cost reduction, with winning bidders typically receiving long-term contracts (15–25 years) that support project financing.

**The design of auctions is evolving, and in the past few years, there has been a shift toward larger, multi-GW tenders and more complex technology mixes, including solar, wind, storage, and hybrid systems.** New contract structures, such as contracts-for-difference (CfDs) and capacity-based mechanisms, are increasingly used. Auctions are also moving beyond least-cost criteria to incorporate broader objectives, such as system reliability and social outcomes.

## Case study from Australia: Federal Competitive Auction Program

**This federal program targets wind, solar, and long-duration storage. It uses two-sided CfDs, providing a revenue floor (downside protection) and a revenue cap (shared upside).** This approach lowers financing risk, supports integrated generation and storage, and aligns procurement with coal phase-out timelines. The scheme represents a shift from "lowest price wins" to "system value wins," balancing cost, reliability, and timing. Recent results (2024–2025) include around 6 GW awarded in the first tender (approximately 4 GW wind and solar, and 2 GW storage across 19 projects), with additional multi-GW economy-level procurements, bringing total capacity contracted or under procurement to over 10 GW.

> *"There is no one-size-fits-all approach. I think there are valuable lessons for all of us that can help evolve the way we think about these mechanisms. Multiple mechanisms and opportunities can be used together to scale renewable energy in a single market"*
>
> **Jennifer Leisch (NREL Foundation)**

## 4.3 From Policy to Investment: Bridging the Gap in Scaling Up Renewable Energy

***By Ananth Chikkatur, XanhTerra***

The gap is not a failure of ambition of policy targets. It requires greater focus on design and bankability features.

There is a significant gap between renewable energy targets and actual deployment across economies such as Papua New Guinea; The Republic of the Philippines; Chinese Taipei; Viet Nam. The challenge is not the lack of ambition or policy targets, but the ability to translate them into implementation.




Source: PDP-8 Rev. (2025), MOEAC (2025), DOE Philippines (2025), PNG NEROP

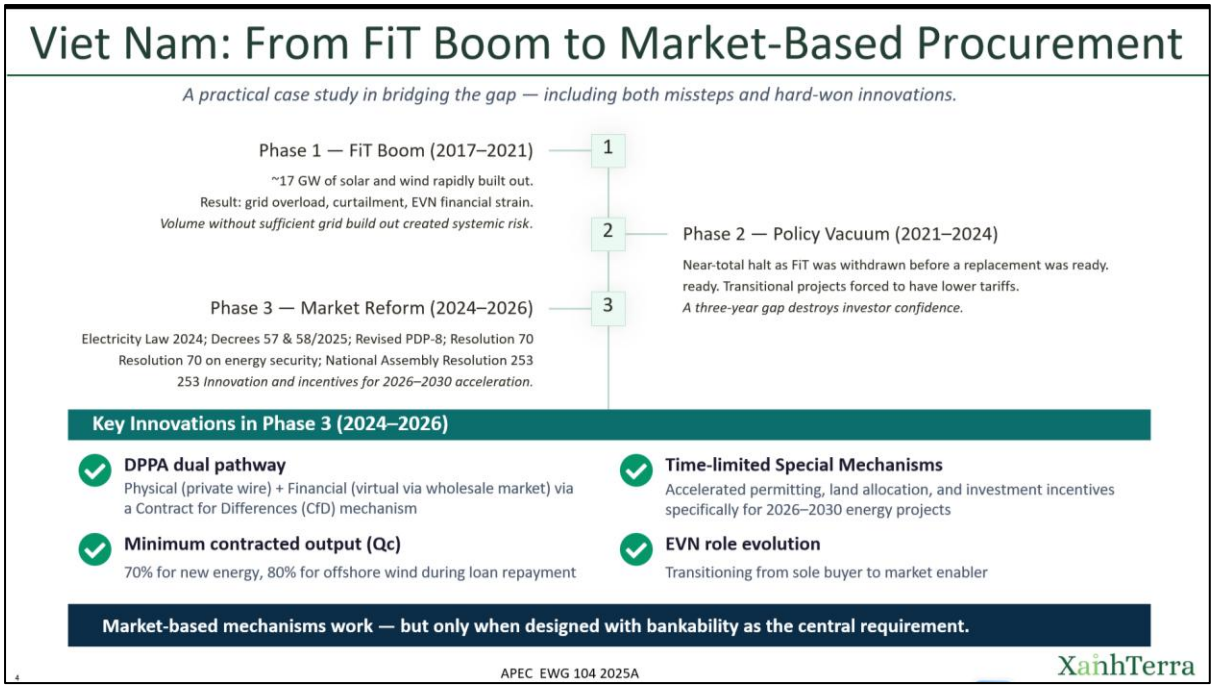
**Figure 20: Examples of Renewable Energy Deployment Gaps in Selected APEC Member Economies**

**Five key barriers—revenue certainty, grid access and offtake risks, PPA bankability, land permitting and planning, and institutional and utility readiness—are common across many economies, although their severity varies by local regulatory and market conditions.**

- **Revenue certainty:** The lack of long-term price signals after initial support schemes (e.g., feed-in tariffs) can create an investment vacuum and hinder continued deployment.
- **Grid access and offtake:** Transmission development often lags behind generation, leading to curtailment and reducing project viability.
- **PPA bankability: Concerns** over lender protections, output guarantees, termination clauses, compensation, and assignment rights limit financing.
- **Land permitting and planning:** Overlapping regulations and lengthy environmental assessments delay project development.
- **Institutional and utility readiness:** Utility financial health, market operator capacity, and investor selection frameworks affect investment confidence.

**Case Study: Viet Nam "boom–bust–reform" cycle in RE development.**

Viet Nam's renewable energy trajectory offers a cautionary yet instructive example of how policy design, grid readiness, and market structure can together determine the pace and sustainability of energy transition. Over roughly a decade, the economy experienced a sharp boom driven by generous feed-in tariffs, followed by an abrupt halt when those incentives were withdrawn, and is now navigating a more deliberate shift toward market-based mechanisms. This boom–bust–reform cycle unfolded across three distinct phases, each shaped by the interplay between government policy, infrastructure constraints, and investor confidence.




Source: From Policy to Investment Bridging the Gap in Renewable Energy Scale Up, presented during the APEC Capacity-Building Workshop for New and Renewable Energy Policy, 31 March 2026.

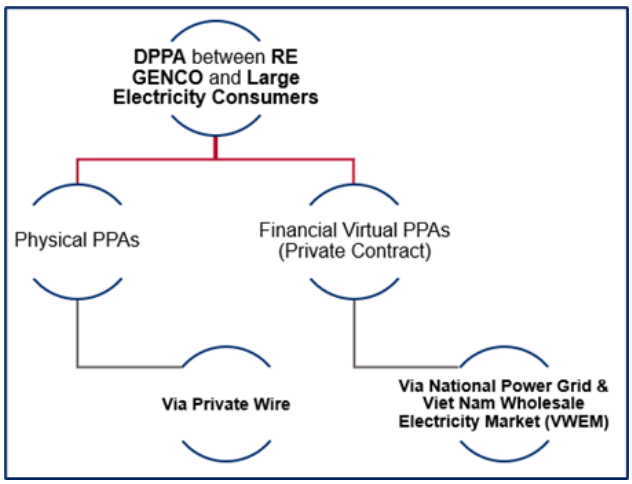
**Figure 21: Renewable Energy Procurement Timeline in Viet Nam: FiT Boom, Development Gap, and Market Reform Phases**

- **Viet Nam's first phase (2017–2021) demonstrated how well-designed incentives can drive rapid capacity growth**. Feed-in tariffs (FiTs) led to the deployment of over 17 GW of solar and wind capacity. However, this expansion outpaced grid development, resulting in congestion, curtailment, and financial strain on the utility.
- **The second phase revealed the damaging consequences of policy discontinuity.** FiTs were withdrawn without immediate replacement, creating a policy vacuum of around three years and significantly weakening investor confidence.

- **In the current phase, Viet Nam is pursuing a more structured and market-oriented approach.** The government is introducing reforms that include direct power purchase agreements (DPPAs), accelerated permitting and land allocation, targeted investment incentives for 2026–2030, and minimum contracted output requirements to improve revenue certainty. The role of the government utility (EVN) is also evolving from a single buyer to a market enabler.

This case highlights the importance of stable policy design, grid readiness, and bankable market mechanisms to sustain renewable energy deployment.

***KEY MESSAGE: Viet Nam's DPPA framework highlights the advantages of virtual PPAs over physical arrangements for scaling renewable energy. Virtual PPAs offer a more commercially viable and scalable solution for large-scale procurement.***

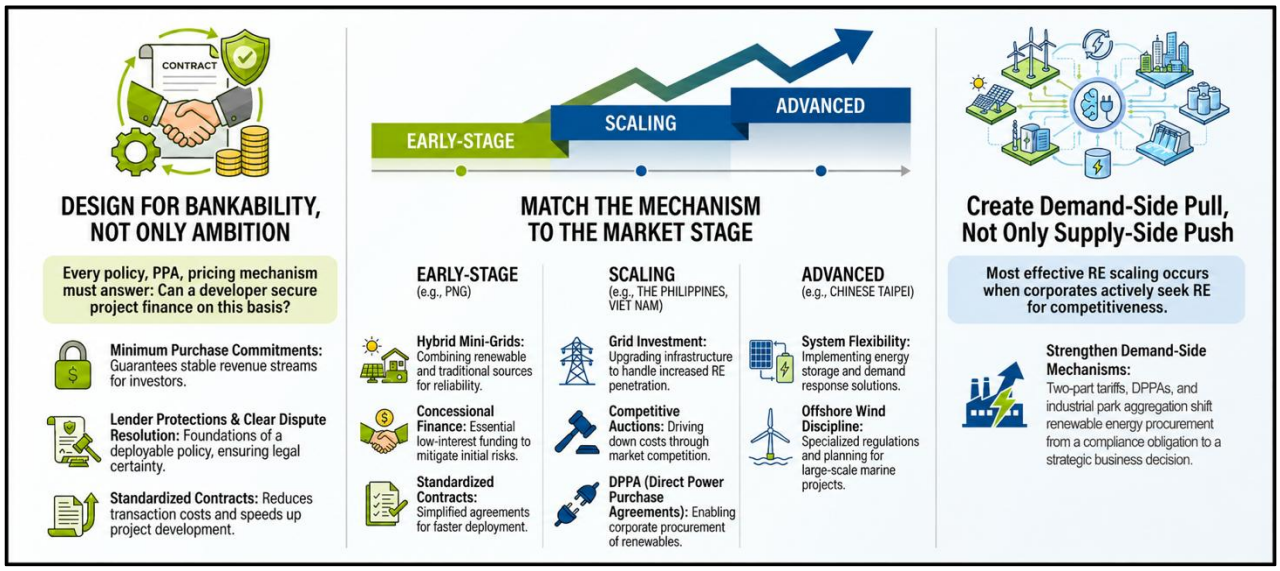



Source: Figure drawn from workshop presentation materials

**Figure 22: Schematic Diagram of Viet Nam's DPPA**

**Virtual DPPA (via grid):** Uses the existing grid with financial settlement through the wholesale market, requiring no additional infrastructure. It is highly scalable, enabling access to large renewable energy projects across the grid, and is the primary pathway for achieving large-scale or 100% renewable energy targets.

**Physical DPPA (private wire):** Involves a direct connection between the generator and the consumer. It requires dedicated infrastructure, is limited by geographic proximity, and has lower scalability—similar to rooftop solar models.




Source: Figure drawn from workshop presentation materials

**Figure 23: Three Principles for Bridging the Gap**

***KEY MESSAGE: Three principles for bridging the gap: design policies for bankability (not just ambition), match mechanisms to the market stage, and strengthen demand-side drivers to support deployment.***

**Examples of implications for Papua New Guinea:** For smaller systems such as Papua New Guinea, simpler and standardized solutions—such as mini-PPAs and solar-diesel-battery hybrid systems—are more appropriate than complex competitive procurement models. Strong planning, sequencing, and targeted support from development partners are critical.

> *"I believe the gap lies in implementation, policy design, and institutional capacity. However, there are common solutions across economies, including credible pricing, bankable contracts, grid readiness, and stronger demand-side engagement. The key question is how to structure peer learning—not only at the policy level, but also among developers and system operators—to accelerate implementation and knowledge sharing."*
>
> **Ananth Chikkatur (XanhTerra)**

**Examples of implications for Chinese Taipei:** Chinese Taipei has set ambitious energy transition targets, but further progress is needed to achieve them. Key options include diversifying solar deployment pathways, particularly for C&I users through third-party models, and strengthening policies such as rooftop solar mandates. There is also a need to recalibrate offshore wind development and local content strategies to meet future capacity targets.

## 4.4 Fishbowl Discussion

**The fishbowl discussion began with a sharing of experiences on offshore wind expansion in Chinese Taipei.** This was followed by an active exchange among participants, with contributors from five economies (Papua New Guinea; Peru; The Russian Federation; Singapore; Chinese Taipei), which led into a broader discussion among representatives of the 13 APEC member economies attending. Their contributions aligned with the objective of the session: to understand the current status and key needs for renewable energy expansion across APEC economies.




**Chinese Taipei Contributor and Three Experts in the Fishbowl Discussion (Session 2), from left to right: Boru Chen (Chinese Taipei); Jennifer Leisch (NREL Foundation); Dimitri Pescia (Agora Energiewende); Ananth Chikkatur (XanhTerra)**

### Sharing Experiences about Off-Shore Wind Development from Chinese Taipei, Boru Chen, Ministry of Economic Affairs

***KEY MESSAGE: Scaling offshore wind in Chinese Taipei requires not only ambitious targets, but also well-designed development pathways and strong spatial governance to ensure sustainable and efficient expansion.***

**Offshore wind has evolved from a standalone energy project into a central pillar of Chinese Taipei's energy transition strategy.** The government aims to increase the share of renewable energy in power generation from approximately 20% in 2025 to 30% by 2030, and further to 60–70% by 2050, with offshore wind playing a critical role in achieving these targets.

**A key lesson from Chinese Taipei's experience is that scaling offshore wind requires strong and sustained public–private collaboration.** Development has followed a structured, three-stage approach: (1) demonstration, (2) zonal planning, and (3) zonal development. This approach enables a step-by-step transition from early market building to large-scale deployment.

**As of March 2026, installed offshore wind capacity exceeded 4 GW, ranking fifth globally and contributing significantly to new and renewable energy additions in 2024.** This progress has been underpinned by stable, long-term policy targets and a phased development pathway, which have provided confidence to investors, developers, and the broader supply chain. Government support has also played a key role in de-risking early-stage investments and enabling a "learn-by-doing" approach.

**As deployment scales up, the challenge has shifted from capacity expansion to spatial management.** Offshore wind development now faces increasing constraints from competing marine uses, including fisheries, shipping, ecological conservation, and military activities. In this context, integrated marine spatial planning has become essential—not only to reduce conflicts but also to optimize sea space utilization and ensure the sustainable long-term development of offshore wind and other marine resources.

> *"To scale up renewable energy, we need not only ambitious targets but also the right development sequence and governance framework. In Chinese Taipei, offshore wind has shown that policy support can help a new sector grow. The next step is to better coordinate renewable energy expansion with marine spatial planning."*
>
> **Boru Chen (Chinese Taipei)**

### *Outer Circle Discussion: Sharing Experiences from Participants*

**Business models, supportive policies, and strategic planning are all critical to scaling up renewable energy for supporting APEC economies and the global community in building local capacity for renewable energy deployment.**

"While policy is essential, it is not sufficient on its own. A key challenge lies in how land and space are managed for renewable energy development. As renewable energy becomes central to the global energy transition—not only in APEC economies—land constraints require more integrated approaches. These include linking renewable energy with islands, transport systems, water infrastructure, and sustainable buildings."

To accelerate deployment at scale, policies must go beyond targets and address permitting processes, land use, and spatial planning. Ultimately, the value we create depends on the strength of our networks and collaboration, which are essential to delivering a more sustainable and scalable renewable energy system."

**Contributor from People's Republic of China**

**Papua New Guinea illustrates how emerging island-like economies face both technical and financial challenges.**

"It's mountainous terrain and dispersed islands result in three main grid systems with limited interconnection. In addition to these geographic constraints, insufficient funding for utilities and transmission infrastructure further restricts the expansion and integration of renewable energy."

**Contributor from Papua New Guinea**

**Singapore is advancing research, testbeds, and demonstration projects to support its "four switches" strategy to increase the share of clean energy.**

"The first switch focuses on maximizing solar deployment. Given limited land availability and constraints such as maintaining maritime traffic, options like offshore wind are not feasible, making solar the primary domestic renewable energy source, supported by various incentive programs. The second switch is improving energy efficiency, including optimizing the use of natural gas. The third switch involves increasing electricity imports through regional cooperation to access cleaner energy. The fourth switch focuses on exploring low-carbon alternatives such as hydrogen, carbon capture, utilization and storage (CCUS), and geothermal energy."

**Contributor from Singapore**

**While investment in renewable energy projects in Peru is increasing, updates to regulatory frameworks, market rules, and infrastructure are still needed.**

"In Peru, around 50% of total energy supply comes from renewable sources, mainly hydropower. However, non-conventional renewables such as solar and wind account for only about 10% of electricity generation. Peru aims to increase this share to around 20% by 2030. To achieve this, Peru is promoting investment in new renewable energy projects, including green hydrogen. Key challenges remain in updating regulations and market design. In addition, infrastructure constraints—such as grid congestion and limited high-voltage transmission capacity—restrict the integration of solar and wind projects, particularly in areas far from demand centers."

**Contributor from Peru**

**Remote islands in the Philippines require stronger regulatory support to ensure the maintenance and long-term sustainability of renewable power systems.**

"With over 7,600 islands, many communities are geographically isolated and not connected to the main grid. Although the Philippines has three major grid systems, only two are interconnected, leaving many areas reliant on small, island-based systems and without reliable electricity access.

The key challenge is not only deploying renewable energy but sustaining operations over time. This underscores the need for regulations that support off-grid solutions, including appropriate technologies, financing mechanisms, and operational frameworks. Strengthening the implementation of the Renewable Energy Law can help address these gaps and improve energy access in remote areas."

**Elvira Gelindon – APERC**

**Russia's renewable energy accounts for only around 1% of the power mix, reflecting economic, institutional, and technical barriers.**

"Economically, Russia remains heavily dependent on fossil fuel exports, particularly natural gas, which limits incentives and creates persistent financing challenges for renewable energy. Institutionally, the system is complex and lacks transparency, with unclear roles and responsibilities leading to stakeholder imbalances and competition. Geographically, its vast territory creates grid connectivity challenges, with some regions facing energy shortages that require government intervention.

Technologically, efforts to build domestic capabilities and achieve technological sovereignty are ongoing. However, solar and wind technologies are often more cost-competitive when imported, especially from China, creating uncertainty and slowing deployment."

**Contributor from The Russian Federation**

# 5 Session 3: Frameworks and Approaches to Scaling Up Renewable Energy Investment: International and APEC Experience

**Session 3 followed the same format as Session 2, with scene-setting presentations on financing gaps and investor perspectives.** Edward Douglas from Kairos Renewables, Evelyn Wong from AVPN, and Peter Storey from PFAN each delivered a 10-minute presentation. Four contributors from People's Republic of China; Peru; The Russian Federation; Singapore then joined the inner fishbowl discussion to share investment experiences from their economies. The outer fishbowl focused on risk perception, risk mitigation, and stakeholder roles in scaling up renewable energy.

### Key Summary of Business Models and Policies for Scaling Up New and Renewable Energy

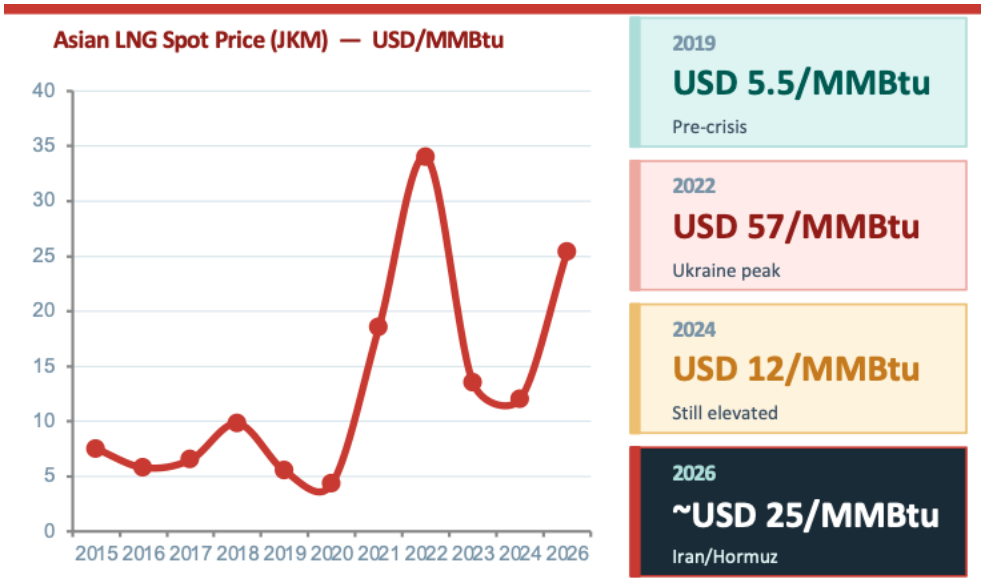
- **Fossil fuel dependency creates energy security and economic risks.** Southeast Asia is highly exposed to LNG and oil price volatility due to spot-market exposure and rising import bills. Renewable energy should therefore be framed not only as a cost comparison, but also as a risk mitigation strategy. Its value lies in improving price stability, avoiding future fuel price shocks, and strengthening energy security.
- **Key gaps include the limited pipelines of investor-ready projects, weak data, and perceived technical and project risks.** Many projects face early-stage risks, unclear returns, limited developer experience, weak data, permitting challenges, land rights issues, policy uncertainty, and incomplete value chains. These gaps make it difficult for investors to price risks and commit capital.
- **Miscommunication slows deployment.** Renewable energy is sometimes perceived as costly because discussions focus on upfront investment rather than levelized cost, long-term savings, and energy security benefits. Misconceptions around land use and electricity costs also require clearer communication.
- **Examples from Peru; The Russian Federation; Thailand, illustrated different support models.** An example from Peru showed the role of government in supporting emerging technologies such as green hydrogen and ammonia, which require coordination across multiple institutions. A Thailand participant described how public support can help non-bankable small hydropower projects deliver electricity access in rural areas. An example from Russia demonstrated how private-sector collaboration through power companies and ESCOs can improve project economics through energy efficiency and diesel savings.
- **A strong policy framework is essential.** While market-driven deployment can sometimes move faster than policy, it is not possible to scale deployment without supporting policies. Economies should simplify land access, market permission, grid connection, environmental approval, and foreign investment rules. They should also improve policy transparency, enable direct PPAs, streamline permitting, invest in grids and workforce capacity, and reduce unnecessary restrictions. Technical assistance should be sector-specific and ecosystem-oriented to support developers, investors, and the wider enabling environment.

## 5.1 The Rising Cost of Imported Energy – System Thinking, Feedback Loops and The Investment Case for Renewables

***By Edward Douglas, Kairos Renewables***

### The volatility risk of fossil fuels

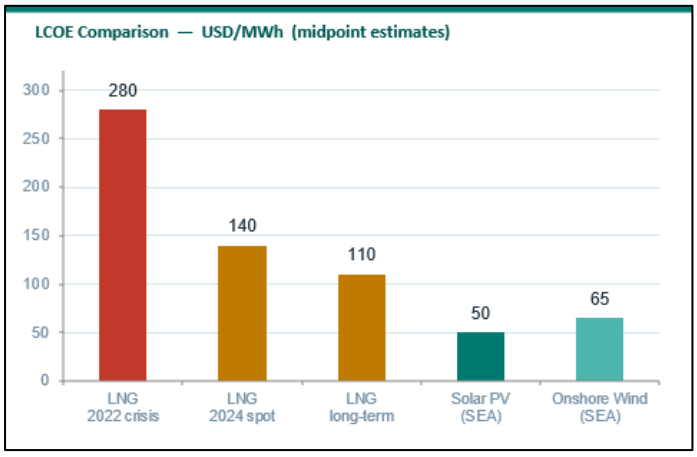
**Rising and volatile fossil fuel prices, particularly LNG, have increased the attractiveness of renewables, which benefit from declining and more stable costs.** LNG is sourced from depleting reserves, and its pricing is highly influenced by geopolitical factors, leading to rising and volatile costs. This volatility creates significant energy security concerns. For example, LNG prices surged in 2022 due to the Ukraine war, reaching 4–6 times the cost of new-build solar and wind. In 2026, prices rose again amid tensions involving Iran and disruptions in the Strait of Hormuz, with the Asian LNG spot price (JKM) doubling within 10 days.




Source: Figure drawn from workshop presentation materials

**Figure 24: The Asian LNG Spot Price from 2015 - 2026 showing the volatility and signaling energy insecurity issues.**

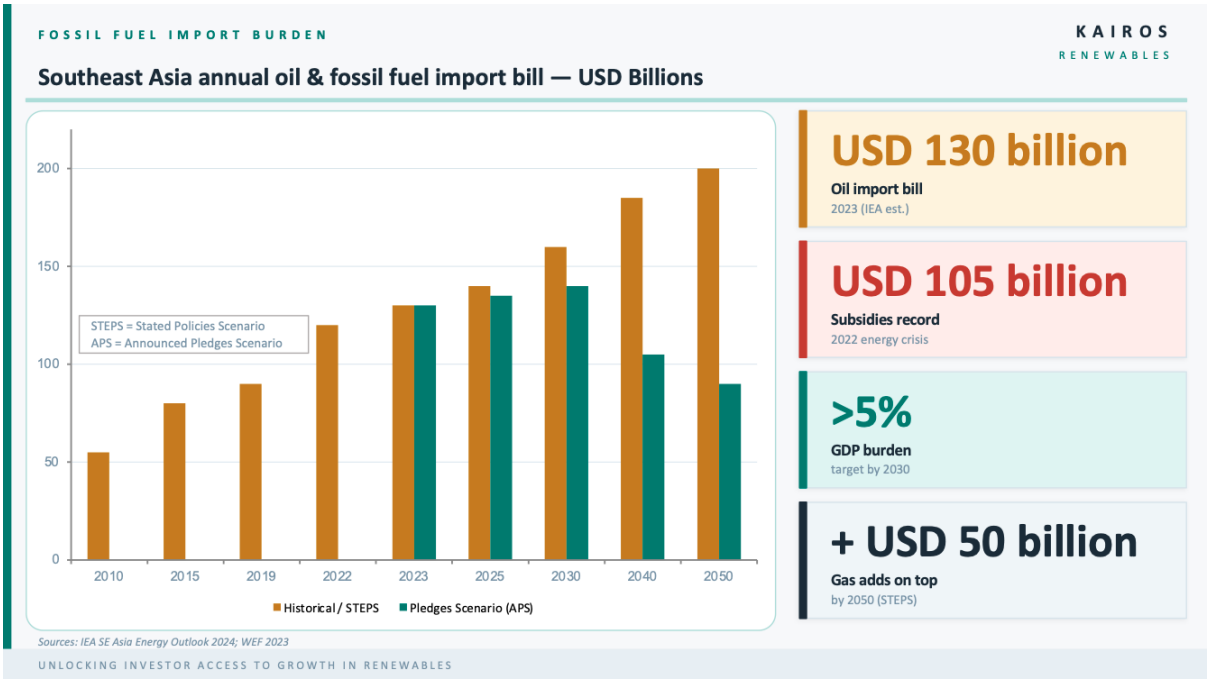
**While LNG is a commodity with volatile and often rising prices, renewable energy is a technology with exponentially declining costs, creating a clear difference in risk profiles.** Solar, wind, and battery technologies have seen significant cost reductions: solar LCOE has declined by around 90% since 2010, battery costs by approximately 97% since 2017, and wind LCOE by about 70% over the past decade.




**The crossover has happened.**
The levelized cost of electricity (LCOE) for renewables—such as wind or solar combined with battery storage—ranges from $35–95/MWh, making it cheaper than LNG-based power, which ranges from $110–370/MWh.

Source: Figure drawn from workshop presentation materials

**Figure 25: Midpoint LCOE Comparison: LNG (Crisis and Long-Term Scenarios) vs. Solar PV and Onshore Wind**




Sources: IEA SE Asia Energy Outlook 2024, WEF 2023.

**Figure 26: Southeast Asia Annual Fossil Fuel Imports**

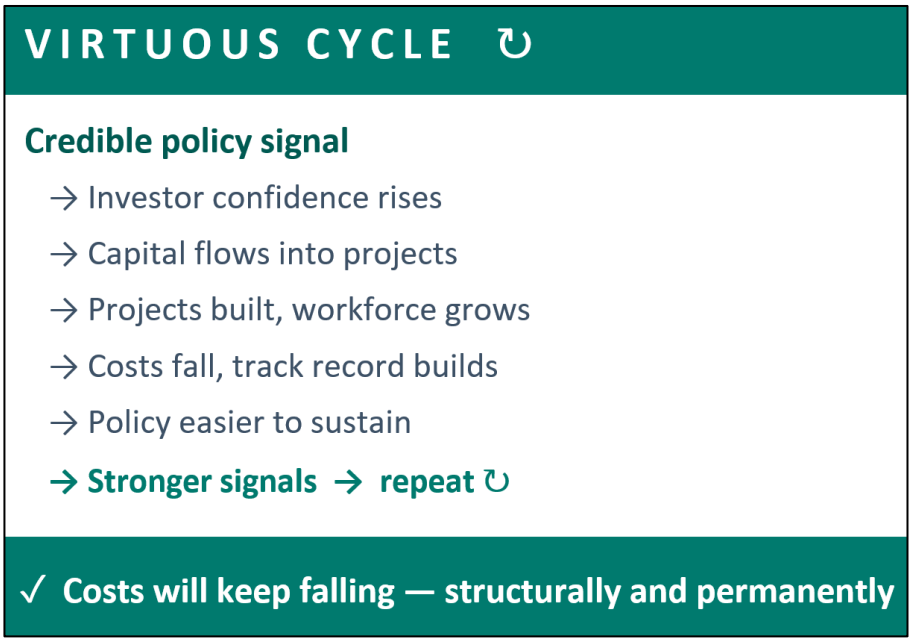
***KEY MESSAGE: Energy security is a key challenge for Southeast Asia economies, which are burdened by costs from fossil fuel imports (oil, petrol, diesel, LNG, coal).***

**Southeast Asia relies heavily on imported fossil fuels and is shifting from a net energy exporter to a net importer.** In 2022, the region recorded energy subsidies of around USD 105 billion, driven by the LNG price surge following the Ukraine crisis. The oil import bill reached approximately USD 130 billion in 2023 and is projected to exceed USD 200 billion by 2050, accounting for more than 5% of regional GDP.

**The pledge scenario (APS, shown in green) indicates a decline in annual fossil fuel import bills.** In contrast, historical trends and the stated policy scenario (STEPS, shown in gold) project continued growth, highlighting the gap between existing policies and stated commitments.

## The virtuous cycle of effective energy policy

**'Effective policy creates a virtuous cycle by mobilizing capital and building workforce capacity.** In contrast, policy uncertainty leads to the opposite outcome.




Source: Figure drawn from workshop presentation materials

**Figure 27: Virtuous Cycle**

**Credible policy signals increase investor confidence and mobilize capital into projects.** As projects scale, the workforce expands, enabling economies of scale, cost reductions, and a stronger track record. This, in turn, enhances policy credibility and reinforces a self-sustaining virtuous cycle.

**However, there is an inherent time lag between policy decisions and tangible outcomes.** Even with mature renewable technologies and cost competitiveness, it typically takes several years for policies to translate into investment, capital mobilization, and workforce development.

*"This may be a self-interested perspective, but there is a clear bottleneck in the region's development capabilities, particularly in terms of capital and skills."*

**Edward Douglas (Kairos Renewables)**

**The response of the sector to policy triggers is not immediate, and it takes time for renewable capacity to scale.** To accelerate this process, key measures include establishing clear, long-term auction programmes and enabling direct PPAs. Permitting remains a major bottleneck; streamlining processes can significantly improve market participation and project delivery, enabling consumers to engage more efficiently, including in grid investment. In parallel, sustained investment in grid infrastructure and workforce development is essential to support scaling.




Source: Figure drawn from workshop presentation materials

**Figure 28: Timeline from Technology Readiness to Implementation: Policy, Capital, and Workforce Preparation**

## 5.2 Renewable Energy from a Social Investment Perspective

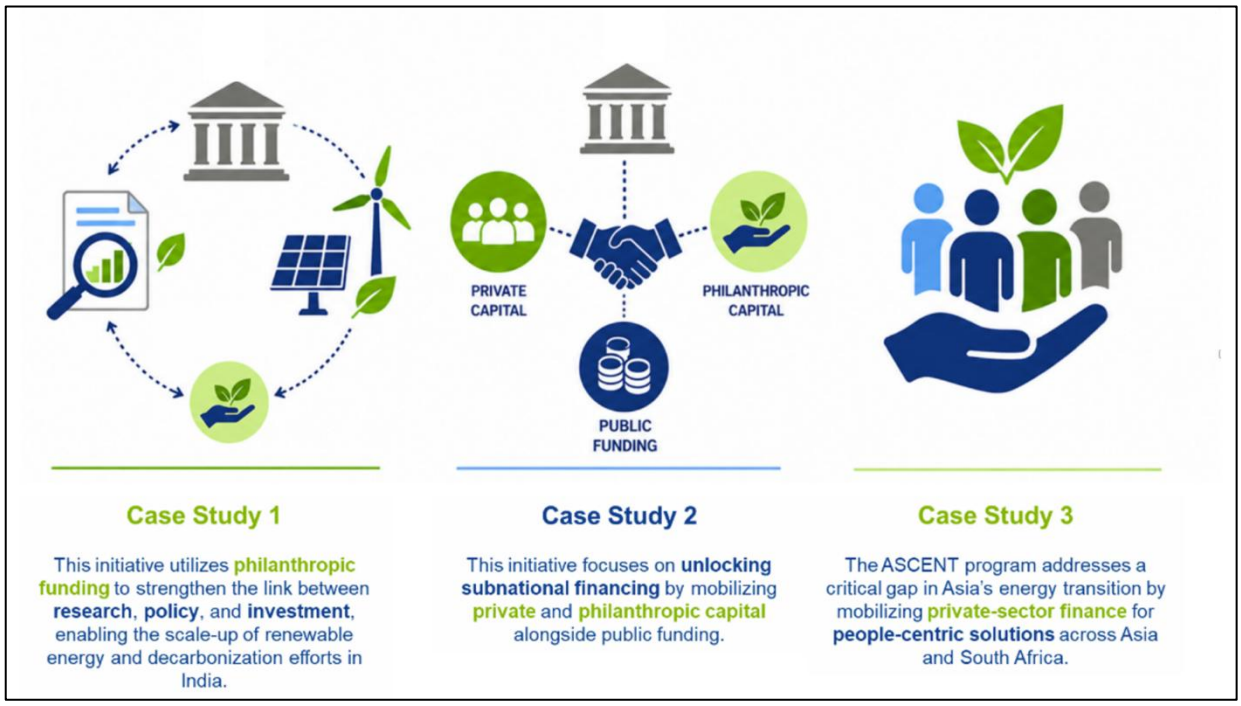
***By Evelyn Wong, AVPN***

**The Asia-Pacific region is vulnerable to climate change, and there is a huge financial gap in addressing the problem.** The Asia-Pacific region is highly vulnerable to climate change, with risks estimated to be six times higher than the global average. Approximately two-thirds of the global population is exposed to extreme heat waves, and a similar share of population is at risk from rising heat and humidity. Much of the impacts are concentrated in the Asia-Pacific region. A climate action platform translates climate agendas into implementation by channeling resources through key programs such as capacity building and investment facilitation.

**However, a significant financing gap remains: only about 14% of the estimated needed annual investment of USD 800 billion to USD 1 trillion is being mobilized at present.** This is largely due to limited awareness and trust. Investors lack clarity on where to deploy capital, innovators cannot access funding at the right stage, and governments struggle to signal demand credibly. At the same time, there is no effective intermediary to connect these actors and facilitate capital flow.

> *"Many social investors now view mitigation as a largely addressed area, with increasing participation from commercial capital. As a result, they are shifting their focus toward adaptation and resilience—particularly traditional philanthropic organizations."*
>
> **Evelyn Wong (AVPN)**

**These examples illustrate AVPN's model as a climate action platform:** catalytic funding and ecosystem participation build the evidence base and policy bridges needed to scale renewable energy investment and adoption.




Source: Figure drawn from workshop presentation materials

**Figure 29: Three Case Studies of Catalytic Funding Models Using Philanthropic Funding, Blended Private–Philanthropic Capital, and a Dedicated Funding Program**

## Case study 1: Capacity-building for climate-focused civil society organizations (CSOs)

**The number of civil society organizations (CSOs) working on climate change in Asia has grown in recent years.** However, this growth remains uneven across economies. Most organizations lack the resources, networks, and positioning needed to translate technical work into policy or investment outcomes. This challenge is particularly evident in renewable energy, where a significant gap persists between evidence on viable solutions and actual policy uptake or capital deployment.

**AVPN addresses this gap primarily through a pooled donor funding model that provides unrestricted, multi-year grants.** This design is intentional: flexible funding enables grantees to translate research into policy, engage with capital providers, and refine their positioning—activities that are often not supported by project-based funding.

**Several examples illustrate this approach.** The Council on Energy, Environment and Water (CEEW) had strong analytical work on green economy pathways, including renewable energy, but required stronger positioning to reach investment and regulatory audiences. Two years of unrestricted funding enabled targeted engagements and knowledge products that enhanced its impact. Development Alternatives had proven LC3 low-carbon cement technology, but

scaling adoption required engagement with market and policy actors. AVPN's support enabled a pilot with the private sector (JK Lakshmi Group), shifting the initiative from a technical exercise to a commercial adoption strategy. The Indian Institute for Human Settlements (IIHS) used the funding to strengthen research on building energy performance and position its findings to inform urban planning standards.

**Beyond grant making, AVPN also supports ecosystem development through convenings that connect renewable energy and clean energy stakeholders.** Integrated Research and Action for Development (IRADe) organized a workshop on low-carbon captive power options for the aluminium industry, exploring pathways to shift from fossil-based generation to renewable alternatives. The Alliance for an Energy Efficient Economy (AEEE) launched a decarbonizing horticulture cold chain initiative in Bihar, demonstrating e-cart last-mile delivery models and exploring renewable energy-powered cold chain solutions for rural livelihoods. AVPN supported both initiatives by linking them with its broader network of funders and capital providers.

## Case study 2: Facilitating clean growth investment

**Sub-economy climate finance remains overwhelmingly public, placing pressure on limited sub-economy budgets.** There are no well-established models for mobilizing private and philanthropic capital to de-risk distributed renewable energy (RE) and clean growth at the sub-economy level. In addition, rural enterprises and SMEs face limited access to RE financing despite clear economic and environmental benefits.

**AVPN operates through two main channels: institutional partnerships with sub-economies and direct deployment support for distributed RE.** In February 2026, AVPN signed an MoU with the Government of Uttar Pradesh in Singapore, in the presence of Chief Minister Shri Yogi Adityanath, to accelerate climate-aligned investments. The partnership targets USD 325 million in mobilization over five years. Initial focus areas include aggregated rooftop solar in industrial parks (starting with Gautam Buddh Nagar and Ghaziabad), agrivoltaic solutions in polyhouses, solarization of agricultural feeders, and the transition from diesel to solar-powered irrigation systems.

**AVPN deploys philanthropic technical assistance alongside its network of more than 700 members to build investment-ready pipelines and improve transaction readiness.**

- Two AVPN member organizations, PIDG and Kaizenvest, also signed MoUs, signaling early investor alignment.
- At the enterprise level, AVPN supported MP Ensystems in deploying rooftop solar PV for rural enterprises in Maharashtra.
- In Gadchiroli, a 3.5 kW system was installed for a women-led herbal cluster FPO under a 60-month operating lease model, reducing energy costs and improving financial resilience.

- In Sindhudurg, a 35 kW system was installed for the Devgad Alphonso Mango and Multifruit Association, generating over 52,000 kWh annually.
- Across the district, 53 units were surveyed and 35 project design documents developed, representing a 220 kW solar pipeline.

### Case study 3: ASCENT – Accelerating Asia's Energy Transition through Blended Finance

**AVPN launched ASCENT in partnership with BCG, with Cathay Financial Holdings as the anchor sponsor.** Phase 1, completed in 2025, focused on building the foundation by establishing an evidence base for people-centric approaches, curating a solutions repository based on consultations with over 30 stakeholders across governments, financiers, business leaders, and NGOs, and developing an impact measurement framework.

**The framework identifies four key stakeholder groups and outlines specific risks, solutions, and metrics for each:** workers (reskilling and transition readiness), communities (economic diversification and resilience), consumers (affordability and access), and SMEs (capacity building and financing). The BCG–AVPN publication, released in September 2025, presents this framework alongside case studies demonstrating people-centric renewable energy solutions in practice. These include the RISE programme in Singapore, which upskilled 200 learners in green economy skills; solar-powered cold storage on Bungin Island in Indonesia; rural electrification planning in Sabah, Malaysia; and SME capacity building in South Africa.

**Phase 1 has had a two-fold impact.** First, it has strengthened ecosystem engagement, with funders and solution providers aligning on shared measurement standards that support both investor due diligence and social impact assessment. Second, it has generated growing interest from impact investors in concrete investment opportunities in the people-centric energy transition space.

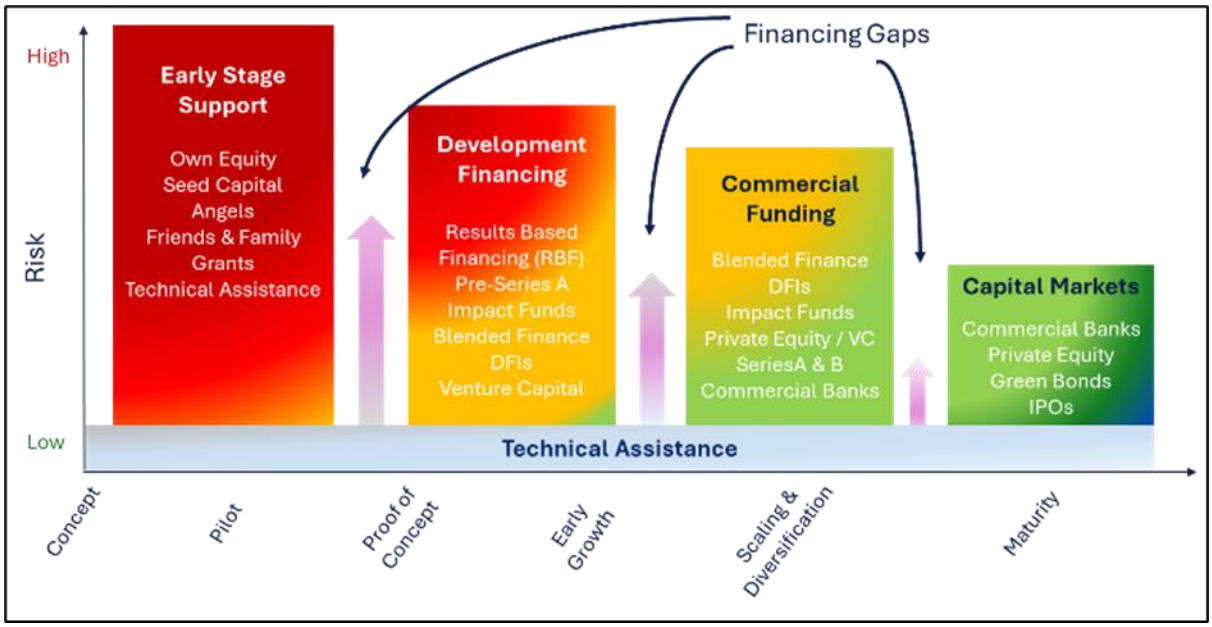
**This investor interest has validated the approach and sets the stage for Phase 2.** Phase 2 will focus on designing financial mechanisms that leverage philanthropic and concessional capital, expanding partnerships with institutional and corporate investors, and launching the ASCENT fund.

## 5.3 Bridging the Financing Gap: What It Really Takes to Get Clean Energy Projects Funded

***By Peter Storey, PFAN (Private Financing Advisory Network)***

**The Private Financing Advisory Network (PFAN) is a global network of finance experts that supports entrepreneurs developing clean energy and climate resilience solutions.** To date, PFAN has mobilized USD 3.6 billion in investment, supported 264 financed projects, and added 1,847 MW of clean energy capacity. As a trusted intermediary, PFAN helps increase financing flows between investors and climate-related businesses by creating investor-ready opportunities, strengthening local financing ecosystems, and accelerating project development and investment.

**Figure 31 illustrates how a project requires different financing mechanisms at different stages.** The result of this reality is that projects may face financing gaps when transitioning from one stage to another.




Source: Figure drawn from workshop presentation materials

**Figure 30: The Project Development and Financing Cycle**

**At the beginning, the risk level is very high; and over time, as the project or business develops, the risk gradually decreases.** Along this process, different types of financing are needed at different stages. However, financing gaps often appear between these stages, and sometimes even within the stages themselves. These gaps make it difficult for developers, programmes, or technology providers to raise the funding they need to move forward. Developers face several challenges. Many may be first-time developers with limited experience.

**Risk levels are especially high in the early stage.** Another persistent challenge, even after more than 20 years of work in this field, is the lack of reliable data. Without reliable data, it is very difficult for investors to price risk. If risk cannot be priced properly, it becomes difficult to estimate expected returns and make informed investment decisions.

**Although investors often have access to significant capital, many are less familiar with renewable energy and low-carbon business models.** Investors want to mobilize their funds, but the main challenge is not only the availability of capital. The key issue is how to move that capital effectively into suitable projects. This requires qualified intermediaries who can bridge technology, commercial viability, and financing. However, there are not enough people with the right expertise to connect these areas and help capital move quickly enough.

**The financing community, which broadly includes commercial banks, development finance institutions, private equity investors, and venture capitalists, is generally conservative.** Investors mainly want to know whether they can recover their investment and generate a return. As a result, they tend to prefer sectors, assets, and business models with clearer and more familiar risk-return profiles.

***KEY MESSAGE: The enabling environment can help bridge the gap between two challenges: limited supply of investor-ready project and slow investment levels.***

**The inefficiency in the project development ecosystem includes issues such as limited coordination, slow decision-making, land rights, logistics, policy, regulation, and the overall efficiency of the value chain.** Another key challenge is the incomplete and inefficient value chain. Many renewable energy technologies, such as solar, biomass, and biogas, are already mature and proven. However, the value chains around these technologies have changed significantly and are often still not deep enough to support efficiency and scale.

> *"One important issue is not only access to land, but land rights. Investors need confidence that the project has clear rights to use the land, and that the land can provide sufficient security for the investment transaction."*
>
> **Peter Storey (PFAN)**

***KEY MESSAGE: An integrated service delivery creates a virtuous model where improvements in one area strengthen the entire ecosystem.***

**In many emerging markets, projects often need to expand horizontally before they can deepen the value chain.** This means solving broader ecosystem issues first, such as community acceptance, land rights, logistics, permitting, and coordination among

stakeholders. These challenges can prevent companies and projects from moving deeper into the value chain, making the overall system less efficient than it needs to be.

**Therefore, focused and sector-oriented technical assistance is needed across three areas: the project, the investor, and the enabling ecosystem.** This support should not only help companies become investment-ready, but also help investors develop pipelines, address post-investment challenges, and manage risks after capital has been deployed. At the ecosystem level, support is needed to strengthen value chains, improve coordination with policymakers and regulators, increase transparency, generate better data, and enable better investment decisions.

**Technical assistance should be tailored to sector-specific barriers, and communities of practice can help address shared challenges across the ecosystem.** First, technical assistance should take a sectoral approach. A one-size-fits-all approach is no longer sufficient. Ten or twenty years ago, many challenges could be addressed broadly as renewable energy issues. Today, each sector (such as solar PV, concentrated solar power, biomass, and biofuels) has its own specific barriers, value chains, market conditions, and investment needs. These need to be understood within each economy and regional context. Second, task groups or communities of practice can be an effective mechanism for identifying and solving ecosystem-level challenges. These groups can bring together government, regulators, civil servants, investors, the private sector, and local communities to address common barriers and improve coordination.

**One inspiring example of the benefits of using an integrated sectoral approach is the off-grid sector in Zambia.** Around ten years ago, the sector was still at a very early stage. Through a task force that brought different stakeholders together, the sector was able to identify and address barriers affecting investment. Over time, this contributed to the growth of a more active off-grid market, with more private players, improved rural energy services, and policy support such as reduced taxes on solar equipment.

**This type of mechanism helps create an integrated ecosystem where problems can be identified, discussed, and solved collectively.** It also supports more focused technical assistance, helping projects become more viable, investable, and scalable.

## 5.4 Fishbowl Discussion on Scaling up Renewable Energy Investment

**The fishbowl discussion began with experience sharing from four economies.** Zhang Shiguo from the People's Republic of China; Fabrizzio Hidalgo Tapriero-Cohen from Peru; Ivan Kalmykov from The Russian Federation; S. Viswanathan from Singapore shared their experiences. Each contributor joined the inner fishbowl discussion and provided initial four-minute reflections and perspectives on the reality of renewable energy investment in their economies.

**While the outer fishbowl discussion in the previous session focused on experience-sharing across economies, this fishbowl was structured around guiding questions.** It brought together diverse perspectives on risk, communication, and implementation to support greater renewable energy investment.




**Active discussion among initial Contributors in the fishbowl session on Scaling up Renewable Energy Finance. Left to right: Hernando Fabrizzio Hidalgo Tapriero-Cohen (Peru); Evelyn Wong (APAC); Edward Douglas (Kairos Renewables); Peter Storey (PFAN), S. Visawanathan (Singapore), Ivan Kalmykov (The Russian Federation), Zhang Shiguo (People's Republic of China)**

### *Sharing Perspectives of Regional and International Scaling the Renewable Energy Deployment*

***By Zhang Shiguo, China New Energy International Alliance/Beijing Bridge New Energy Institute***

***KEY MESSAGE: To scale up renewable energy implementation faster, APEC economies need enabling policies that simplify land access, market permission, grid connection, environmental approval, and foreign investment.***

Scaling up renewable energy investment is widely desired, but difficult to implement in practice. Large renewable energy projects, especially solar and wind, are complex because they require several approvals and enabling conditions to work together, including land access, market permission, grid connection, and environmental approval.

Land access and market permission as especially important, and since large projects require significant land, delays in land approval or market access can slow development. Grid connection and environmental approval are also critical, as projects cannot proceed without connection rights and regulatory compliance. The speaker notes that many economies spend too much time planning and discussing, but do not move quickly enough into action.

Another key challenge is access to capital. Major renewable energy markets, such as China; Japan; the United States; and Europe, have strong capital bases. Other economies need access to global and foreign capital to scale renewable energy investment. However, restrictive foreign investment policies can limit project development and cause economies to miss opportunities.

> *"Timing is important: if economies delay too long, they may miss the chance to develop renewable energy at scale."*
>
> **Zhang Shiguo (People's Republic of China)**

APEC economies should make renewable energy investment more welcoming to investors (including foreign investors). Experience shows that economies with more open investment frameworks are likely to scale deployment faster. This requires simplifying renewable energy policies, improving transparency, and making regulations easier for companies to navigate. Reducing unnecessary restrictions, including supply chain constraints, can further accelerate the pace of deployment.

### Sharing Experience about Green Hydrogen in Peru

***By Fabrizzio Hidalgo Tapriero-Cohen, Ministry of Foreign Affairs of Peru.***

***KEY MESSAGE: The Horizonte de Verano hydrogen plan in Peru demonstrates that moving from policy to implementation requires holistic enabling conditions, including financing, institutional coordination, and technical guidance.***

In Peru, the main hydrogen plan mentioned is the Horizonte de Verano, or Summer Horizon, project in southern Peru. The project aims to produce green hydrogen and ammonia by combining large-scale solar generation, electrolysis, desalination, and export infrastructure. It

received environmental approval from the Ministry of Production in March 2025, demonstrating progress while also highlighting the need for coordination across multiple authorities and technical areas.

Several challenges for green hydrogen development in Peru. Financing remains difficult, particularly for first-of-a-kind projects that are still considered risky by investors. Infrastructure costs are also high, especially when projects require additional components such as desalination facilities and export infrastructure. A structured and coordinated environmental evaluation process can help reduce uncertainty and provide greater clarity for investors.

To achieve Peru's hydrogen plan, the APEC policy guidance on clean and low-carbon hydrogen policy frameworks, adopted in 2024, is useful because it identifies concrete areas that need to be addressed together, including finance, investment, risk reduction, financing schemes, and coordination. In parallel, Peru is working on broader enabling conditions, including long-term energy planning toward 2050, energy efficiency measures to reduce system pressure, and renewable energy deployment strategies that consider territorial and environmental factors. Together, these efforts can improve predictability for investment decisions.

In addition, green hydrogen projects depend on several systems working together. Renewable energy supply, infrastructure, industrial demand, and regulatory processes all need to be aligned. Coordination across sectors such as energy, industry, environment, and regulation can take time and effort. Technical standards and common reference points are also becoming increasingly important, and Peru is working through coordination mechanisms linked to international standardization processes, including the International Organization for Standardization (ISO) technical committees.

### *Sharing Progress of Renewable Investment in The Russian Federation*

***By Ivan Kalmykov, Russia Renewable Energy Development Association (RREDA)***

***KEY MESSAGE: Russia's renewable energy sector has been largely government-supported. Attracting more private investment will require a structured, transparent, and predictable policy and market framework.***

Russia's renewable energy investment framework is strongly government-led, with limited private-sector interest to date**.** The main support mechanism is the Capacity Supply Agreement Support Program, known in Russia as DPM, which was launched in 2013. Its first phase aimed to build the renewable energy sector from the ground up by providing long-term capacity payments and ensuring returns on investment. This supported the deployment of wind and solar capacity and helped establish a functioning renewable energy market and supply chain. The second phase has shifted the focus toward efficiency, technological

development, and stronger competition. It includes strict localization requirements, KPI-based project selection, and clearer obligations for investors, while continuing to provide predictable long-term revenue streams. The programme can therefore be seen not only as a support scheme, but also as a platform for strategic partnerships, particularly in manufacturing and localization.

### *Sharing Progress of Green Electricity Plan in Singapore*

***By S. Viswanathan, National University of Singapore***

**KEY MESSAGE: Singapore has explored renewable electricity from international peers to compensate their limited renewable power resources and plan to back up their high VRE power system by the battery integration.**

Singapore has limited renewable energy resources, so cross-border renewable electricity trade has become an important strategy**.** Around four years ago, Singapore faced difficulties securing renewable energy import agreements with ASEAN economies. However, progress has been made, and Singapore now has around 8.35 GW of renewable energy import deals signed. It remains uncertain how many of these projects will eventually be implemented, but the most promising option appears to be electricity imports from Batam, Indonesia, which is only about 100 km from Singapore. Singapore has also signed deals with economies including Australia; Cambodia; and Viet Nam, and is exploring long-distance imports through undersea cables from Darwin, where renewable energy potential is higher than in many parts of Southeast Asia.

Singapore's approach focuses not only on importing renewable electricity, but also on ensuring reliable supply. For solar-based imports, Singapore requires battery storage at the exporting end. This allows renewable electricity to be supplied more like baseload power and helps ensure that expensive undersea cables are used efficiently throughout the day.

The renewable electricity imports can still make commercial sense, even when battery storage and undersea cable costs are included**.** Even imports from Cambodia, around 1,000 km away, could be commercially reasonable by around 2035 compared with Singapore's wholesale and retail electricity tariffs. However, grid-related costs may be much higher. Battery cost assumptions are also critical. Some project developers currently assume only a two-year battery life, which makes costs very expensive, while the literature suggests battery life could

> *"Although some people criticize this approach (importing renewable power though subsea cables and utilizing battery), research shows that utilizing battery storage makes sense, especially because undersea cables are costly and need high utilization to be commercially viable."*
>
> **S. Viswanathan (Singapore)**

reach around 15 years by 2035. Therefore, better battery management and longer battery lifetimes will be important for reducing costs.

### *Outer Circle Discussion: Sharing Experiences from Participants*

**Importance of balancing expansion with public support and the issue of land use.**

Questions raised by contributors from Papua New Guinea and Chinese Taipei included the following:

- How can policymakers balance the need to scale up renewable energy capacity with the challenge of gaining public support for higher investment costs?
- When limited land availability conflicts with renewable energy scale-up, how should policymakers and developers approach this challenge?

Below are some of the ideas and perspectives shared in response to these questions.

Policy can bridge the gap between early-stage clean technologies and wider market adoption. When technologies are not yet commercially viable, supportive policies and incentives can create market opportunities and attract investment, as seen in India's electric mobility sector.

Early-stage investment often comes from impact investors, while commercial investors usually wait for more mature technologies or business models. However, impact investors typically focus on pilot-stage projects, creating a "missing middle" where projects are too large for philanthropy but not yet attractive enough for commercial investors. Blended finance can help address this gap (missing middle) by using concessional capital to reduce risk and attract private capital, although it remains difficult to implement in practice.

**Evelyn Wong (AVPN)**

Concerns that renewable energy increases electricity costs or creates major land-use problems are often misunderstood. In the UK, rising electricity prices were largely driven by LNG prices, not renewables. Once this was understood, public sentiment toward renewables improved. Social acceptance can also increase when communities see local benefits, such as jobs, local payments, and CSR contributions. Scotland's experience with wind power shows that initial concerns about tourism and landscape impacts can be reduced when economic benefits are clear.

Land use is also not always a fundamental barrier. Renewable energy requires a relatively small share of total land, and wind projects can often be located on less productive land, such as ridges.

**Edward Douglas (Kairos Renewables)**

The government plays an important role in supporting renewable energy projects that are not commercially bankable, especially in remote rural areas. In Thailand, small hydropower projects, such as micro-dams, may not attract commercial financing due to their small scale, remote locations, and limited returns.

To address this gap, the government provides budget support, hires technical consultants, and helps rural communities develop small hydropower systems for local electricity generation.

**Contributor from Thailand**

In Russia, ESCOs support small and medium-sized energy projects in isolated, extremely cold areas that are not connected to centralized power supply. These communities often rely on expensive diesel power generation. Under contract with the power supply company, an ESCO installs solar power, battery storage, and modernizes diesel generation. The project pays for itself through savings from reduced diesel fuel consumption.

However, these projects still face financial challenges, including high capital costs, high interest rates, and long payback periods. To improve project economics without subsidies, integrated pilot projects are being considered. These combine solar generation with diesel modernization, heat recovery, consumer-side energy efficiency, building renovation, and lighting replacement. By reducing energy demand and improving system efficiency, these measures can reduce the required capacity of new generation equipment and lower overall project costs.

**Contributor from The Russian Federation**

Rural electrification investment in Fiji focuses on off-grid island communities where commercial investment alone is not viable. Through the Fiji Rural Electrification Fund, upfront public subsidies support the development of remote solar mini-grids.

The model is designed to ensure long-term sustainability after the initial subsidy. Once the asset is built, it is owned and operated on a commercial basis through a partnership between the private sector, the fund, and the local community. Each community has a stake in the project, which helps support long-term operation over a 10- to 15-year period without further subsidy.

Although island tariffs may be higher than those on Fiji's main island, solar mini-grids with battery backup can provide more reliable, near 24/7 electricity at a lower cost than diesel-based power.

**Peter Storey (PFAN)**

**Importance of effective communication.** This conversation moved on to discuss whether the challenges are caused solely by policy barriers, as well as the importance of clear communication. Experts and contributors from Thailand highlighted that effective communication is a key factor in scaling up renewable energy.

Communication is one of the key challenges. Better communication is needed to explain the real costs, savings, and benefits of renewable energy. Many renewable energy and clean technology options are already economically attractive, but this is not always clearly communicated to consumers, policymakers, or investors.

For example, solar and other renewable energy resources are now competitive in terms of levelized cost of energy in many regions. Solar home systems and mini-grids can also be more cost-effective in off-grid areas, where existing electricity costs are often very high.

The misunderstanding often comes from focusing too much on upfront costs rather than long-term savings and broader economic benefits. To address this, financing structures and business models need to be redesigned so that people can access clean technologies more easily and benefit from different cash-flow patterns.

**Peter Storey (PFAN)**

Strong communication is essential when energy transition projects directly affect communities and workers. For example, Coal phase-out also requires strong communication. Phasing down or closing coal-fired power plants can affect mining workers and surrounding communities. Therefore, civil society engagement and careful communication are needed to manage social impacts.

**MK Balaji (ACE Partners)**

Misconception is a key barrier to renewable energy scale-up. In Viet Nam, a large developer planned to move away from LNG due to high fuel prices but also claimed that replacing 4 GW of LNG with 4 GW of renewables would require very high investment costs.

This framing focuses only on upfront investment costs and overlooks the levelized cost of electricity. When the full cost of electricity over time is considered, renewables could be cheaper than LNG, even with battery energy storage included. Emphasizing only the high upfront investment costs of renewable energy can create misconceptions among policymakers and the public.

Land constraints can become a real issue in some locations, especially if large amounts of solar are concentrated in one province. However, most places have not yet reached that point.

**Ananth Chikkatur (XanhTerra)**

**Discussion on investment risks and how they are managed.** The discussion moved on to private investment, which was recognized as having strong potential to fill financing gaps and help renewable energy projects reach a more mature stage. However, investment remains limited due to perceived risks, which raised the following questions from contributors:

- How do investors assess renewable energy investments from a risk mitigation perspective, rather than only from a financial return or payback perspective?
- How do investors, governments, and other stakeholders value the risk-reduction benefits of renewable energy investments?

**Southeast Asia is highly exposed to LNG and oil price volatility because much of its LNG is purchased on the spot market rather than through long-term contracts.** Oil is also largely spot-priced, creating further exposure to sudden price increases. This creates significant risk when global fuel prices spike, as seen during the early phase of the Ukraine war and recent geopolitical tensions.

**From a risk mitigation perspective, energy security is one of the strongest arguments for renewable energy deployment.** Renewable energy can reduce dependence on imported fossil fuels and limit exposure to volatile LNG and oil prices. Therefore, its value should not be assessed only against current fossil fuel prices, but also against the avoided costs of future fuel price spikes and the benefits of reducing import dependence.

**However, governments have not been very effective at pricing the long-term risks of oil and gas price volatility.** Economies such as Japan; Republic of Korea; Chinese Taipei; Thailand and other more developed Southeast Asian economies face high imported fuel bills, estimated at around 5% of GDP in some cases. As prices rise, this becomes not only an energy issue, but also an economic and political concern. Governments should therefore shift attention from paying high and volatile fossil fuel import bills toward investing in domestic renewable energy infrastructure.

**At the same time, investors must account for government policy risk.** This creates a circular challenge: governments want more private investment, but investors need clear and stable policies before committing capital.

**From an investor perspective, many renewable energy investors in Southeast Asia appear comfortable with around a 15% equity internal rate of return (IRR) over the project life.** Governments could help attract investment by structuring renewable energy contracts, such as direct PPAs, as contracts for difference. This would allow investors to benefit from price upside while helping manage exposure to market price volatility.

**Edward Douglas (Kairos Renewables)**

**Market conditions may accelerate renewable energy adoption faster than policy.** A Californian fund manager with solar investment experience in the United States and Asia noted that policy is currently lagging market realities.

**High gas and oil prices are becoming increasingly difficult for ordinary consumers to afford.** If prices remain high, households and businesses are likely to seek their own solutions, such as rooftop solar, to reduce energy costs. The example of Pakistan shows that when electricity or fuel costs become too expensive, consumers may invest directly in renewable energy systems rather than waiting for policy support.

**Peter Storey (PFAN)**

**Renewable energy should be framed as an energy security issue.** Imported fuels can be disrupted, even when contracts are in place, because physical supply may still be unavailable. In contrast, domestic solar and wind resources cannot be taken away; the sun and wind will remain available. This makes renewable energy important for reducing import dependence and improving energy independence, with climate benefits as an additional co-benefit.

**Faster implementation is also needed.** Some economies are trying to build domestic solar manufacturing capacity, but this takes time and money. Pakistan shows that rapid solar deployment can happen when consumers seek their own solutions to high energy costs. Viet Nam also shows how deployment can exceed official plans, with solar capacity growing far beyond the initial target.

**Policy still plays an important role.** While market-driven deployment can accelerate progress, better planning is needed to manage volatility and guide investment. Integrated resource and resilience planning can help governments account for fuel price risks, energy security, and the value of domestic renewable resources.

**Ananth Chikkatur (XanhTerra)**

# 6 Session 4: World Café Discussion

**The World Café was designed as an interactive discussion format to encourage active participation, peer learning, and practical reflection among experts and participants.** The discussion was organized into three rounds of 15 minutes each, with experts facilitating discussions at six thematic tables illustrating in Figure 32 on the following topics:

- **Ananth Chikkatur:** What actions should regulators prioritize to translate policy ambition into bankable and scalable renewable energy projects?
- **Jennifer Leisch:** How can policy and regulatory design accelerate the scaling of renewable energy deployment?
- **Dimitri Pescia:** How can renewable energy policy frameworks help economies better identify barriers and opportunities for scaling solar and wind deployment?
- **Peter Storey:** What it takes to get projects financed: understanding the project development and financing cycle
- **Edward Douglas:** The importance of systems thinking and the strong investment case for renewable energy
- **Evelyn Wong:** How can networks be better leveraged to scale clean energy investment across APEC economies?

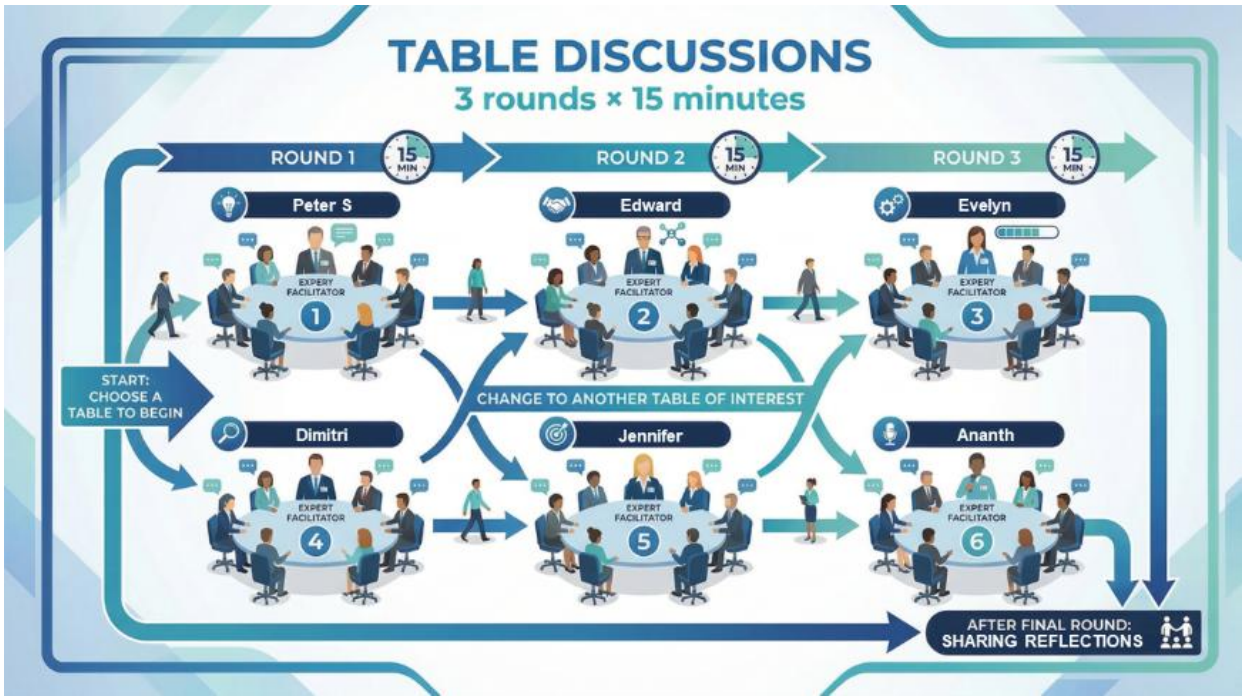



**Figure 31: World Café Discussion Seating Arrangement.**

Note: The format consisted of three discussion rounds of 15 minutes each, allowing participants to engage with experts, ask questions, and explore topics relevant to their future implementation

**During each round, participants had the opportunity to engage directly with experts, ask questions, exchange experiences, and explore how the workshop content could be applied in their own economies or institutional contexts.** At the end of the session, participants were invited to share consolidated reflections and key takeaways from the discussions. This helped identify common lessons, implementation priorities, and areas where further support or collaboration may be needed.

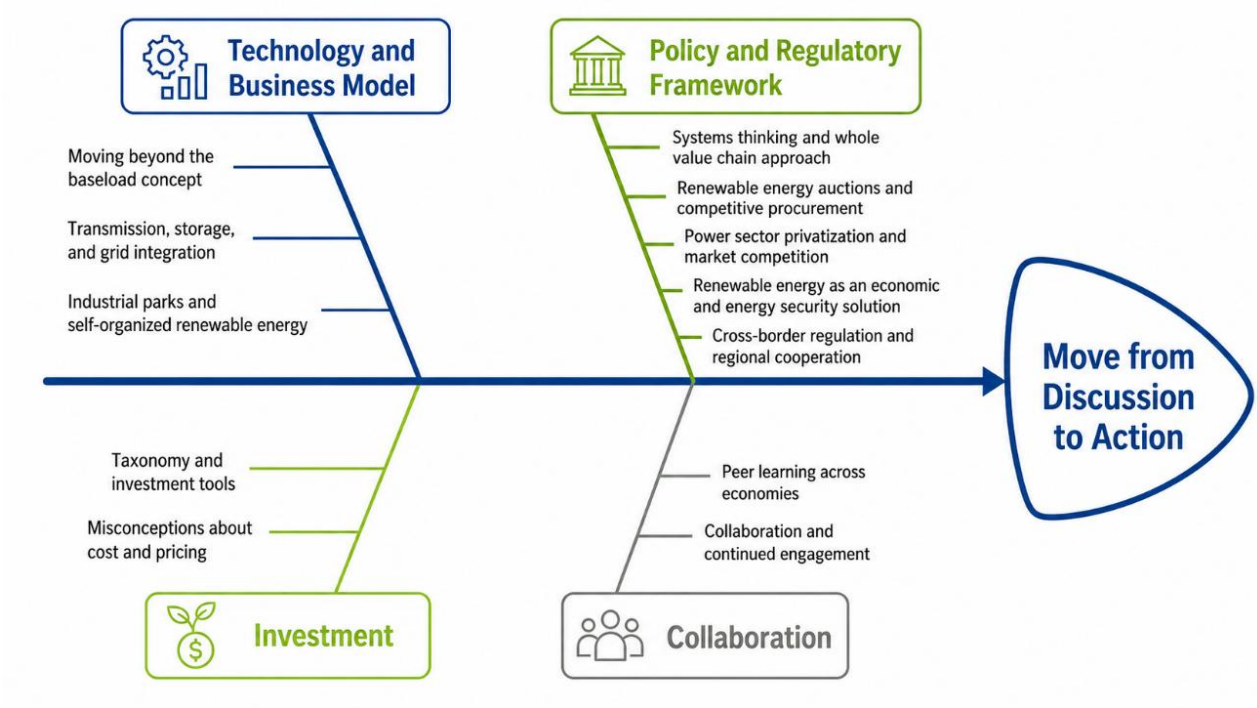



**Figure 32: Fishbone Diagram of Key Participant Takeaways from the Workshop**

**Reflections from participants highlighted that achieving renewable energy goals requires more than policy and investment frameworks alone.** It also depends on appropriate technologies, innovative business models, effective investment tools, clear communication, and continued collaboration across economies. Key takeaways from the reflection session are summarized below:

## Technology and business models

- **Moving beyond the baseload concept:** The traditional baseload model is becoming less relevant as energy systems shift toward higher shares of

variable renewable energy. Energy security increasingly depends on flexible systems that can integrate wind and solar with sufficient transmission and storage capacity.

- **Transmission, storage, and grid integration:** Additional transmission and storage capacity are essential for integrating renewable energy at scale. Grid connection constraints remain a key barrier to renewable energy project development.
- **Industrial parks and self-organized renewable energy:** Industrial parks can organize their own renewable power supply, including through rooftop solar PV. This model can help scale renewable electricity use, particularly where industrial demand is concentrated.

## Investment and communication

- **Taxonomy and investment tools:** Clear taxonomies and investment tools can help guide renewable energy investment, particularly in relation to cross-border regulation and investment facilitation.
- **Misconceptions about cost and pricing:** Addressing misconceptions about renewable energy costs and pricing can strengthen the investment case for renewable energy and support more informed decision-making.

## Policy and regulatory frameworks

- **Systems thinking and whole value chain approach:** Scaling renewable energy requires a whole-system perspective, including policy, workforce, financing, value chains, grid infrastructure, and implementation capacity.
- **Renewable energy as an economic and energy security solution:** Renewable energy is not only a climate solution. It can also provide cost-competitive electricity, improve access for remote communities, and strengthen energy security against supply shortages and volatile fossil fuel prices.
- **Cross-border regulation and regional cooperation:** Cross-border regulation and regional cooperation are important for supporting renewable energy investment, particularly across ASEAN and broader APEC economies.
- **Renewable energy auctions and competitive procurement:** Open bidding and competitive auctions, as demonstrated in the Philippines, can support renewable energy development, encourage competition, and improve market confidence.
- **Power sector privatization and market competition:** The Philippines' experience suggests that power sector privatization, despite initial public

hesitation, has contributed to a more competitive electricity market and supported renewable energy procurement.

### Collaboration and continued engagement

- **Peer learning across economies:** Participants valued the opportunity to learn from different economies, compare challenges, and identify practical lessons that could be adapted to their own contexts.
- **Collaboration and continued engagement:** Continued communication and collaboration are important for exchanging updates, sharing challenges, and sustaining momentum beyond the workshop.

## 7 Conclusions, Recommendations, and Next Steps

**The workshop discussions highlighted that, while APEC economies have made important progress in renewable energy development, much stronger implementation is needed.** This can be achieved by translating policy ambition into bankable, scalable, and reliable deployment. Across the sessions, participants and experts emphasized that the main barriers are no longer primarily technology cost, but policy design, permitting, grid readiness, financing, institutional capacity, and coordination across stakeholders.

**APEC economies should strengthen renewable energy policy frameworks by moving beyond targets and focusing on implementation.** Clear and stable policies, transparent procurement mechanisms, streamlined permitting processes, and predictable tariff and market rules are needed to reduce uncertainty for investors and developers. Policy frameworks should also be designed around bankability, including revenue certainty, credible pricing, grid access, lender protections, and appropriate contract structures such as corporate PPAs, direct PPAs, auctions, and contracts for difference where suitable.

**Effective communication is also essential: misconceptions about upfront costs often obscure the long-term savings and energy security benefits of renewable energy,** it is important to develop strategies and plans to address these misconceptions, in order to gain public and policy support.

**APEC economies should prioritize grid planning, transmission development, storage, and system flexibility to support higher shares of variable renewable energy.** Renewable energy zones, proactive transmission planning, improved forecasting, grid modernization, and clear connection procedures can help address the mismatch between renewable generation timelines and transmission development. These measures are especially important where renewable resources are located far from demand centers or where curtailment and congestion reduce project viability.

**APEC economies should improve land use, spatial planning, and permitting coordination for renewable energy projects.** Offshore wind, solar, and other large-scale renewable energy projects can face land and marine space constraints, competing resource uses, and environmental approval requirements, though the extent of these constraints varies significantly across economies and technology types. Integrated spatial planning, one-stop-shop permitting systems, clearer land rights, and early stakeholder engagement can help reduce delays, lower development risks, and improve public acceptance.

**APEC economies should frame renewable energy as a driver of energy security and economic resilience—not just as a response to climate change.** Imported fossil fuels expose economies to price volatility, supply disruption, and rising import bills. Greater investment in domestic renewable energy, storage, and grid infrastructure can reduce exposure to fuel price shocks, improve energy independence, and strengthen long-term economic stability.

**APEC economies should strengthen financing ecosystems and develop more investor-ready project pipelines.** This requires better data, stronger project preparation, clearer risk allocation, and more effective use of development finance, concessional capital, guarantees, blended finance, and technical assistance. Particular attention should be given to the "missing middle"—projects too large for philanthropy but not yet sufficiently mature to attract commercial investors—where blended finance using concessional capital can play a critical de-risking role. Support should address the needs of developers, investors, and the wider enabling ecosystem, including value chains, permitting, land rights, regulation, and post-investment risk management.

**Technical assistance should be more sector-specific and practical.** Different technologies and market segments—such as solar PV, offshore wind, biomass, green hydrogen, mini-grids, and biofuels—face different barriers and require tailored support. Communities of practice or task groups can help bring together government, regulators, utilities, investors, developers, and local communities to identify shared barriers and develop practical solutions.

**APEC economies should also strengthen demand-side drivers for renewable energy deployment.** Corporate PPAs, direct PPAs, industrial park aggregation, green tariffs, and 24/7 carbon-free electricity models can help mobilize private demand and create bankable scale. These are evolving mechanisms that carry implementation challenges of their own, including price volatility risk, interconnection delays, contract complexity, and the need for firming or storage solutions. These approaches should therefore be supported by clear rules on wheeling charges, renewable energy certificates or energy attribute certificates, contract terms, storage, and firming requirements, and should be designed with these challenges in mind.

**Finally, APEC should continue supporting peer learning among member economies.** The workshop showed that economies face different levels of readiness, but many implementation challenges are shared. Continued exchange among policymakers, regulators, developers, investors, utilities, and system operators can help accelerate renewable energy deployment, improve policy design, and support more effective implementation across APEC economies.

**For future APEC-supported workshops on new and renewable energy, it is important to continue practical, implementation-focused exchanges that go beyond high-level policy discussions.**

- **Future workshops should incorporate more case-based learning**, including detailed project examples, lessons from both successful and unsuccessful initiatives, and step-by-step insights on policy design, financing structures, and delivery mechanisms.
- **Greater participation from developers, utilities, investors, and system operators is recommended** to complement policy perspectives with on-the-ground experience.
- **Interactive formats such as fishbowl discussions and World Café sessions should be maintained and further strengthened**, with the aim to encourage peer-to-peer learning and problem-solving.
- **In addition, future workshops may consider dedicating focused sessions to specific themes**, such as grid integration, financing instruments, permitting, and off-grid solutions, tailored to the varying levels of readiness across APEC economies.
- Strengthening follow-up mechanisms, including knowledge products and continued engagement among participants, can also help ensure that workshop outcomes translate into sustained capacity building and implementation progress.

## Appendix 1: Pre-Workshop Survey

| Economy | Renewable energy targets / current status | Key technologies | Key policies and mechanisms | Main challenges | Priority actions |
|---|---|---|---|---|---|
| **Republic of Korea** | Korea targets 121.9 GW of renewable energy installations and 205.7 TWh of renewable electricity generation by 2038. Current renewable electricity generation was reported at around 10.5%. Another response reported a 78 GW renewable capacity target by 2030. | Utility-scale solar, onshore wind, offshore wind, and stand-alone battery energy storage. | The 11th Basic Plan for Electricity Supply and Demand, Renewable Portfolio Standard, Clean Hydrogen Power Bidding Market, and government-led offshore wind auction system. Financing includes public budget support, green bonds, sustainability-linked bonds, and concessional finance. | Technical constraints, grid congestion, and market coordination are key challenges. Offshore wind permitting and social acceptance are also important. | Expand HVDC transmission and utility-scale energy storage, streamline offshore wind deployment, and establish or expand clean energy bidding markets for hydrogen, ammonia, and other carbon-free technologies. |
| **Malaysia** | Malaysia targets 35% renewable energy installed capacity by 2030 under the National Energy Transition Roadmap. No electricity generation or grid mix target was reported. | Utility-scale solar, floating solar, rooftop solar PV, and hydropower. | National Energy Transition Roadmap, supported by legislative frameworks, market-based mechanisms, financial incentives, and targeted programmes. Financing includes fiscal incentives, green and sustainability-linked bonds, and commercial debt. | Policy and regulatory challenges and market coordination are highly relevant. Technical constraints are less severe but still present. | Accelerate grid expansion and flexibility infrastructure, expand market mechanisms to mobilize private investment, and strengthen financing mechanisms for clean energy infrastructure. |
| **Papua New Guinea** | PNG has renewable-based electrification goals, including 70% household electricity access by 2030 and a 100% renewable electricity grid by 2050. Reported current renewable energy share ranges from 30–60%, depending on the response. | Hydropower, utility solar, rooftop solar PV, geothermal. Hydrogen has also been explored. | National Energy Policy 2017–2027, renewable energy subsector policies, off-grid regulation, National Energy Authority Act, NEROP, and NEA Corporate Plan 2023–2027. Financing relies on concessional finance, public grants, fiscal incentives, climate finance, and blended finance. | Financial and investment barriers, technical constraints, market coordination, and regulatory readiness are key challenges. | Create a more attractive environment for private investment, strengthen renewable energy regulation, expand off-grid and mini-grid systems, and build domestic technical and human resource capacity. |

| Economy | Renewable energy targets / current status | Key technologies | Key policies and mechanisms | Main challenges | Priority actions |
|---|---|---|---|---|---|
| **Peru** | Peru targets 20% of electricity generation from non-conventional renewable energy, mainly wind and solar, by 2030. It also targets 43–81% renewable energy in the energy matrix by 2050. Current renewable share was reported at around 50% when hydropower is included. | Utility-scale solar, onshore wind, and hydropower. Green hydrogen is also emerging, supported by the Green Hydrogen Promotion Law. | National Energy Policy 2010–2040, renewable energy auctions, Green Hydrogen Promotion Law, and BESS and grid flexibility regulations. Financing includes fiscal incentives, green bonds, sustainability-linked bonds, and concessional finance. | Technical constraints and policy challenges are most relevant, especially transmission expansion and market modernization. | Modernize the electricity market through hourly block bidding, expand high-voltage transmission infrastructure, and implement the Green Hydrogen Promotion Law. |
| **The Russian Federation** | Russia does not have a formal economy-wide renewable share target for installed capacity or electricity generation. Renewable deployment is guided through capacity-based support mechanisms, with non-hydro renewable capacity expected to reach around 12–15 GW by the mid-2030s. Renewable energy accounts for around 18–20% of total energy production when large hydropower is included, while non-hydro renewables account for around 1–2% of electricity generation. | Utility-scale solar, onshore wind, hydropower, and early-stage BESS deployment. | Energy Strategy to 2035, Unified Energy System development programme, and Capacity Supply Agreement mechanism for renewable energy. Support includes long-term capacity payments, competitive selection procedures, localization requirements, public budget support, commercial debt, and strategic equity investment. | Market coordination and financial barriers are highly relevant. Grid modernization, flexibility, investment certainty, and international cooperation are also important. | Improve long-term policy visibility, expand support mechanisms, develop grid and storage infrastructure, facilitate access to finance, and support technology transfer and localization. |

| Economy | Renewable energy targets / current status | Key technologies | Key policies and mechanisms | Main challenges | Priority actions |
|---|---|---|---|---|---|
| **Singapore** | Singapore targets 3 GWp of solar by 2030 and aims to import up to 6 GW of low-carbon electricity by 2035, equal to around 30% of electricity demand. Current renewable energy share was reported at 2.58% in 2025. | Rooftop solar PV, utility-scale solar, floating solar, and stand-alone battery energy storage. | Singapore Green Plan 2030, EMA strategies, RIE 2030, whole-of-government solar deployment, grants for energy innovation, and bilateral or multilateral agreements for renewable electricity imports. Financing includes public grants, blended finance, and international climate finance. | Technical constraints and market coordination are the most relevant barriers. Domestic renewable resource limitations are also a key structural challenge. | Increase regional renewable electricity imports through the ASEAN Power Grid and bilateral agreements, expand solar deployment, and continue research on hydrogen, geothermal, CCUS, SMRs, and storage. |
| **Thailand** | Thailand's draft PDP 2024–2037 targets 51% renewable energy in the power generation mix by 2037. Current total renewable energy consumption was reported at 15.4%. | Utility-scale solar, floating solar, biomass, and onshore wind. Thailand is also studying small modular reactors. | Key measures include feed-in tariffs, EV incentives under the 30@30 policy, and corporate PPAs. Financing includes fiscal incentives, public budget support, and commercial debt. | Policy and regulatory challenges, market coordination, technical constraints, and financial barriers are all highly relevant. | Implement the draft revised PDP 2024, upgrade grid infrastructure for flexibility, scale up battery energy storage systems, and streamline rooftop solar regulations. |
| **Viet Nam** | Viet Nam's revised PDP8 includes major 2030 capacity targets for solar, wind, biomass, waste-to-energy, hydropower, pumped storage, and battery storage. Renewable generation was reported at 12.1% excluding hydropower and 44.7% including hydropower in 2025. | Solar and BESS hybrid systems, stand-alone BESS, and pumped hydro storage. | PDP8, Decree 57, Decree 58, DPPA framework, grid-connected BESS pricing framework, and two-component tariffs. Financing includes public budget support, fiscal incentives, and international climate finance. | Financial and investment barriers and market coordination are the most important challenges. Market reform and utility structure remain key issues. | Update Decrees 57 and 58, strengthen the independence of EVN power corporations, and complete Viet Nam Wholesale Electricity Market reforms. |

## Appendix 2: Presentation Materials

The presentation materials are available below.

### Scene Setter

- Setting the Scene Presentations (by Daniel Burlutsky and Peter DuPont)

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# APEC Capacity Building Workshop for New and Renewable Energy Policy – Setting the scene

**31 March 2026 , Bangkok, Thailand**

Daniel BURLUTSKY, Researcher,
APERC



## Table of contents

- APEC renewables goals in focus
- Progress towards these goals
- Opportunities for green energy
- Challenges faced by APEC economies
- Conclusion

## The policy background – the goals in focus

- **Doubling the share of renewable energy in the APEC energy mix, including in power generation, by 2030 relative to 2010 levels**
  - **Beijing Declaration** at the EMM 11 held in Sep 2014 in People's Republic of China.
- **Tripling renewable capacity globally by 2030 (target 11 000 GW)**
  - Announced at COP28 UAE in 2023. Presumably 2023 is the starting point.
  - APEC leaders support this goal under the APEC Leader's Golden Gate Declaration:

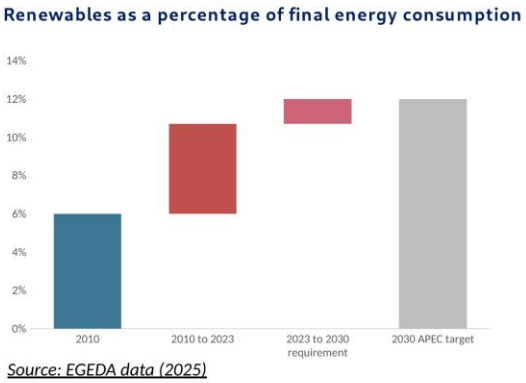
*We will pursue and encourage efforts to triple renewable energy capacity globally through existing targets and policies as well as demonstrate similar ambition with respect to other zero and low emissions technologies including abatement and removal technologies in line with domestic circumstances by 2030.*

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## Progress made on doubling the renewable energy mix

- Strong progress has been made by APEC economies towards doubling the share of renewables in their energy mix.
- Latest EGEDA data is from 2023, so it is entirely possible the target has already been met.
- Growth in renewables being driven by ambitious net zero targets adopted by most APEC economies and decarbonisation of power sectors.




Source: EGEDA data (2025)

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## Most APEC economies have adopted ambitious decarbonization targets

| Economy | Reduction target |
|---|---|
| **Australia** | Reduce GHG emissions by 43% below 2005 levels by 2030 and a 62-70% reduction by 2035 below 2005 levels. |
| **Brunei Darussalam** | Reduce GHG emissions by 20% below BAU levels by 2035. |
| **Canada** | Reduce GHG emissions by 40 – 45% below 2005 levels by 2030 and 45–50% below 2005 levels by 2035. |
| **Chile** | GHG emissions level of 90 million tonnes $CO_2e$ by 2035. |
| **People's Republic of China** | Peak $CO_2$ emissions before 2030.<br>7% to 10% reduction in total greenhouse gas emissions from their peak by 2035. |
| **Hong Kong, China** | Reduce carbon emissions by 50% before 2035 compared with 2005 levels. |
| **Indonesia** | GHG emissions peak by 2030 and then decline to 1.26 and 1.49 gigatonnes of carbon dioxide equivalent ($GtCO_2e$) by 2035 under two economic growth scenarios. |
| **Japan** | Reduce GHG emissions by 46% by 2030 relative to 2013 levels.<br>Increase efforts to further reduce emissions by 60% below 2013 by FY 2035 and 73% by FY 2040. |
| **Korea** | Reduce GHG emissions by 53% to 61% by 2035 from 2018 levels. |
| **Malaysia** | Reduce GHG emissions by 15–30 million tonnes of equivalent $CO_2e$ by 2035 compared to peak levels. |
| **Mexico** | Reduce GHG emissions by 35% by 2030 compared with the 2013 BAU baseline. Reducing GHG emissions to a range between 364 to 404 MtCO2e by 2035 for total economy wide emissions. |

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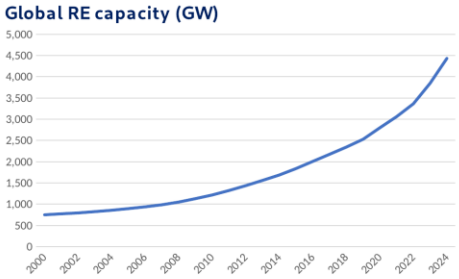
## Most APEC economies have adopted ambitious decarbonization targets

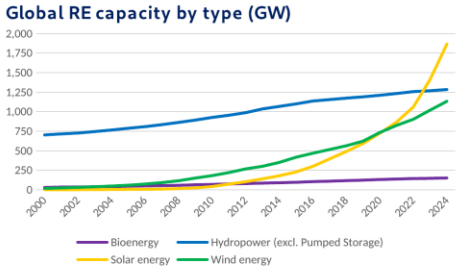
| Economy | Reduction target |
|---|---|
| **New Zealand** | Reduce net GHG emissions to 51-55% below gross 2005 levels by 2035. |
| **Papua New Guinea** | Carbon neutrality within its energy industries sub-sector by 2030. |
| **Peru** | Caping GHG emissions at 179 million tons $CO_2e$ by 2035 and achieving carbon neutrality by 2050. |
| **The Philippines** | Reduce GHG emissions by 75% relative to BAU levels by 2030 (2.71% unconditional and 72.29% conditional). |
| **The Russian Federation** | Limit GHG emissions to 65-67% of the 1990 level by 2035 (including forestry, LULUCF). |
| **Singapore** | Reduce GHG emissions to around 45 - 50 MtCO2e by 2035. |
| **Chinese Taipei** | Reduce net GHG emissions by 28% (+/- 2%) below 2005 levels by 2030. |
| **Thailand** | Reduce net GHG emissions by 47% below 2019 levels by 2035. |
| **United States** | Not currently a Party to the Paris Agreement; previous NDC was to reduce economy-wide net GHG emissions by 50–52% below 2005 levels by 2030. |
| **Viet Nam** | Reduce GHG emissions by 15.8% relative to BAU levels by 2030.<br>Further reduce by up to 43.5%, subject to international support. |

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## Progress made on tripling renewable capacity - Global

- Total renewable energy capacity in 2023 was 3,870 GW.
- By 2024 it was 4,448 GW, a 15% annual increase.
- To reach 11,000 GW, the world will need to maintain a 16% growth rate.
- Strong growth in solar adoption brought on by decreases in module costs, policy support and ease of implementation.



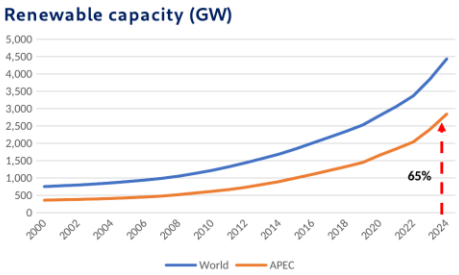



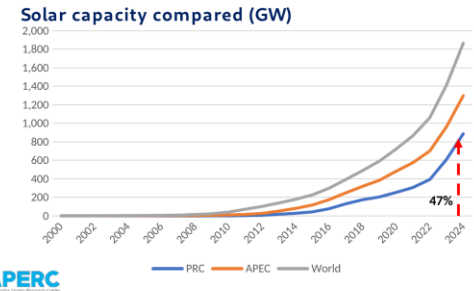

Source: Renewable Capacity Statistics 2025

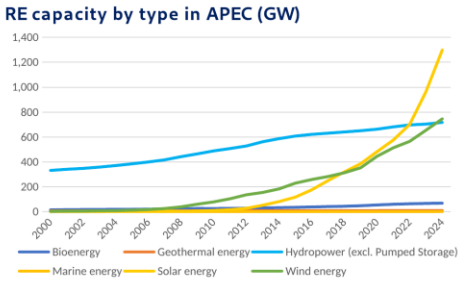
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## APEC's contribution to this growth

- APEC economies have made strong contributions in meeting this global target.
- By 2024, they contributed 65% of global renewable capacity.
- Solar and wind once again the dominant drivers of APEC RE capacity growth.
- The PRC has installed the dominant share of global solar capacity (nearly 50%).



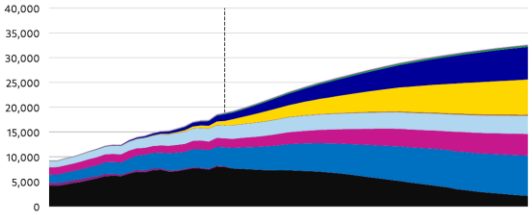

Source: Renewable Capacity Statistics 2025

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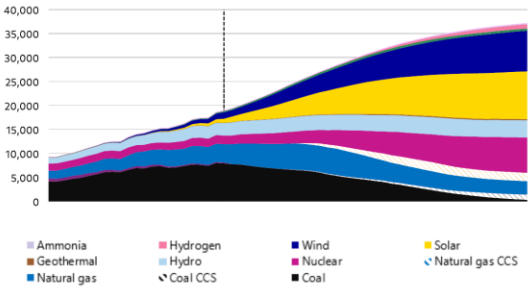
## Opportunities for green energy

- Maximising solar and wind deployment and integration with storage.
- Technology specific opportunities for economies – offshore wind, bio-energy, renewable hydrogen, CCUS.
- Opportunities to improve energy security.
- Competitive Renewable Energy Zones.
- Policy frameworks to enable renewable deployment.
- Sourcing financing for RE deployment.

**Projected generation (TWh) in 9th Outlook REF case**




**Projected generation (TWh) in 9th Outlook TGT case**




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## Challenges APEC economies will face – Policy based

- **Monopoly utilities and grid operators may hinder RE deployment with potential conflicts of interest.**
  - Incumbent utilities controlling grids and generation may favor existing assets, delaying renewable connections, limiting competition, and discouraging independent power producers.
- **Frameworks for RE deployment may exist in some economies but are still improving.**
  - Some economies have auctions, plans, or incentives. However weak implementation, policy instability, and permitting delays can slow renewable deployment.
- **Some economies lack clear RE targets with the appropriate regulatory framework.**
  - Without clear targets, procurement rules, and grid access regulations, renewable investment can be uncertain, slow, and difficult to scale beyond isolated projects.

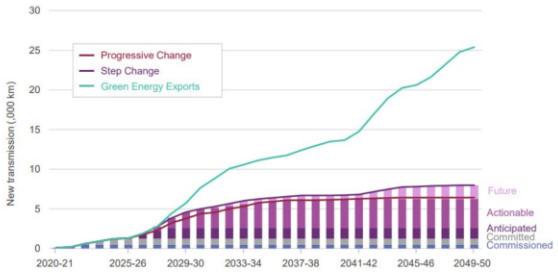
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## Challenges APEC economies will face – Technical

- **How to integrate RE into a decarbonising economy.**
  - RE must be matched with grid upgrades, storage, flexibility, and electrification so clean power can reliably replace fossil fuels.
- **Limited land availability in some economies.**
  - Dense populations, agriculture, environmental constraints, and terrain can limit utility-scale RE deployment.
- **Dealing with grid congestion and technical assistance.**
  - Many economies need technical support with forecasting, storage, and system operation to prevent straining power grids.
- **Limited system planning capacity making integration difficult from the outset.**
  - Weak planning/coordination across power and demand grids can delay renewable integration and create reliability and investment problems.

**Transmission capacity required in Australia (,000 KM)**




Source: 2024 AEMO Integrated System Plan

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## Challenges APEC economies will face – Financial

- **Some economies won't have an issue with financing though cost blow outs in advance economies might be an issue.**
  - Inflation, supply chain pressures, labour shortages, and complex projects can drive significant renewable energy cost overruns.
- **Emerging and early-stage economies will face higher barriers to financing RE projects.**
  - Higher perceived risk, weaker institutions, limited bankable pipelines, currency risk, and underdeveloped financial markets can complicate RE investment.
- **Some economies will need to rely heavily on development finance and donor support.**
  - In some economies, concessional finance, guarantees, and donor support are needed to reduce risk and mobilise investment.

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## Conclusion

- APEC is committed towards doubling the share of renewable energy in its energy mix and contributing towards tripling global renewable capacity by 2030.
- Strong progress has already been made to meet these objectives.
- Many economies already have ambitious targets to reduce carbon emissions by 2030.
- Opportunities and challenges will be faced by APEC economies and concerted policy action will be necessary in response.

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APEC
Asia-Pacific
Economic Cooperation

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## Thank you for your kind attention.

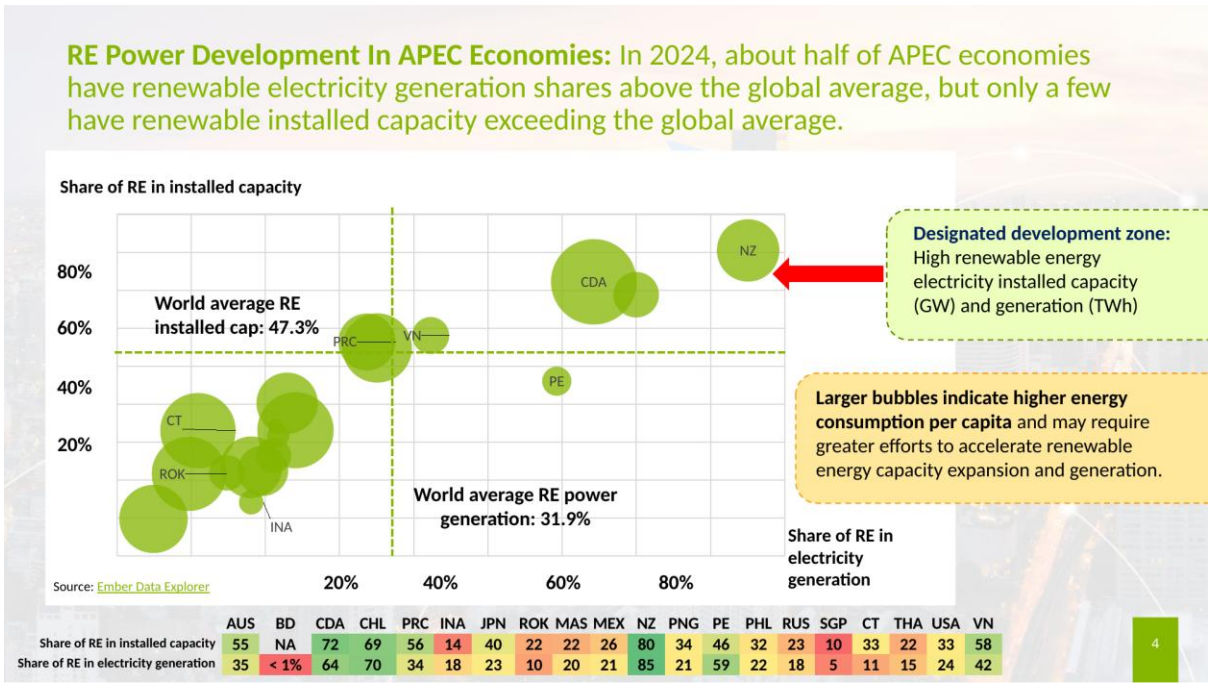
**https://aperc.or.jp**




APEC
Asia-Pacific
Economic Cooperation
APEC Capacity Building Workshop
for New and Renewable Energy Policy
(EWG Project: 104 2025A)
Peter du Pont, Co-CEO, Asia Clean Energy Partners
Bangkok, 31 March 2026

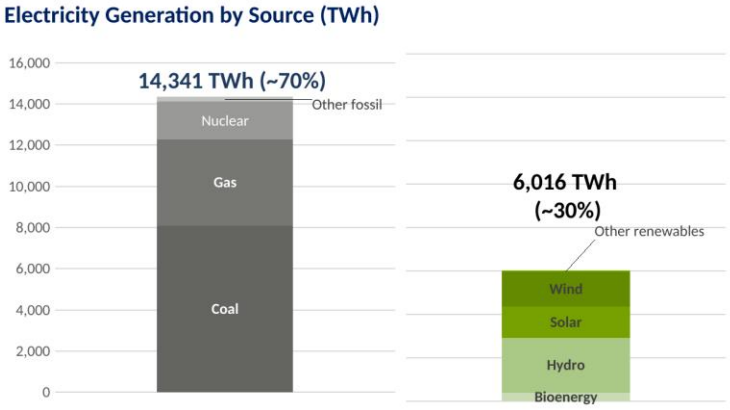

Agenda
• Objectives of the Workshop
• Progress of the Energy Transition in Asia-Pacific
» The RE power installation and consumption in APEC member economies
» The major electricity sources in APEC
» RE Policy Readiness
» Energy Investment in Selected Regions
2




| | AUS | BD | CDA | CHL | PRC | INA | JPN | ROK | MAS | MEX | NZ | PNG | PE | PHL | RUS | SGP | CT | THA | USA | VN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Share of RE in installed capacity | 55 | NA | 72 | 69 | 56 | 14 | 40 | 22 | 22 | 26 | 80 | 34 | 46 | 32 | 23 | 10 | 33 | 22 | 33 | 58 |
| Share of RE in electricity generation | 35 | < 1% | 64 | 70 | 34 | 18 | 23 | 10 | 20 | 21 | 85 | 21 | 59 | 22 | 18 | 5 | 11 | 15 | 24 | 42 |

**Coal Still Dominates Electricity Generation:** Coal remains the dominant source of electricity generation of APEC economy members, while the share of renewable energy in electricity supply was only 30%* in 2024.




Renewable electricity generation of the APEC economy member is primarily driven by **hydropower**, followed by **wind** and **solar PV**.

Wind is the second-largest source, generating approximately 1.6 thousand TWh in 2024, while solar PV generated a similar level of around 1.6 thousand TWh.

*Due to limited data availability, generation estimates were derived from 20 economies in the APEC.

Source: Ember Data Explorer

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**Example of Policy Analysis from IEA:** RE integration readiness in Southeast Asia can be grouped into three levels—transformational actions to optimize VRE, enabling actions to enhance flexibility, and foundational actions to establish regulatory frameworks and standards.

### Economies that need transformational actions

They should deploy advanced technologies, cross-sector integration, and sophisticated market designs to ***optimize high-VRE system performance***. However, they need to strengthen their capacity to manage grid complexity at high VRE penetration and ensure equitable access to green electricity.

PHL SGP

### Economies that need enabling actions

They have implemented operational capabilities and developed market mechanisms and infrastructure to manage VRE. However, they should further ***enhance flexibility*** procurement mechanisms, strengthen grid investment to diversify flexibility resources, and improve the operational flexibility of conventional power plants.

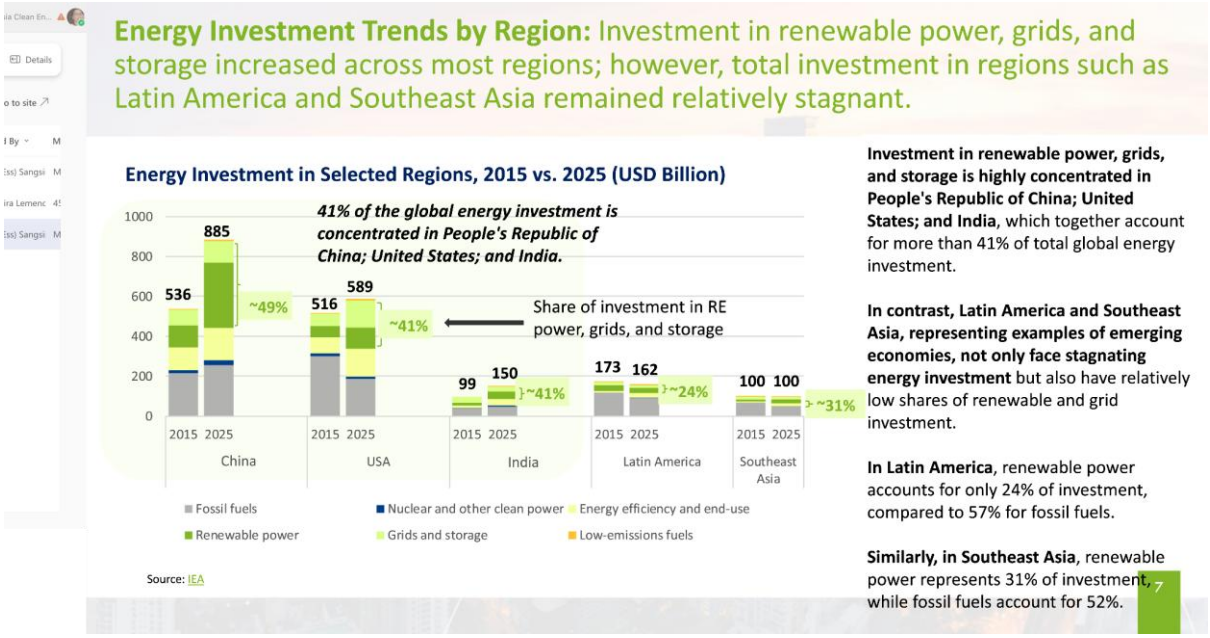
IDN MYS VNM THA

### Economies that need foundational actions

They have already established core policies but should ***further develop regulatory frameworks and technical standards*** to support more ambitious VRE targets.

BRN

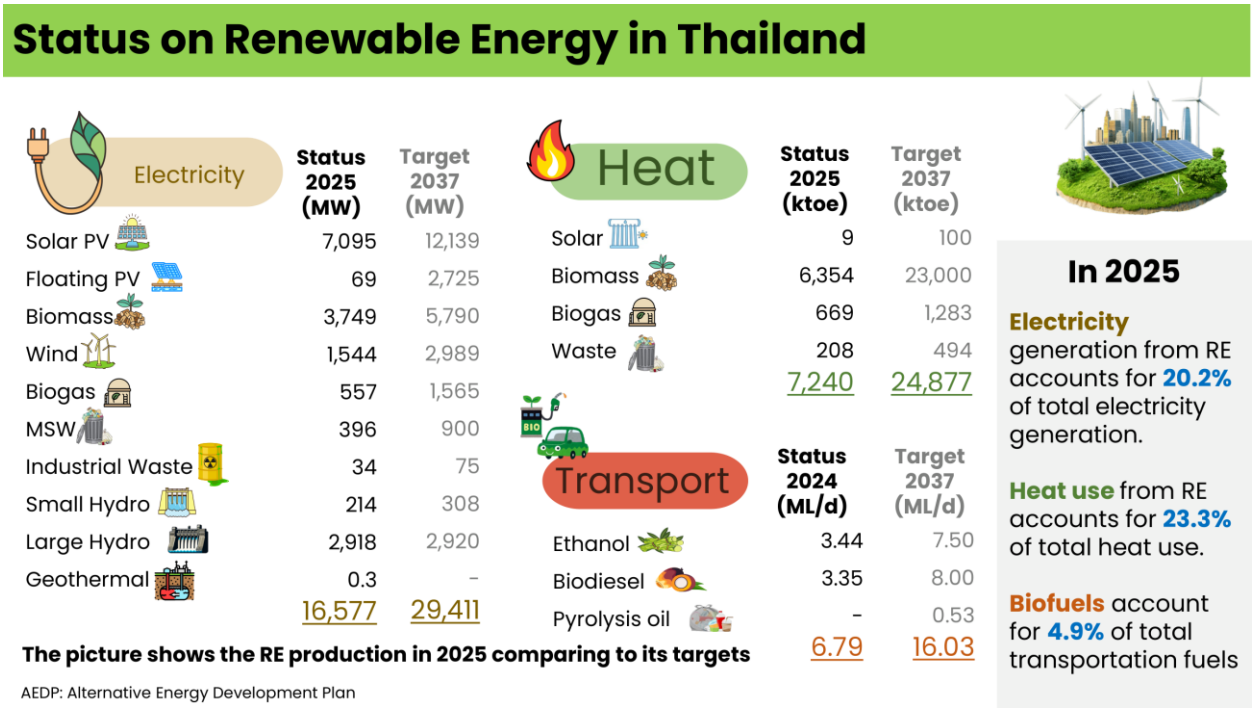
Source: IEA


Energy Investment Trends by Region: Investment in renewable power, grids, and storage increased across most regions; however, total investment in regions such as Latin America and Southeast Asia remained relatively stagnant.
Energy Investment in Selected Regions, 2015 vs. 2025 (USD Billion)
41% of the global energy investment is concentrated in People's Republic of China; United States; and India.
1000
800
600
400
200
0
536
885
~49%
516
589
~41%
Share of investment in RE power, grids, and storage
99
150
~41%
173
162
~24%
100
100
~31%
2015 2025
China
USA
India
Latin America
Southeast Asia
Fossil fuels
Nuclear and other clean power
Energy efficiency and end-use
Renewable power
Grids and storage
Low-emissions fuels
Source: IEA
Investment in renewable power, grids, and storage is highly concentrated in People's Republic of China; United States; and India, which together account for more than 41% of total global energy investment.
In contrast, Latin America and Southeast Asia, representing examples of emerging economies, not only face stagnating energy investment but also have relatively low shares of renewable and grid investment.
In Latin America, renewable power accounts for only 24% of investment, compared to 57% for fossil fuels.
Similarly, in Southeast Asia, renewable power represents 31% of investment, while fossil fuels account for 52%.
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Thank you!
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## Session 1: Overview of Thailand's Renewable Energy Policies and Development Plan



## Energy Plan toward Net-Zero Emissions

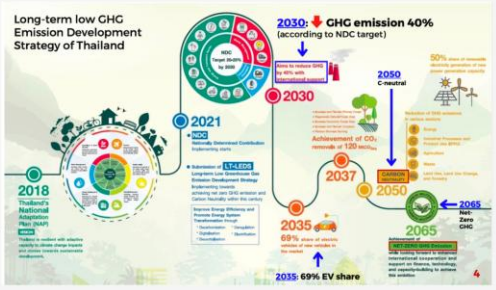
COP 26 GLASGOW

**Thailand's Commitment for GHG mitigation**

**2030:** reduce 30% GHG compared with BAU (40% with international support)

**2050:** Carbon neutrality

**2065:** Net-Zero GHG emissions




Source: Global Compact Network Thailand.

COP30 BRASIL AMAZONIA

**2035:** reduce 47% GHG compared with BAU with international support

**2050:** Net-Zero GHG emissions

**Key enablers:** renewables expansion, energy storage, green mobility, CCUS, hydrogen, and potential SMR deployment

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## Energy Plan toward Net-Zero Emissions

### The Development of National Energy Plan (NEP)

OIL PLAN — แผนพลังงานชาติ National Energy Plan — GAS PLAN

AEDP PDP EEP

**The National Energy Plan (NEP) is built on key principles:**

- Deliver benefits to the people
- Increase the competitiveness of the economy
- Drive Thai energy in line with world energy trends

### NEP's Policy Direction

**The National Energy Policy Council (NEPC) approved The NEP framework on the 4th Aug 2021**

**RE > 50% with ESS**
- Reduction of RE cost
- Reduction of ESS cost
- Smart Grid development

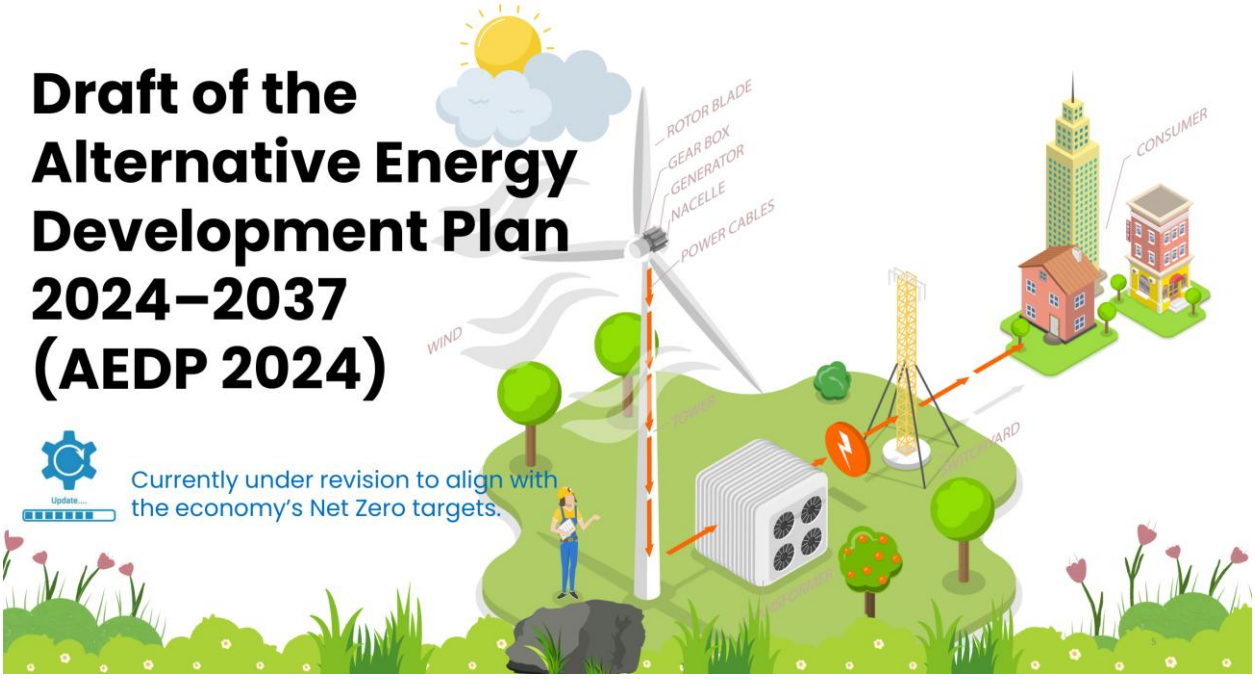
**EV 30@30**
- Promote clean energy in transport sector
- Promote EV utilization and battery industry
- Development of EV-related infrastructure

**EE > 30%**
Promoting modern technology and innovation to enhance energy management efficiency

**4D1E**
- DIGITALIZATION
- DECARBONIZATION
- DECENTRALIZATION
- DE-REGULATION
- ELECTRIFICATION

**Net-Zero Emissions**

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## Draft AEDP 2024 Targets

**Increase the Renewable Energy (RE) share in Total Final Energy Consumption to 37% by 2037.**

**Electricity 73,286 MW**

- Solar
- Wind
- Biomass
- Waste-to-Energy
- Biogas
- Small/Large Hydro
- Hydrogen
- Geothermal
- Imported Hydro

**Heat 17,360 ktoe**

- Biomass
- Biogas
- Waste-to-Energy
- Solar
- Hydrogen/Geothermal /Pyrolysis Oil

**Biofuels 1,939 ktoe**

- Biodiesel (B7)
- Ethanol (E10/E20)
- Hydrogen
- Sustainable Aviation Fuel (SAF)

**RE Target 37%**

**Electricity 16%** | **Heat 19%** | **Biofuel 2%**

### Expected Benefits

**Economic Dimension**

- Reduce fossil fuel consumption by 20,000 ktoe, equivalent to a value of at least THB 400 billion
- Generate income for farmers of no less than THB 41 billion per year
- Create investment value of at least THB 1.3 trillion

**Social Dimension**

- Improve quality of life through access to energy, particularly in areas with limited energy accessibility
- Strengthen energy resilience and enhance access to basic public utilities for communities
- Promote domestic knowledge development and support the creation of researchers and energy innovation

**Environmental Dimension**

- Reduce carbon dioxide ($CO_2$) emissions by at least 75 $MtCO_2$ by 2037, compared to 2022 levels
- Support the BCG Model (Bio-Circular-Green Economy)

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# Key Measures to Drive Targets

## Electricity Sector

**Policy, Legal, and Regulatory Measures**

- Promote electricity purchasing from renewable energy sources
- Encourage renewable electricity generation through tax incentives
- Support appropriate green electricity tariff structures
- Revise and improve relevant laws and regulations

**Stability and Energy Security**

- Promote and develop energy storage systems
- Support decentralized renewable energy (RE) generation
- Encourage off-grid renewable power systems in remote areas
- Develop digital-based RE forecasting systems

**Development of New Renewable Energy Sources**

- Conduct studies on hydrogen production and utilization in the power sector
- Promote green hydrogen production and utilization

## Heat Sector

**Promote green hydrogen production and utilization**

- Promote systematic storage and aggregation of renewable fuels
- Support upgrading renewable fuels into primary or co-firing fuels (e.g., wood pellets, RDF)
- Encourage the use of alternative fuels from industrial waste streams
- Support business matchmaking initiatives

**Entrepreneurial Mindset**

- Publicize successful project outcomes
- Promote pilot projects in industries with low RE adoption

**Investment**

- Promote investment through tax incentives and low-interest financing
- Support fuel switching from fossil fuels to renewable or alternative energy
- Facilitate access to green finance under environmental conditions

## Biofuels Sector

- **Promotion of Sustainable Aviation Fuel (SAF)**

***Domestic Implementation***

- Assess national potential and impacts of SAF utilization
- Develop carbon credit trading mechanisms to support SAF
- Establish domestic certification bodies

***International Engagement***

- Review Default Life Cycle Emissions values
- Negotiate SAF utilization criteria from feedstocks such as CSPO, molasses, sugarcane, and palm oil
- Engage in SAF carbon trading negotiations

- **Promotion of Hydrogen Utilization**

***Preparation Phase (2024–2027)***

- Study and develop regulatory frameworks for production, transport, and utilization
- Define investment promotion measures across the value chain, including infrasture and FCEVs

***Pilot Phase (2028–2034)***

- Initiate pilot projects in various sectors

***Commercialization Phase (2035–2037)***

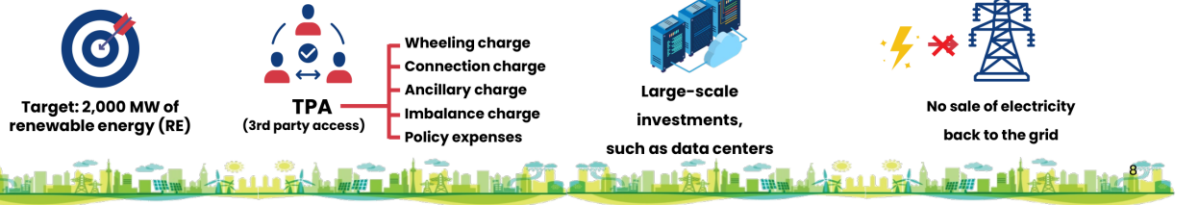
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# Key Policy

## Direct PPA through Third-Party Access Mechanism

- ❑ Resolution of the National Energy Policy Council (NEPC) on 25 June 2024 approving the implementation framework for a pilot project on renewable electricity trading through Direct Power Purchase Agreements (Direct PPA), utilizing Third-Party Access (TPA) to the transmission system
- ❑ Pilot capacity target: 2,000 MW
- ❑ Aimed at attracting large-scale foreign investment, particularly in high-demand sectors such as data centers
- ❑ Under preparation for submission to Energy Policy Administration Committee EPAC and NEPC: Direct PPA framework, TPA tariff structure, and grid access assurance mechanisms.






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## Key Policy




**Promote biomass-based power generation to address open-field burning of agricultural residues, thereby reducing $PM_{2.5}$ emissions.**

- **Consider promoting mechanisms through the establishment of appropriate feed-in tariff rates for electricity generated from sugarcane leaves and tops.**



- **Enhance integration and coordination among relevant agencies, such as the Ministry of Energy and the Ministry of Industry.**

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## Key Policy

**UGT in Thailand is divided into UGT1 and UGT2**

**UGT1 (non-source-specific)**

**Supply**
EGAT hydro ~ 2,000 GWh/year



Hydro power

**Demand**
In 2025 services will be provided to tariff type 3, 4, and 5*
From 2026 onwards, services will be Provide to all tariff types



**Electricity tariff**

(annual contract)

UGT1 | **Retail electricity price by tariff types, including $F_t$** + **Premium**: 1. Market price of REC 2. Service charges

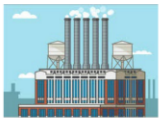
The pricing is calculated based on the standard electricity tariff plus a fixed green premium

**UGT2 (source-specific)**

**Supply**
Solar/Solar + BESS
Wind ~ 8,000 GWh/year
Big Lot 1: ~4,850 MW



**Demand**
tariff type 4 and 5*



**Electricity tariff**

(annual contract)

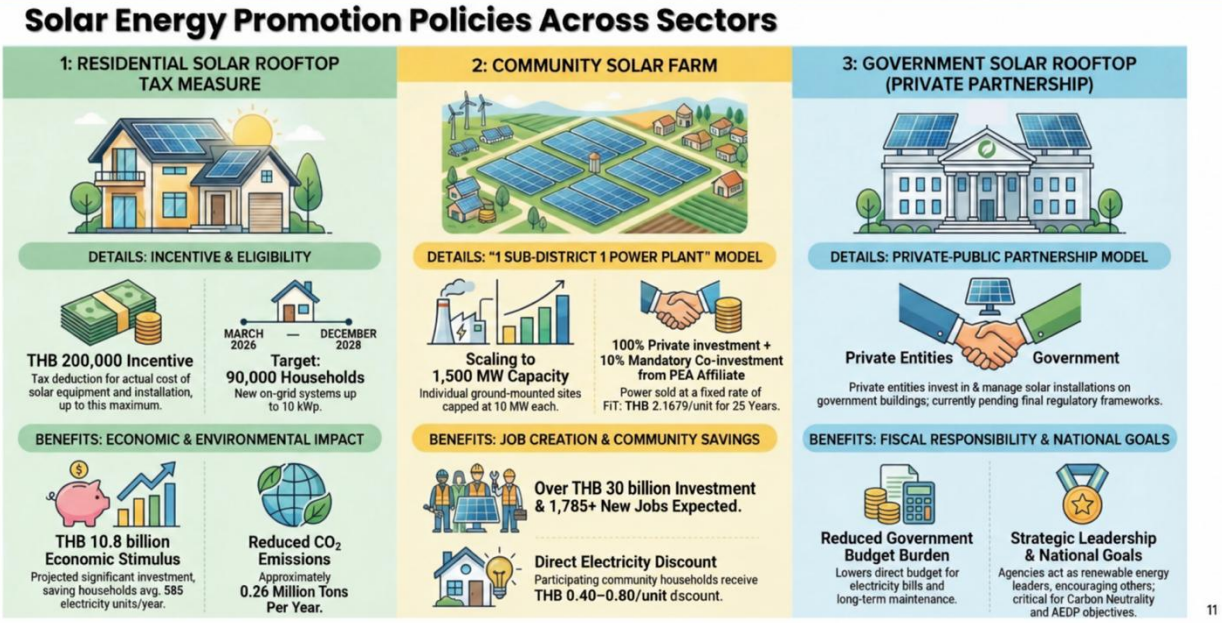
UGT2 | Wheeling Charge / Transmission (T) / Distribution (D) + Energy Purchase + Dependable Capacity + Policy expenses (PE) and service charge or other expenses

The pricing is based on the actual cost of electricity from the chosen source, plus additional operational charges.

* Electricity tariff type 3: medium general services, Electricity tariff type 4: large general services and Electricity tariff type 5: specific bussiness

10

## Key Policy




11

## Summary: Driving Thailand's Clean Energy Future

**Accelerated Climate Ambitions**

- Committing to Net-Zero GHG emissions by 2050 (Post-COP30) and driving the energy transition through the 4D1E framework.

**Aggressive AEDP 2024 Targets**

- Aiming for a 37% Renewable Energy share by 2037, delivering substantial economic, social, and environmental benefits.

**Innovative Market Mechanisms**

- Unlocking massive green investments via Direct PPA (TPA) and offering clear choices through the Utility Green Tariff (UGT).

**Comprehensive Sectoral Actions**

- Scaling Solar across all levels, utilizing Biomass to solve $PM_{2.5}$, and advancing future fuels like SAF and Hydrogen.






12




# Thank You

yaowateera@gmail.com
http://www.dede.go.th

## Session 2: Business Models and Policies for Scaling Up New and Renewable Energy

- Unlocking Wind and Solar Deployment: A Diagnostic Tool to Overcome Renewable Energy Policy Barriers (presented by Dimitri Pescia)
- Scaling New and Renewable Energy Deployment (presented by Jennifer Leisch)
- From Policy to Investment: Bridging the Gap in Scaling Up Renewable Energy (presented by Ananth Chikkatur)



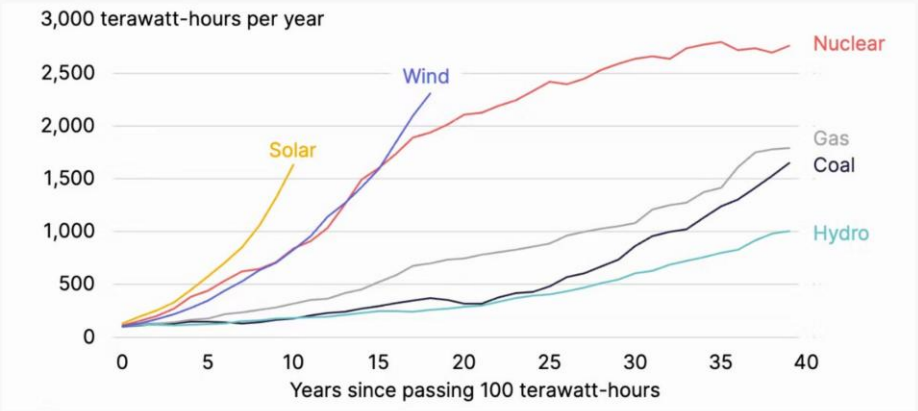


Agora Energiewende

- **Think Tank** and **Policy Lab**
- **~180 energy transition experts**
- **Independent** and non-partisan with diverse financing structure
- **Our vision:** a prosperous and **carbon-neutral global economy** by 2050
- Agora Energiewende is part of a family of **think tanks** that cover all GHG emitting sectors (energy, industry, agriculture, transport)
- **Science-based solutions and policy advice** to deliver **clean power, heat, industries, and agriculture** – in Germany, Europe, and globally
- **Programs in ~20 economies**, with offices in Berlin, Brussels, Beijing and Bangkok

## Wind and solar power are disruptive technologies, growing faster than any other generation source in history

Annual electricity generation from various power plant technologies after exceeding 100 TWh in a year

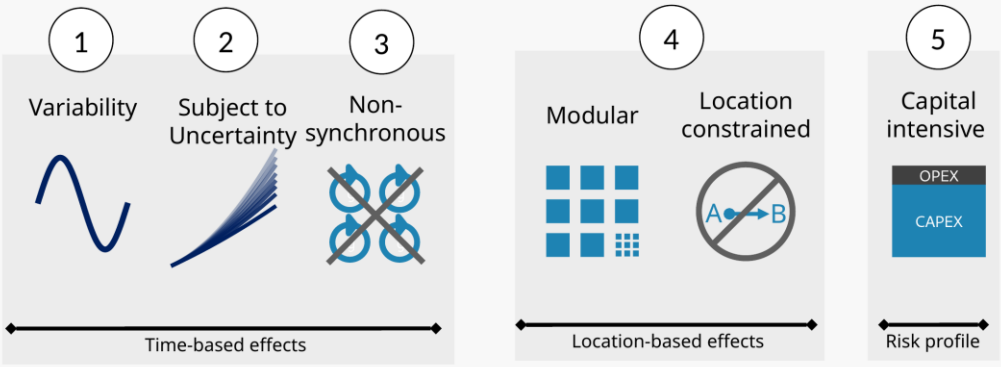



3 | Source: Nat Bullard, from Ember

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## Wind and solar differ fundamentally from conventional generation, introducing distinct challenges for power system integration

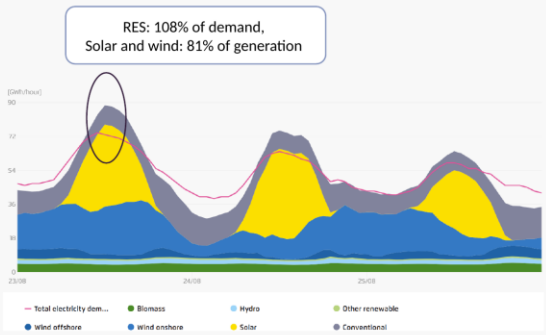
5 characteristics of variable renewables, like solar and wind power, that challenge traditional power system operations & planning



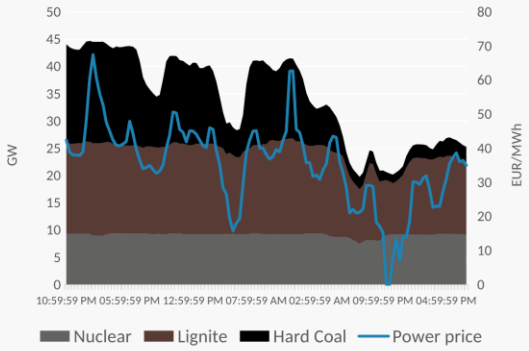

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## Flexibility is the new paradigm of power systems. Baseload operation is an obsolete concept, as power plants provide most of the flexibility needs.

Power generation and demand in Germany (August 2024)




Power generation from nuclear, hard coal and lignite power plants (5 days in March 2018)

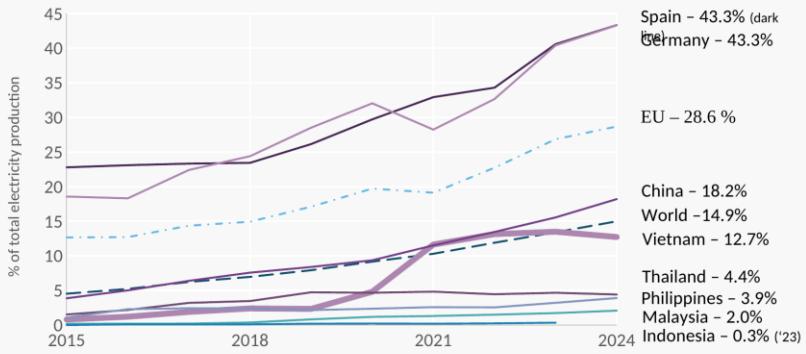



5 | Source: Agorameter https://www.agora-energiewende.de/daten-tools/agorameter/

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## Despite record cost declines, solar and wind deployment isn't on track to meet net zero targets, making stronger policy frameworks vital to unlock potential

Share of wind and solar power (%) in total power production in various economies



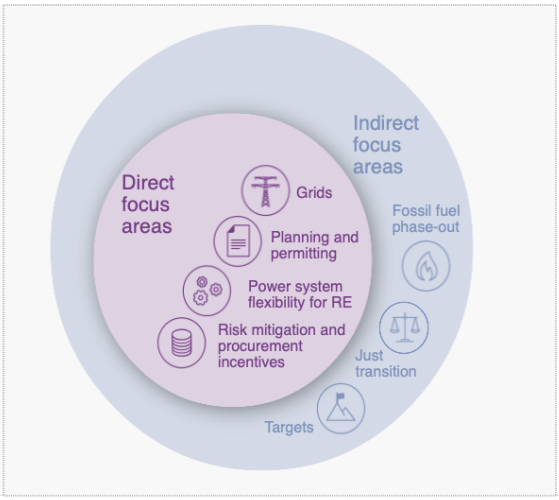

**Shift in deployment barriers**

- Subsidies and financial incentives are no longer primary barriers
- Streamlined permitting and transparent procurement can lower risks and improve the bankability of solar and wind energy projects
- Grid modernization and system flexibility mechanisms are vital to absorb RE generation
- Fossil-fuel phase out and just transition policies as well as clear targets can indirectly impact solar and wind deployment

6 | Sources: Ember, Agora

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## Agora's Renewable Energy Policy Framework provides a qualitative assessment of key barriers and opportunities for solar and wind energy deployment




→ Applied to eight Asian economies: Indonesia; Japan; Republic of Korea; Malaysia; The Republic of the Philippines; Thailand; Viet Nam; and Pakistan

→ Each assessment has been validated by local think-tanks and experts

→ The Renewable Energy Policy Framework (REPF) has eight direct and indirect focus areas, twenty-four indicators and over seventy sub-indicators affecting solar and wind deployment

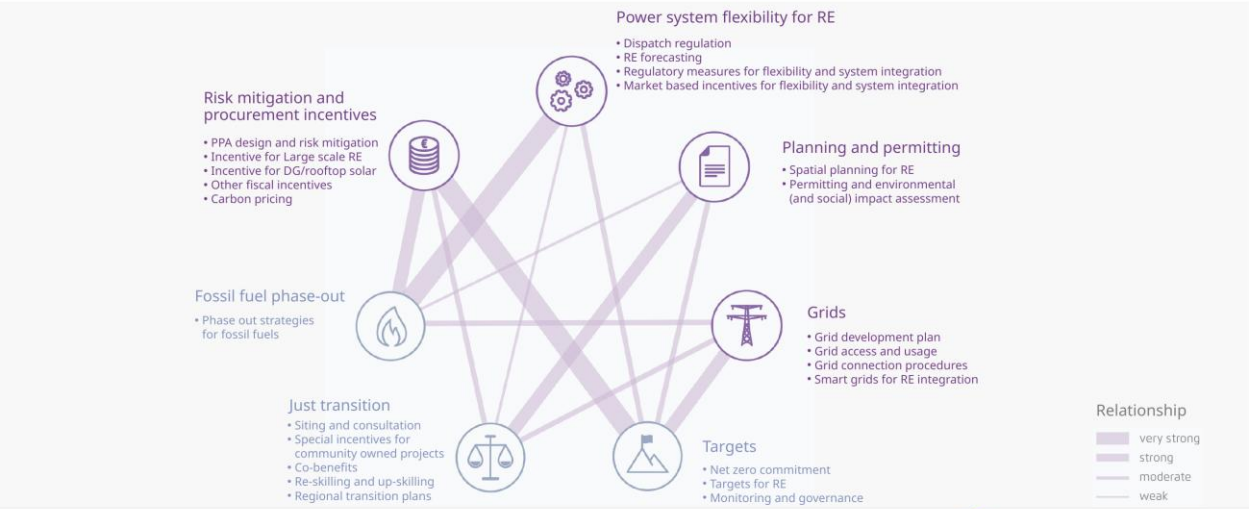
→ It will be presented in a publicly available platform with regular updates to reflect policy changes

7 | Sources: USGS

INETTT International Network of Energy Transition Think Tanks

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## Interactions between different focus areas reflect the complexity of the solar and wind policy landscape, with a need for prioritisation and managing trade-offs




8 |

INETTT International Network of Energy Transition Think Tanks

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## Policy assessment (REPF*) for the Republic of the Philippines

**Key: size of barrier to RE deployment**

Big Medium Low N/A

| 1. Risk Mitigation and Procurement Incentives | 2. Planning and Permitting | 3. Power system flexibility for RE integration | 4. Grids | A. Fossil Fuel Phase Out | B. Targets | C. Just Transition |
|---|---|---|---|---|---|---|
| 1.1. PPA design and risk mitigation | 2.1: Spatial Planning for RE | 3.1: Dispatch regulation | 4.1: Grid development plan | A1: Phase out strategies for fossil fuels | B1: Net zero commitment | C1: Siting and consultation |
| 1.2: Incentive for large scale RE | 2.2: Permitting and ESIAs | 3.2: RE forecasting | 4.2: Grid access and usage | | B2: Targets for RE | C2: Special incentives for community owned projects |
| 1.3: Incentive for DG/rooftop solar | | 3.3: Regulatory measures for flexibility and system inte | 4.3: Grid connection procedures | | B3: Monitoring and governance | C3: Co-Benefits |
| 1.4: Other fiscal incentives | | 3.4: Market based incentives for flexibility and system integration | 4.4: Smart grids for RE integration | | | C4: Re-Skilling and Up-Skilling |
| 1.5: Carbon pricing | | | | | | C5: Regional transition plans |

### Take-aways

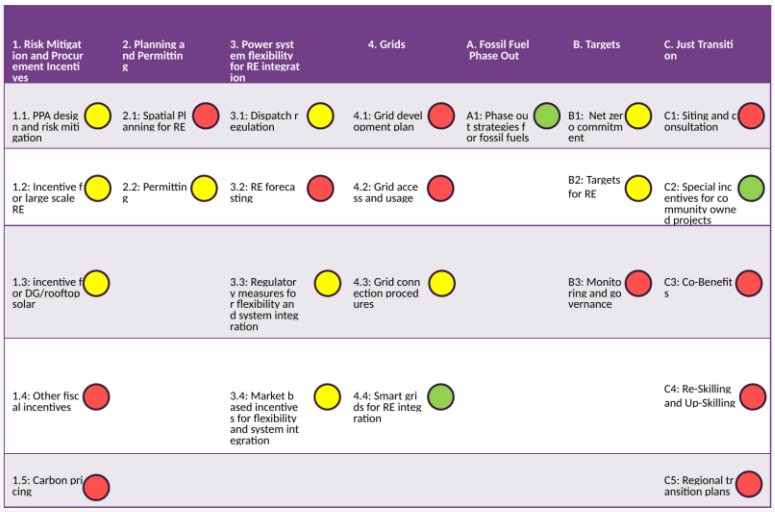
- Large solar and wind projects face **permitting delays** with a need for **transmission network development** to keep pace with RE expansion
- **Coal power contracting structures must build in flexibility**: Power Supply Agreement clauses (minimum offtake and capacity payments) incentivize baseload plants and undermine RE integration
- **Procurement reform is the key lever for change:** Revising existing PSAs and procurement practices is essential to unlock a more flexible and RE-compatible power system in the Philippines

9 | *REPF – Renewable Energy Policy Framework

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## Policy assessment (REPF*) for the Republic of Korea

Key: size of barrier to RE deployment
Big Medium Low N/A




### Take-aways

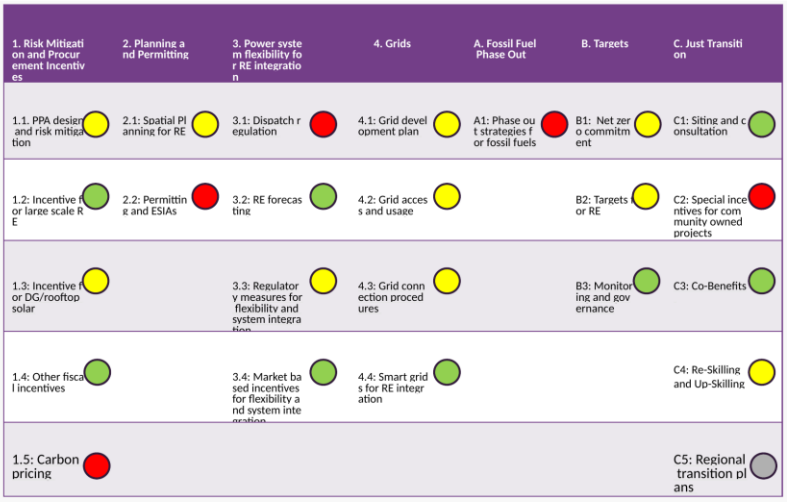
- **Insufficient RPS quotas for utilities:** Mandatory RE targets (15% by 2026) can be more ambitious to drive deployment
- **Transmission infrastructure** expansion needs to align with generation growth, causing significant RE curtailment
- **Spatial planning**: RE siting must be systematically integrated into municipal land-use plans, thereby reducing community opposition to RE projects
- The new administration has signalled a **commitment towards the energy transition** and is developing several measures to address these barriers

10 | *REPF – Renewable Energy Policy Framework

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## Policy assessment (REPF*) for Japan

Key: size of barrier to RE deployment
Big Medium Low N/A




### Take-aways

- **The lack of economic dispatch and available grid capacity** leads to high curtailment rates and reduces the bankability of RE projects
- Land acquisition and permitting bottlenecks drive up costs and timelines. **Solar and wind prioritisation in national spatial planning and one-stop-shop permitting agencies** could unlock significant cost reductions
- The 40–50% renewable electricity goal by 2040 could be **more ambitious** to **leverage cost reductions in RE and battery storage**
- The net-zero strategy overemphasizes the role of hydrogen, and **underestimates the potential of direct electrification**

11 | *REPF – Renewable Energy Policy Framework

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## Key Takeaways

1. The global energy transition is accelerating, driven increasingly by economic and security imperatives rather than climate goals.
2. As wind and solar reshape power systems worldwide, flexibility has overtaken baseload as the guiding principle for planning, investment, deployment and operation.
3. To navigate this transformation effectively, a holistic policy framework is essential—one that designs supportive measures, prioritizes interventions, and manages inevitable trade-offs.

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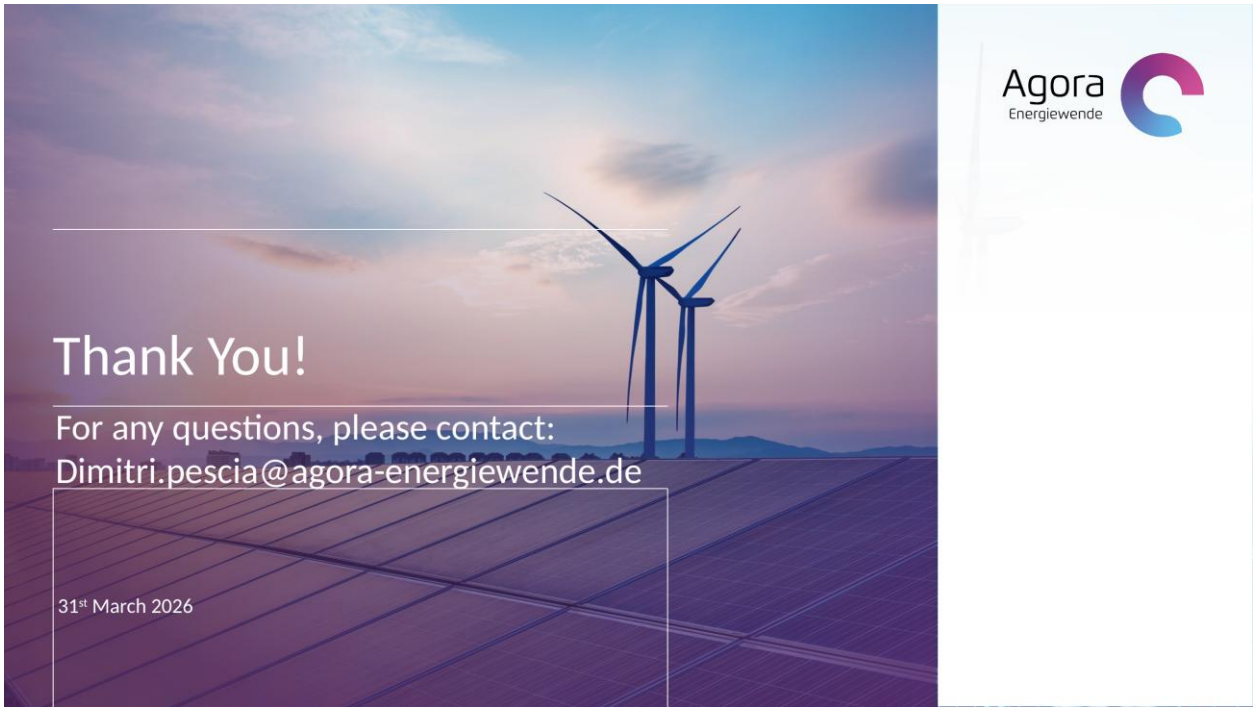
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## Discussion Questions

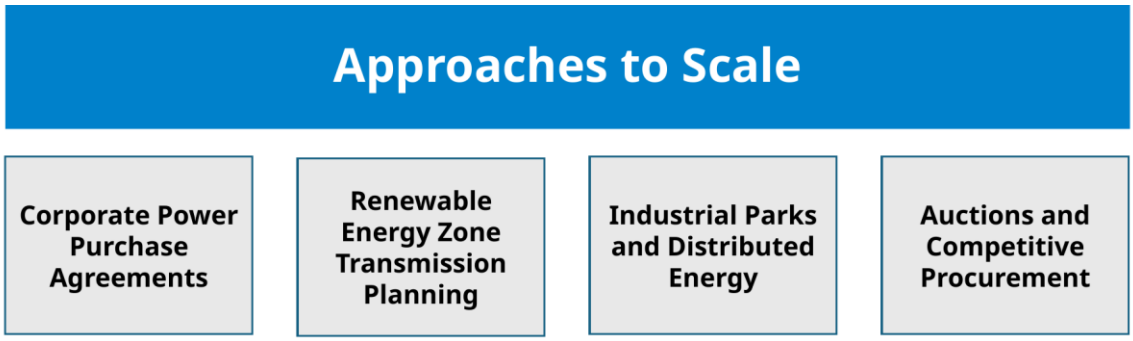
1. What are the most important priority barriers in your economies? (e.g. risk mitigation and procurement incentives, planning and permitting, grid capacity and modernization, power system flexibility for renewable energy integration…)
2. Which lessons can be shared from your economy's experience on how these barriers have been alleviated?
3. Do you have specific requests regarding the design of our Policy Assessment Framework to ensure effectiveness and usefulness?

13 |

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Thank You!
For any questions, please contact:
Dimitri.pescia@agora-energiewende.de
31st March 2026
Agora
Energiewende




- Renewable energy scale is no longer a technology challenge
- The constraint is how projects are **structured, financed, and delivered**
- This can greatly depend on policy and regulatory design
- **There is no one-size fits all approach** - different markets require different models
- Several approaches to scale can complement or be used in one market

# Corporate PPAs: Demand-Driven Deployment

A contract where a developer sells electricity (and its attributes) to a C&I buyer (corporate), structured as either physical or virtual based on the buyer's location, goals, and risk tolerance.

### ⚙️ Why Corporate PPAs Work

**Bankability -** Long-term contracts enable project financing

**Key Considerations:**

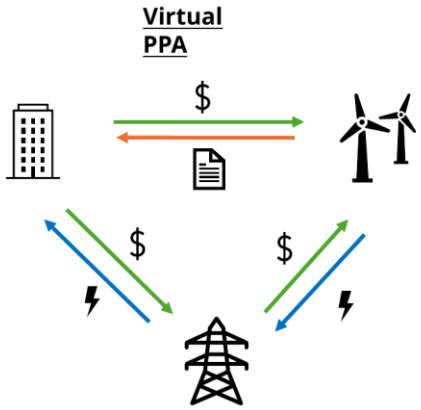
**Structure & market** — physical vs. virtual PPA, driven by location and regulatory context

**Price & risk** — fixed pricing vs exposure to market volatility, including basis and negative pricing risk

**Volume & reliability** — intermittency, load matching, and need for storage or firming solutions

**Contract terms** — tenor, credit requirements, and key provisions (curtailment, flexibility)

**Strategic fit** — alignment with decarbonization goals, financial objectives, and risk tolerance




# Case Study: Corporate PPA Market Trends

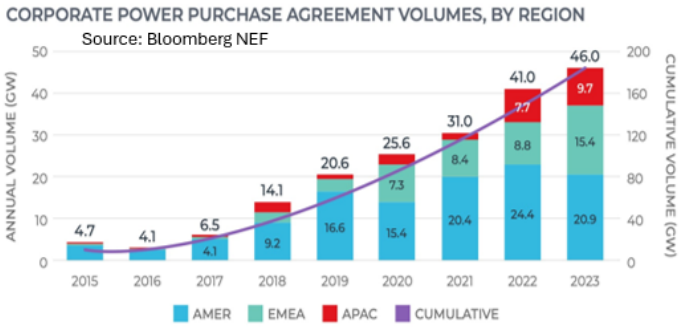
**~300+ GW total contracted corporate PPA capacity globally**

**Market Evolution** from standalone solar or wind; Annual energy matching

To: **Hybrid portfolios (solar + wind + storage); 24/7 hourly matching (time + location specific)**

**Emerging Challenges**

- Price volatility & negative pricing risk
- Interconnection delays
- Increasing contract complexity
- Need for firming (storage, dispatchable supply)
- Wheeling Charges
- Accounting and 24/7



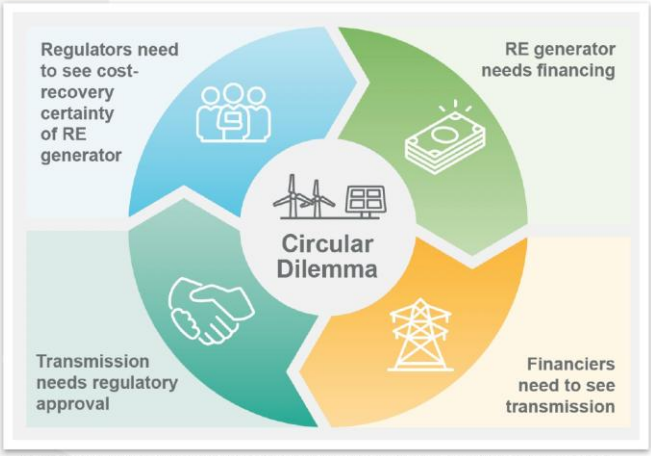

**Market Reality (2024–2026)**

- 2025 Slowdown
- **Corporate PPAs ~25% of global wind & solar additions (ex-China)**
- Multi-GW annual procurement led by hyperscalers
- Market size projected to **~2x by 2030**
- Increasing demand for **24/7 carbon-free energy (CFE)**

## Renewable Energy Zones (REZ): Infrastructure-led Scale

- Proactive transmission planning for large scale RE development
- Identify high-resource zones
- Build **transmission + permitting readiness** in advance
- Coordinate multiple projects in a single region
- Reduces development risk and speeds deployment




Source: *Ready for Renewables: Grid Planning and Competitive Renewable Energy Zones (CREZ) in the Philippines,* NREL/TP-7A40-76235 • September 2020

## Case Study: Philippines Competitive RE Zones (CREZ)

- Archipelagic system → complex grid constraints
- Identified 25 zones with > 150GW Wind and Solar potential
- Integrating these into the National Transmission Development Plan, and identifying upgrades and construction needed to support further development
- CREZ is an enabler of policies like the RE Targets and Green Energy Auction Program

**Coordinated planning reduces bottlenecks and project risk, supports economies of scale**

# Industrial Parks: Distributed Energy Aggregation

- Concentrated industrial demand enables **aggregated energy solutions**
- On-site or near-site solar, storage, and microgrids
- Delivered via **energy-as-a-service models or owned by the IP directly**
- Reduces grid dependence and accelerates deployment

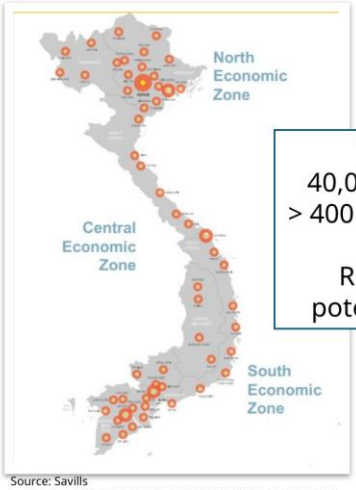
**Demand aggregation, partnerships is the key to scaling distributed energy**



Amata Bien Hoa Industrial Park
https://vietnamenergy.vn/rooftop-solar-and-energy-storage-development-in-industrial-parks-field-insights-from-dong-nai-and-bac-ninh-35553.html

# Case Study: Viet Nam's Industrial Parks

## Industrial clusters turn fragmented demand into bankable scale




Source: Savills
https://industrial.savills.com.vn/2023/08/vietnam-industrial-zone/

**Viet Nam**
40,000 companies
> 400 industrial zones

Rooftop solar potential of **12–20 GWp**

- Rapid expansion of export-oriented industrial parks
- Developers targeting **entire parks, not individual tenants**
- Rooftop solar + shared infrastructure models
- Driven by multinational supply chain requirements

**Challenges:**

- Construction Standards
- Roof Ownership
- Regulatory F


VIETNAM'S BW INDUSTRIAL TARGETS UP TO 700MW FOR DATA CENTRES, HIGH TECH PROJECTS

# Auctions: Scaling Through Competitive Procurement

- Governments or utilities procure renewable capacity via competitive tenders
- Auctions have overtaken as the dominant global mechanism for large scale renewables deployment (ex-China)
- Auctions drive **price discovery and cost reduction**
- Winning bidders receive long-term contracts (typically 15–25 years); **Enables project finance**

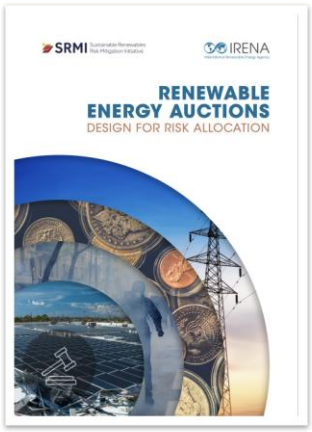
**Trends:**

**Scale:** Multi-GW auctions becoming standard

**Technology mix:** Moving beyond solar/wind → **storage, hybrid**

**Design evolution:** More contract-for-difference (CfD), hybrid auctions, and capacity-based mechanisms, other objectives

Context Matters: There is no one-size-fits-all auction design




# Case Study: Australia Capacity Investment Scheme

**Capacity Investment Scheme**

- Federal government-led **competitive auction program**
- Targets **wind, solar, and long-duration storage**
- Uses **two-sided Contracts for Difference (CfD)**
  - Revenue floor → downside protection
  - Revenue cap → shared upside

**Why It Works**

- Government-backed revenue floor lowers financing risk
- Co-optimizes **generation + storage**, not just cheapest MWh
- Multi-GW procurements aligned with coal retirements

**Key Innovation**

- ➡️ **Shift from "lowest price wins" → "system value wins"**
- Balances price, reliability, and timing
- Mimics real grid needs vs theoretical LCOE competition



📊 **Recent Results (2024–2025)**

**~6 GW awarded (first national tender)**

~4 GW wind + solar

~2 GW storage

**19 projects selected**

Additional **multi-GW state rounds (NSW, Victoria)**

Total: **10+ GW contracted or in procurement**

## Key Takeaways

- **There is no one size fits all approach** → the market matters
- **Corporate PPAs** → create demand, provide bankability
- **Auctions** → structure supply, provide cost discovery
- **RE Zones** → address the chicken-or-egg infrastructure dilemma
- **Industrial parks** → aggregate distributed demand to create scale

| Corporate Power Purchase Agreements | Renewable Energy Zone Transmission Planning | Industrial Parks and Distributed Energy | Auctions and Competitive Procurement |
|---|---|---|---|



# Thank You

**APEC Workshop - RE Policies and Investments: Are We on the Right Track?**
**31 March 2026 | Bangkok**

**Jennifer E. Leisch, Ph.D. | Jennifer.Leisch@FoundationNLR.org**
Foundation for the National Laboratory of the Rockies

# From Policy to Investment

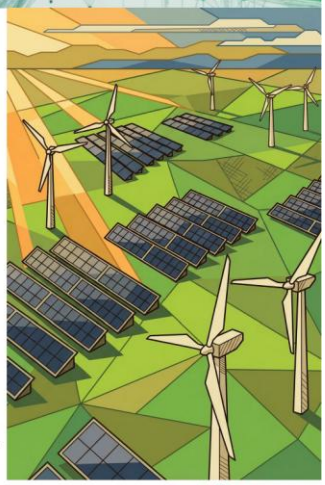
## Bridging the Gap in Renewable Energy Scale Up

### APEC Workshop - RE Policies and Investments: Are We on the Right Track?

**Bangkok, Thailand**
**31 March 2026**

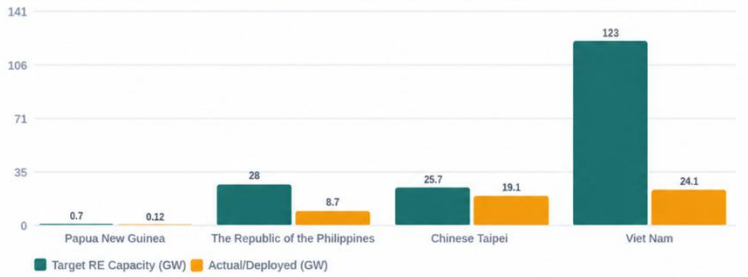
XanhTerra
Dr. Ananth Chikkatur
Co-Founder & CEO
Ananth@xanhterra.com; +84-855-15-2463

APEC EWG 104



XanhTerra

## Implementation Gap for Renewable Energy




**Papua New Guinea** **<20% electrified**
Target: 70% by 2030

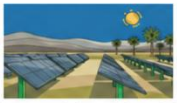
**The Republic of the Philippines** **22% RE gen.**
Target: 35% by 2030

**Chinese Taipei** **~11 GW gap**
Projected shortfall by 2030

**Viet Nam** **26.8% RE share**
Target: 28–36% by 2030



Papua New Guinea
**<20% electrification**; 900 MW total capacity; diesel-diesel-dominated. 70% electrification and 78% RE by RE by 2030 requires major major transformation.



The Republic of the Philippines
35% RE target by 2030; currently at **~22% of** generation. Coal still dominates at ~60%. 794 MW added in 2024 — but but insufficient.



Chinese Taipei
Solar 15.5 GW vs. 20 GW target; offshore wind at 3.6 3.6 GW vs. 5.7 GW. Estimated Estimated **11 GW cumulative cumulative gap** projected by projected by 2030.

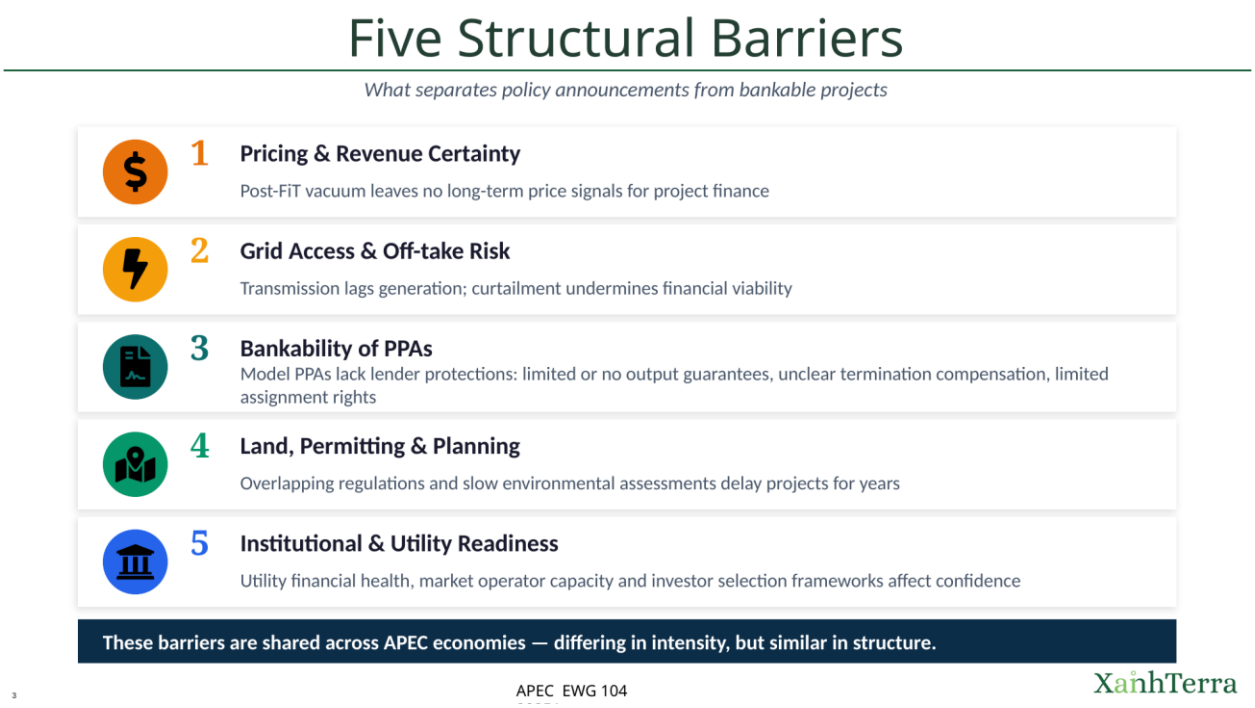


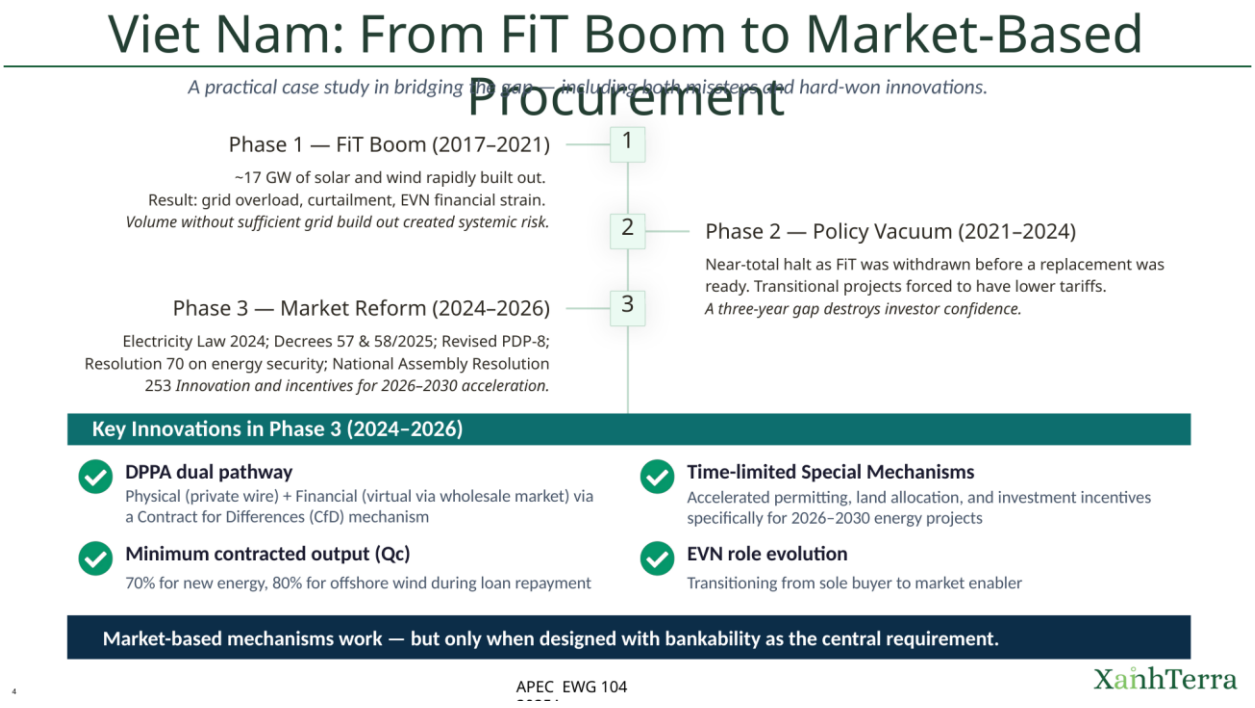
Viet Nam
Targets: 183–236 GW by 2030. Today's capacity ~90 ~90 GW Onshore wind reached only **19%** of its original plan by end-2024. 2024.

**The Gap is *not* a failure of Ambition or Policy Targets — it requires greater focus on Design & Bankability features**

2 Sources: PDP-8 Rev. (2025), MOEAC (2025), DOE Philippines (2025), PNG NEROP APEC EWG 104 2025A

XanhTerra


Five Structural Barriers
What separates policy announcements from bankable projects
1
Pricing & Revenue Certainty
Post-FiT vacuum leaves no long-term price signals for project finance
2
Grid Access & Off-take Risk
Transmission lags generation; curtailment undermines financial viability
3
Bankability of PPAs
Model PPAs lack lender protections: limited or no output guarantees, unclear termination compensation, limited assignment rights
4
Land, Permitting & Planning
Overlapping regulations and slow environmental assessments delay projects for years
5
Institutional & Utility Readiness
Utility financial health, market operator capacity and investor selection frameworks affect confidence
These barriers are shared across APEC economies — differing in intensity, but similar in structure.
APEC EWG 104
XanhTerra


Viet Nam: From FiT Boom to Market-Based Procurement
A practical case study in bridging the gap — including both missteps and hard-won innovations.
Phase 1 — FiT Boom (2017–2021)
~17 GW of solar and wind rapidly built out.
Result: grid overload, curtailment, EVN financial strain.
Volume without sufficient grid build out created systemic risk.
Phase 2 — Policy Vacuum (2021–2024)
Near-total halt as FiT was withdrawn before a replacement was ready. Transitional projects forced to have lower tariffs.
A three-year gap destroys investor confidence.
Phase 3 — Market Reform (2024–2026)
Electricity Law 2024; Decrees 57 & 58/2025; Revised PDP-8; Resolution 70 on energy security; National Assembly Resolution 253 Innovation and incentives for 2026–2030 acceleration.
Key Innovations in Phase 3 (2024–2026)
DPPA dual pathway
Physical (private wire) + Financial (virtual via wholesale market) via a Contract for Differences (CfD) mechanism
Time-limited Special Mechanisms
Accelerated permitting, land allocation, and investment incentives specifically for 2026–2030 energy projects
Minimum contracted output (Qc)
70% for new energy, 80% for offshore wind during loan repayment
EVN role evolution
Transitioning from sole buyer to market enabler
Market-based mechanisms work — but only when designed with bankability as the central requirement.
APEC EWG 104
XanhTerra

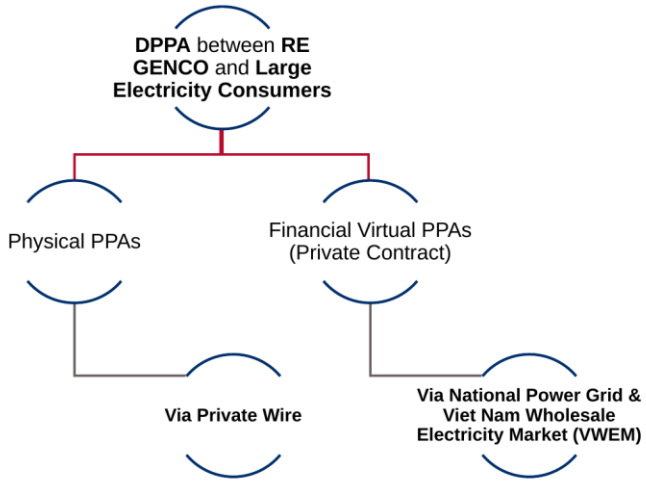
# FiT-Driven RE Capacity in Viet Nam




Confidential—Not for

XanhTerra

# Viet Nam's Direct Power Purchase Agreement (DPPA)




**Physical DPPA (Private Wire)**

- Generator and factory connected by a dedicated private wire
- Similar to rooftop solar — limited scalability
- Requires physical infrastructure build-out
- Restricted geographic proximity

**Virtual DPPA (via Grid)**

- Settlement through the wholesale electricity market
- No change to physical electricity supply or infrastructure
- Scalable: access large RE projects (10+ MW) anywhere on the grid
- Primary pathway for 100% RE targets

Virtual DPPA uses the existing grid, requires no infrastructure changes, and is the commercially viable path for large-scale RE procurement. Whereas Physical DPPA is constrained by geography and scale — similar to rooftop solar.



XanhTerra

# Three Principles for Bridging the Gap

**1 Design for Bankability, Not Only Ambition**

Every policy, PPA, pricing mechanism must answer: *Can a developer secure project finance on this basis?* Minimum purchase commitments, lender protections, clear dispute resolution are the foundations of a deployable policy.

**2 Match the Mechanism to the Market Stage**

Early-stage (PNG): standardized contracts, hybrid mini-grids, concessional finance.
Scaling (The Philippines, Viet Nam): competitive auctions, DPPA, grid investment.
Advanced (Chinese Taipei): system flexibility, offshore wind discipline, demand-side markets.

**3 Create Demand-Side Pull, Not Only Supply-Side Push**

Most effective RE scaling occurs when corporates actively seek RE for competitiveness.
Two-part tariffs, DPPAs, and industrial park aggregation transform RE procurement from obligation into business decisions.

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# Implications for Papua New Guinea

**<20% electrification | ~900 MW total | Diesel-dependent | 70% electrification target by 2030**

**Standardized Procurement**
Develop simple mini-PPA templates for solar-diesel-battery hybrid mini-grids with transparent tariff structures. Avoid premature market complexity.

**Solar + Storage Hybrids**
Prioritize provincial centers where diesel costs are highest. World Bank NEAT Project (USD 204 million, Nov 2024) anchors this approach.

**Institutional Sequencing**
Build PNG Power Limited capacity before introducing competitive procurement. ADB-funded Power Sector Master Plan is an essential prerequisite.

**Leverage Mining Sector**
Develop mechanisms for captive generators in mining companies (~300 MW already exist) to provide power to the grid as grid-connected IPPs. For example, PPAs could provide credible risk allocation and payment certainty.

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# Implications for The Philippines

35% RE target by 2030 | 22% RE gen. (mid-2025) | 100% foreign ownership | 178 GW offshore wind potential

**Scale Corporate RE Procurement**
Simplify RCOA compliance, improve price transparency, and enable industrial park aggregation for manufacturing, BPO centers, and data centers.

**Accelerate Grid Infrastructure**
Continue with grid expansion to support RE and third-party grid concessions to attract private capital. Only 29% of planned transmission completed by 2024

**Structured Offshore Wind Approach**
Incorporate lessons from Chinese Taipei & Viet Nam into the GEA-5: clear contracts, realistic timelines, investor-friendly terms. GEA-5 targets 3,300 MW.

**Tariff Reform as Market Signal**
Consider two-part retail tariffs (similar to Viet Nam) to make rooftop solar and BESS more compelling for industrial consumers without additional subsidies.

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# Implications for Chinese Taipei

"532" energy mix | 15.5 GW solar vs 20 GW target | 3.6 GW wind vs 5.7 GW target | ~11 GW gap by 2030

**Diversify Solar Pathways**
Develop policies to encourage C&I rooftop via third-party leasing that can scale fast. New rooftop mandate (+660 MW/yr) is a good start. Ground-mounted solar has achieved ~50% of its 12 GW target.

**Recalibrate Offshore Wind + Local Content**
Balance industrial policy with market openness in order to achieve the Phase III targets 15 GW (2026–2035); e.g., Viet Nam's Decree 58 allows up to 95% foreign ownership for offshore wind while maintaining security review mechanisms.

**Build Corporate RE Procurement**
Amend the Electricity Business Act to enable direct RE sales to consumers. The Republic of the Philippines; Viet Nam show how corporate demand for RE can accelerate deployment faster than auctions alone.

**Grid Flexibility & Energy Storage**
Implement regulations to support system integration, particularly when RE penetration is at 20%+. Viet Nam's PDP-8 targets 10–16 GW BESS by 2030 and has developed several mechanism to incentivize BESS.

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# Closing Reflection … Discussion

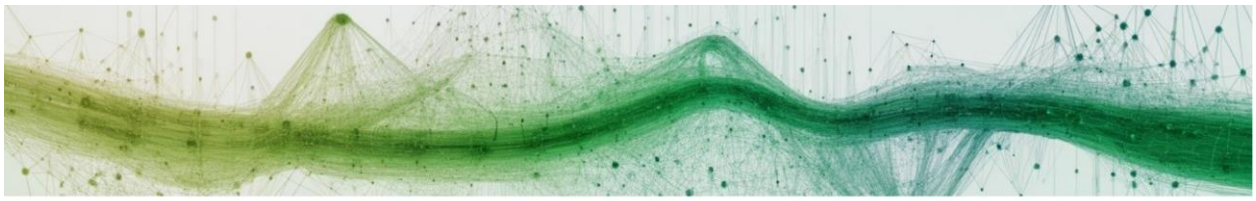
*The gap between renewable energy policy and deployment is, at its core, a gap in implementation design and bankability.*

- **PNG:** Basic electrification & institutional capacity
- **The Philippines:** Execution speed & grid modernization
- **Chinese Taipei:** Land constraints & social acceptance
- **Viet Nam:** Post-FiT market reconstruction

**Common solutions: Credible pricing • Bankable contracts • Grid readiness • Demand-side engagement**

*Discussion: How can APEC build structured peer-learning — not only at the policy level, but among developers, financiers, and grid operators — to accelerate implementation knowledge transfer?*





# Contact

XanhTerra
Strategic Intelligence for the Energy Transition era
www.xanhterra.com

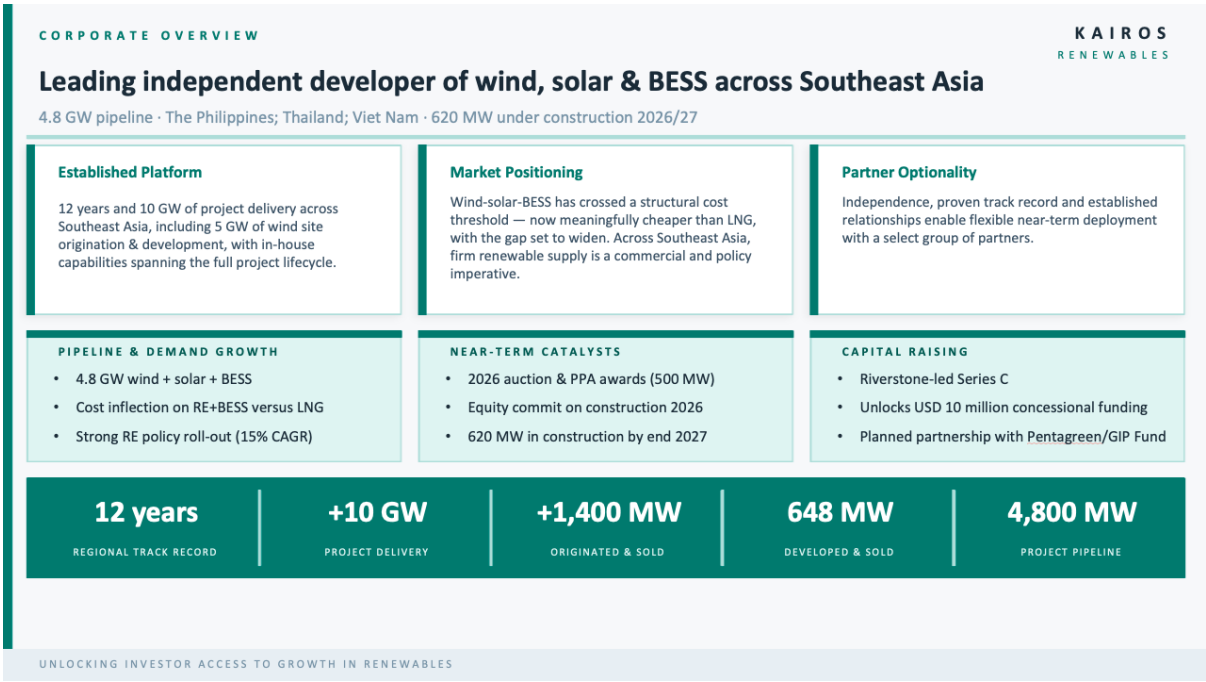
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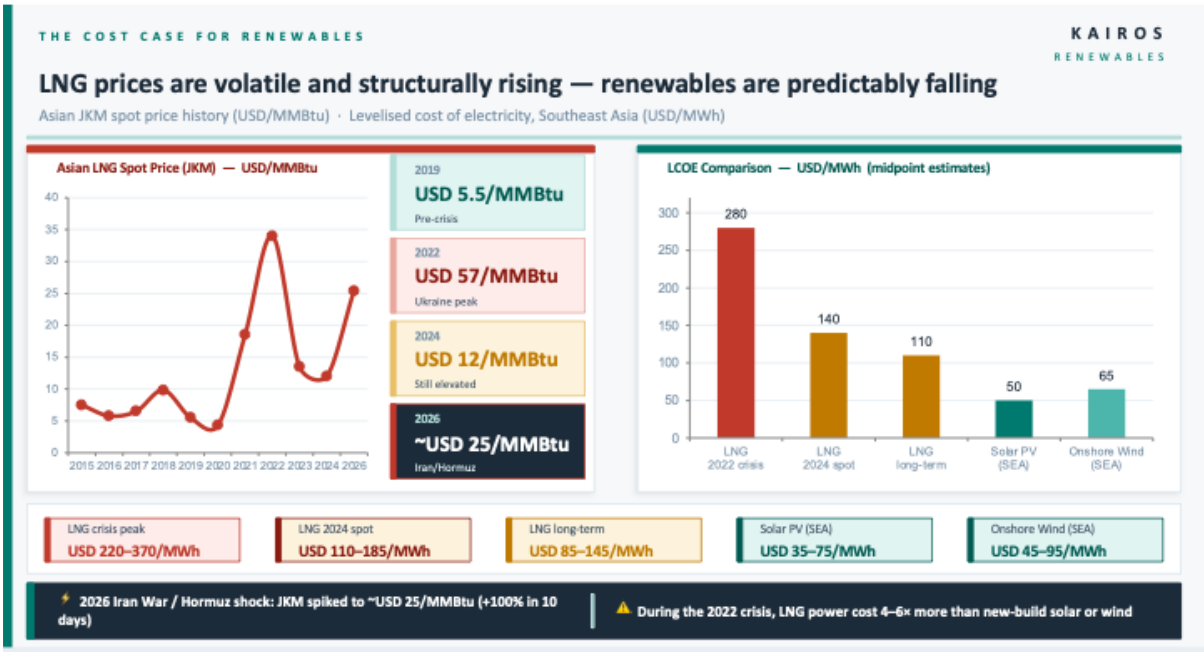
## Session 3: Business Models and Policies for Scaling Up New and Renewable Energy

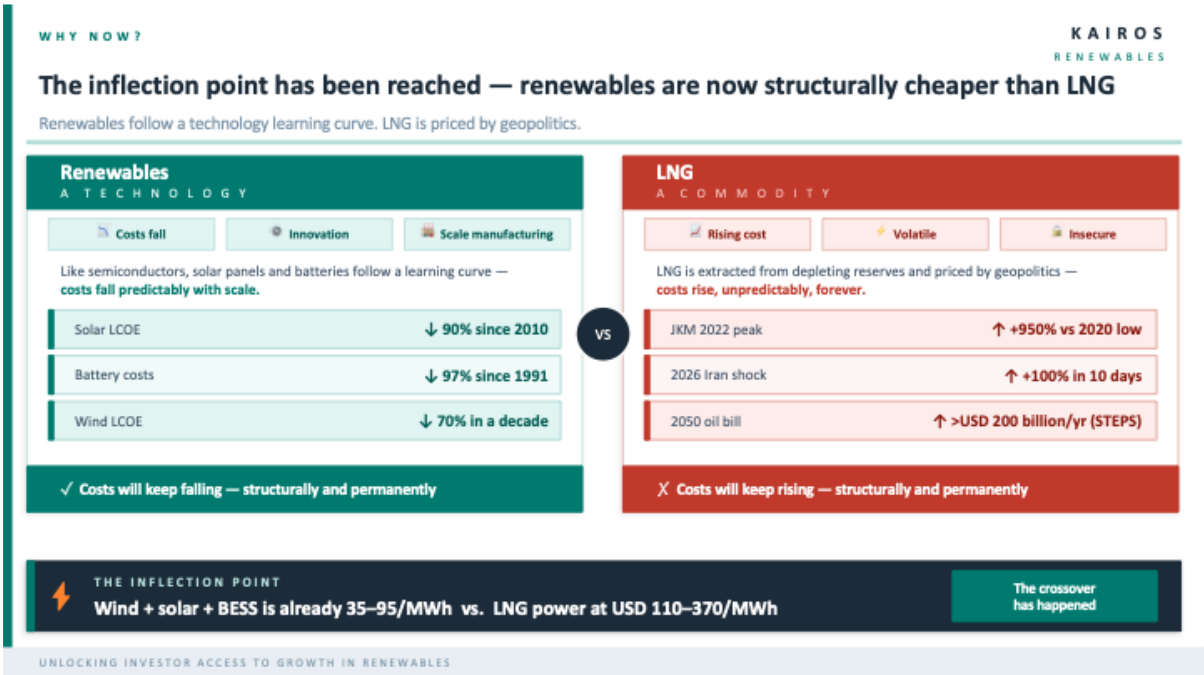
- The Rising Cost of Imported Energy (presented by Edward Douglas)
- Renewable Energy from a Social Investment Perspective (presented by Evelyn Wong)
- Bridging the Financing Gap – What it really takes to get Clean Energy Projects Funded (presented by Peter Storey)

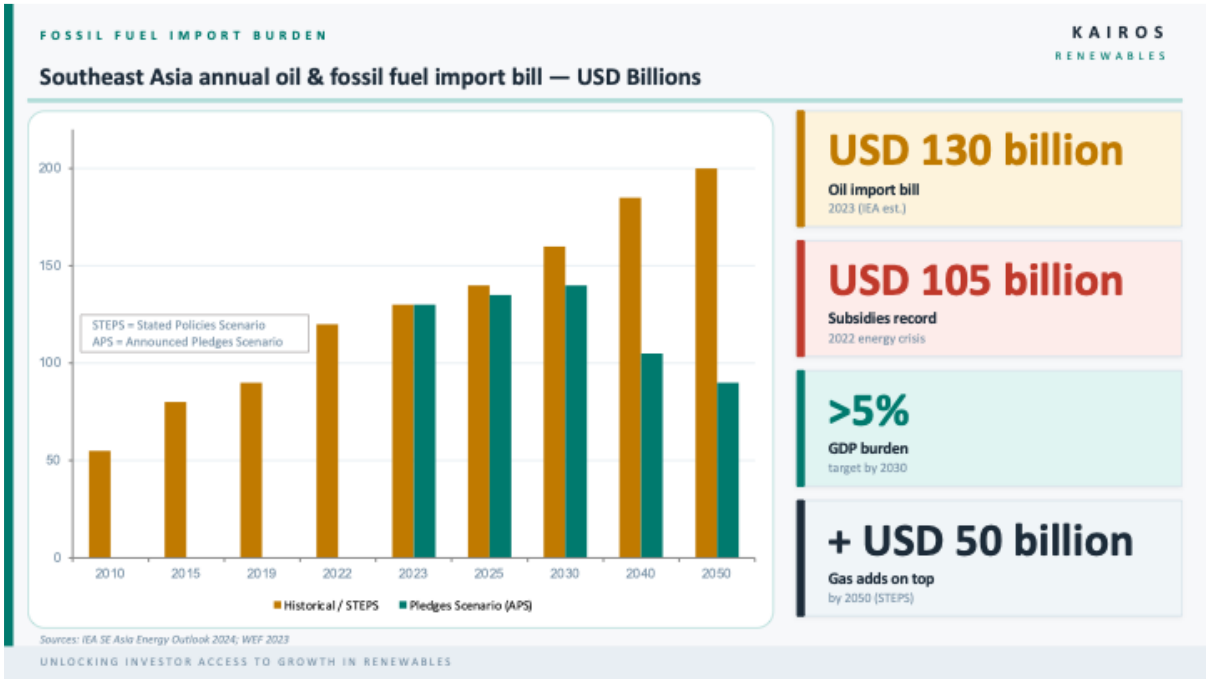


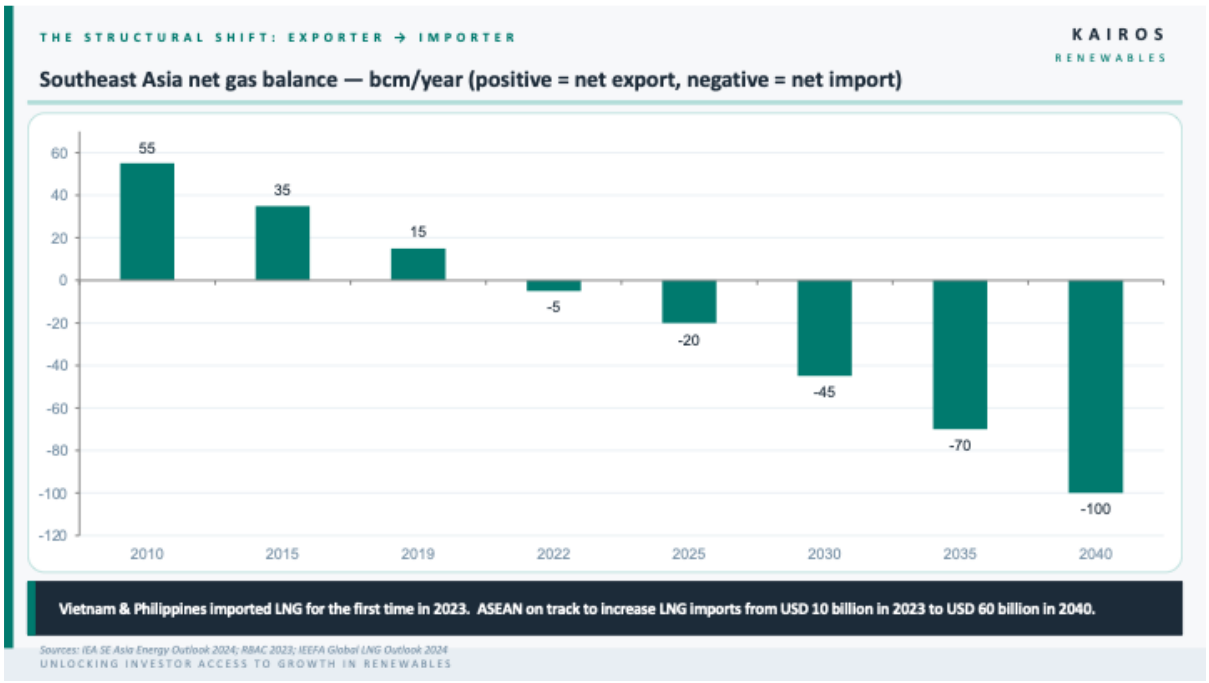

MY BACKGROUND
KAIROS
RENEWABLES
Technical Project Development & Financing of Power Projects — 37 Years
Europe →
Asia →
1989 – 2000
Engineering Groups
Gas-Fired
2000 - 2003
Private Equity
Gas-Fired
2003 - 2005
Engineering
Gas-Fired
2006 – 2019
Private Equity
Renewables
2020 – 2026
Project Developer
Renewables
Engineering Group — Gas-Fired
Private Equity — Gas-Fired
Private Equity — Renewables
Project Developer — Renewables
1989 – 2006
17 Years in Gas
Engineering & PE investment through the gas boom
2006 – 2026
20 Years in Renewables
Investing in the development & construction of renewables projects
Career timeline: direct experience across project development, private equity investment and engineering management
UNLOCKING INVESTOR ACCESS TO GROWTH IN RENEWABLES

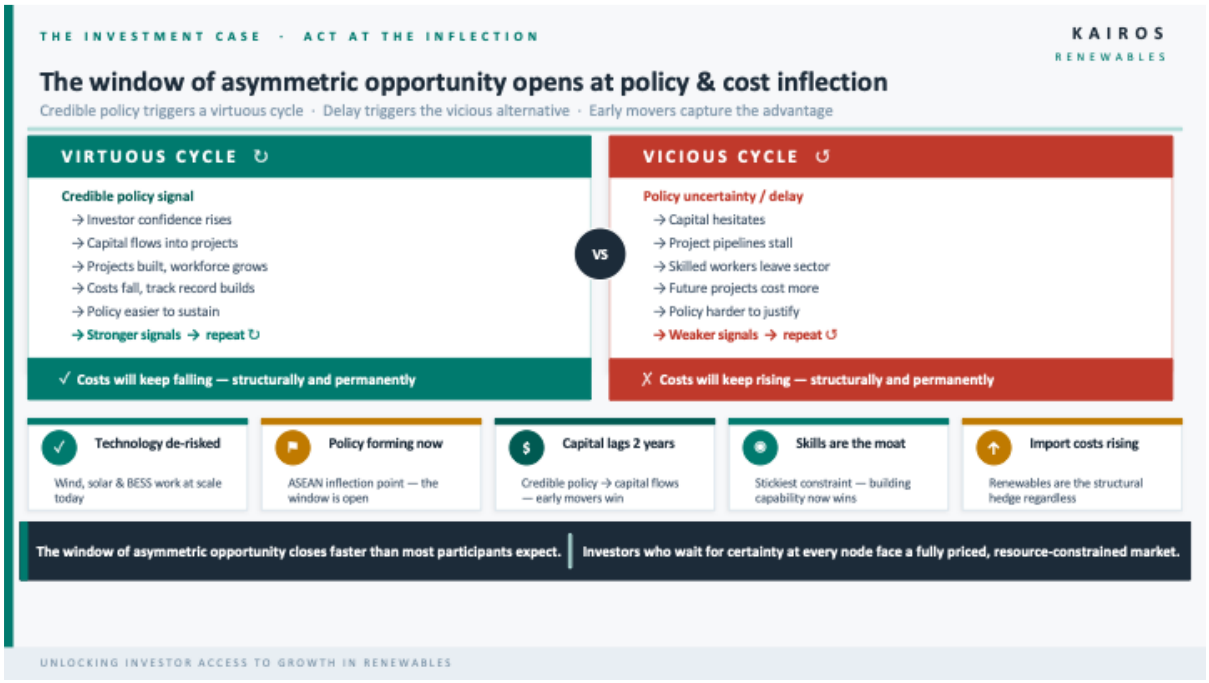

CORPORATE OVERVIEW
KAIROS
RENEWABLES
Leading independent developer of wind, solar & BESS across Southeast Asia
4.8 GW pipeline · The Philippines; Thailand; Viet Nam · 620 MW under construction 2026/27
Established Platform
12 years and 10 GW of project delivery across Southeast Asia, including 5 GW of wind site origination & development, with in-house capabilities spanning the full project lifecycle.
Market Positioning
Wind-solar-BESS has crossed a structural cost threshold — now meaningfully cheaper than LNG, with the gap set to widen. Across Southeast Asia, firm renewable supply is a commercial and policy imperative.
Partner Optionality
Independence, proven track record and established relationships enable flexible near-term deployment with a select group of partners.
PIPELINE & DEMAND GROWTH
4.8 GW wind + solar + BESS
Cost inflection on RE+BESS versus LNG
Strong RE policy roll-out (15% CAGR)
NEAR-TERM CATALYSTS
2026 auction & PPA awards (500 MW)
Equity commit on construction 2026
620 MW in construction by end 2027
CAPITAL RAISING
Riverstone-led Series C
Unlocks USD 10 million concessional funding
Planned partnership with Pentagreen/GIP Fund
12 years
REGIONAL TRACK RECORD
+10 GW
PROJECT DELIVERY
+1,400 MW
ORIGINATED & SOLD
648 MW
DEVELOPED & SOLD
4,800 MW
PROJECT PIPELINE
UNLOCKING INVESTOR ACCESS TO GROWTH IN RENEWABLES

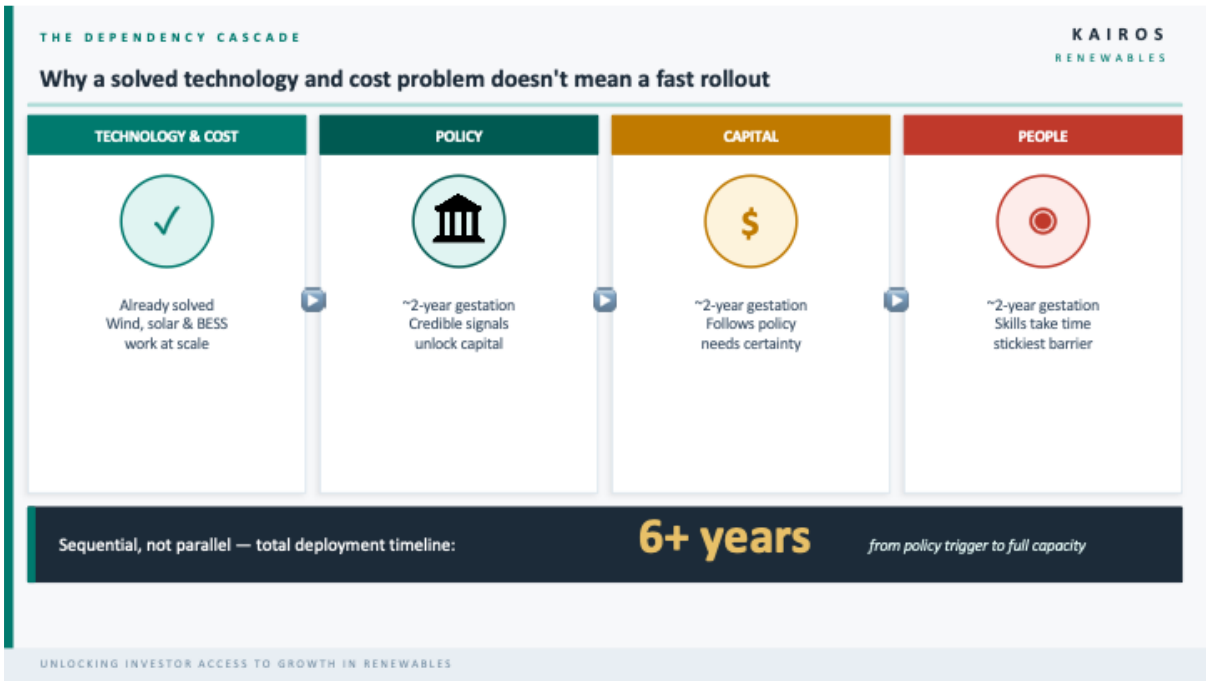

THE COST CASE FOR RENEWABLES
KAIROS RENEWABLES
LNG prices are volatile and structurally rising — renewables are predictably falling
Asian JKM spot price history (USD/MMBtu) · Levelised cost of electricity, Southeast Asia (USD/MWh)
Asian LNG Spot Price (JKM) — USD/MMBtu
2019 USD 5.5/MMBtu Pre-crisis
2022 USD 57/MMBtu Ukraine peak
2024 USD 12/MMBtu Still elevated
2026 ~USD 25/MMBtu Iran/Hormuz
LCOE Comparison — USD/MWh (midpoint estimates)
280
140
110
50
65
LNG 2022 crisis
LNG 2024 spot
LNG long-term
Solar PV (SEA)
Onshore Wind (SEA)
LNG crisis peak USD 220–370/MWh
LNG 2024 spot USD 110–185/MWh
LNG long-term USD 85–145/MWh
Solar PV (SEA) USD 35–75/MWh
Onshore Wind (SEA) USD 45–95/MWh
2026 Iran War / Hormuz shock: JKM spiked to ~USD 25/MMBtu (+100% in 10 days)
During the 2022 crisis, LNG power cost 4–6× more than new-build solar or wind
UNLOCKING INVESTOR ACCESS TO GROWTH IN RENEWABLES

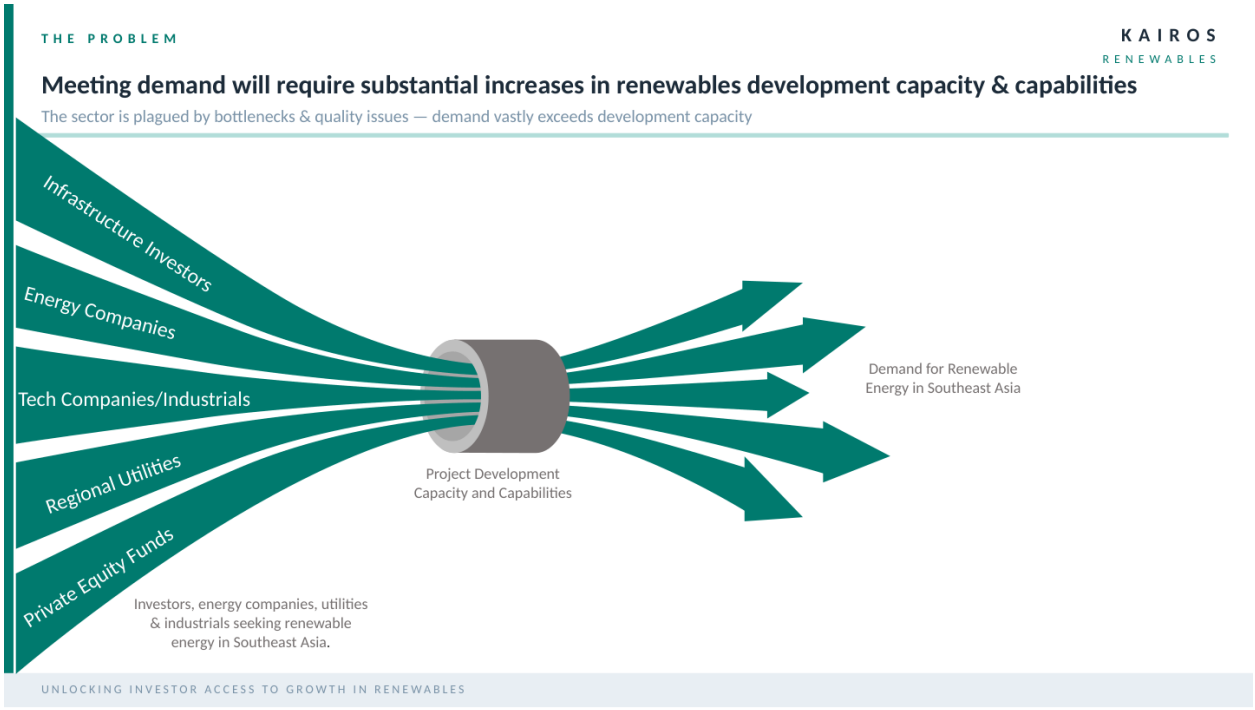

WHY NOW?
KAIROS RENEWABLES
The inflection point has been reached — renewables are now structurally cheaper than LNG
Renewables follow a technology learning curve. LNG is priced by geopolitics.
Renewables
A TECHNOLOGY
Costs fall
Innovation
Scale manufacturing
Like semiconductors, solar panels and batteries follow a learning curve — costs fall predictably with scale.
Solar LCOE ↓ 90% since 2010
Battery costs ↓ 97% since 1991
Wind LCOE ↓ 70% in a decade
✓ Costs will keep falling — structurally and permanently
VS
LNG
A COMMODITY
Rising cost
Volatile
Insecure
LNG is extracted from depleting reserves and priced by geopolitics — costs rise, unpredictably, forever.
JKM 2022 peak ↑ +950% vs 2020 low
2026 Iran shock ↑ +100% in 10 days
2050 oil bill ↑ >USD 200 billion/yr (STEPS)
✗ Costs will keep rising — structurally and permanently
THE INFLECTION POINT
Wind + solar + BESS is already 35–95/MWh vs. LNG power at USD 110–370/MWh
The crossover has happened
UNLOCKING INVESTOR ACCESS TO GROWTH IN RENEWABLES

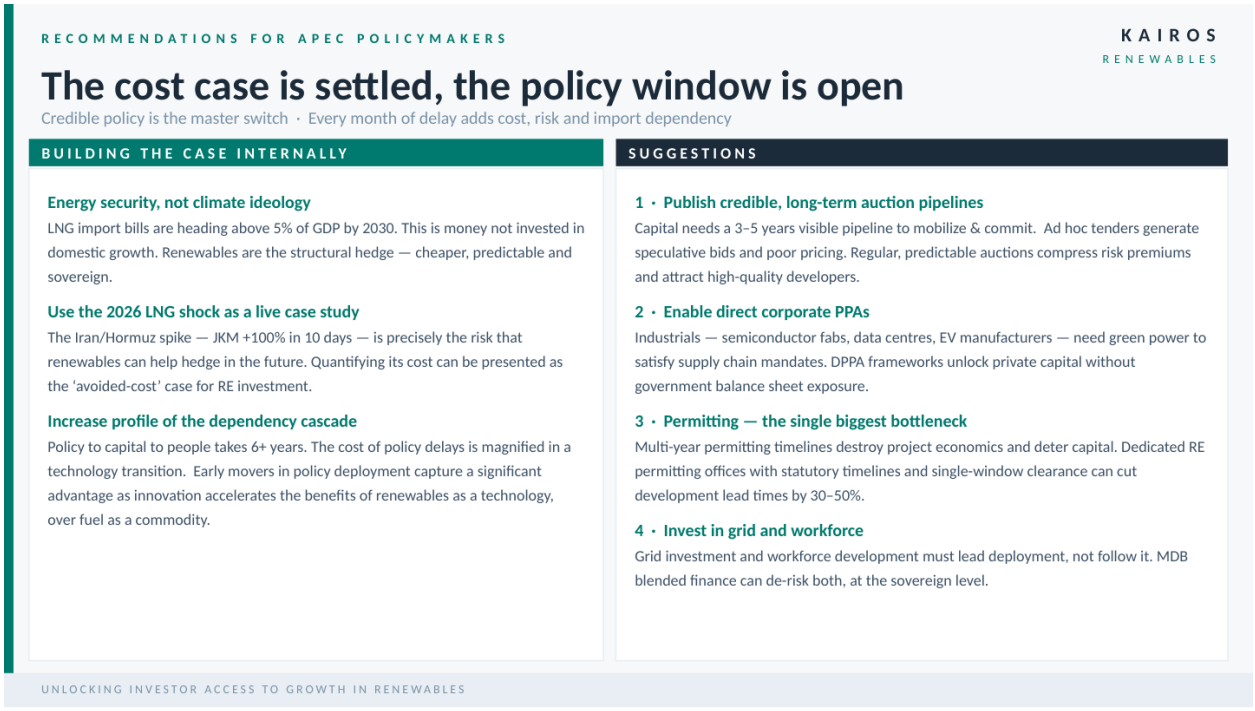

FOSSIL FUEL IMPORT BURDEN
KAIROS RENEWABLES
Southeast Asia annual oil & fossil fuel import bill — USD Billions
200
150
100
50
0
2010
2015
2019
2022
2023
2025
2030
2040
2050
STEPS = Stated Policies Scenario
APS = Announced Pledges Scenario
Historical / STEPS
Pledges Scenario (APS)
USD 130 billion
Oil import bill
2023 (IEA est.)
USD 105 billion
Subsidies record
2022 energy crisis
>5%
GDP burden
target by 2030
+ USD 50 billion
Gas adds on top
by 2050 (STEPS)
Sources: IEA SE Asia Energy Outlook 2024; WEF 2023
UNLOCKING INVESTOR ACCESS TO GROWTH IN RENEWABLES

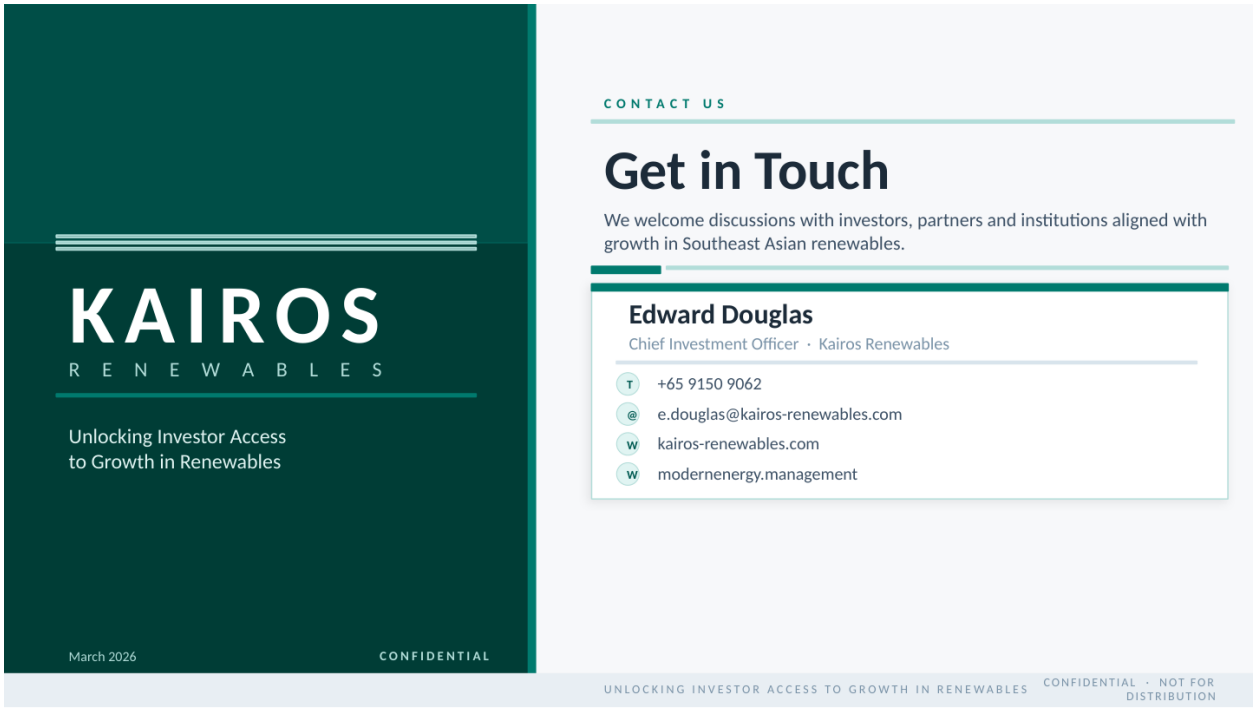

THE STRUCTURAL SHIFT: EXPORTER → IMPORTER
KAIROS RENEWABLES
Southeast Asia net gas balance — bcm/year (positive = net export, negative = net import)
60
40
20
0
-20
-40
-60
-80
-100
-120
55
35
15
-5
-20
-45
-70
-100
2010
2015
2019
2022
2025
2030
2035
2040
Vietnam & Philippines imported LNG for the first time in 2023. ASEAN on track to increase LNG imports from USD 10 billion in 2023 to USD 60 billion in 2040.
Sources: IEA SE Asia Energy Outlook 2024; RBAC 2023; IEEFA Global LNG Outlook 2024
UNLOCKING INVESTOR ACCESS TO GROWTH IN RENEWABLES

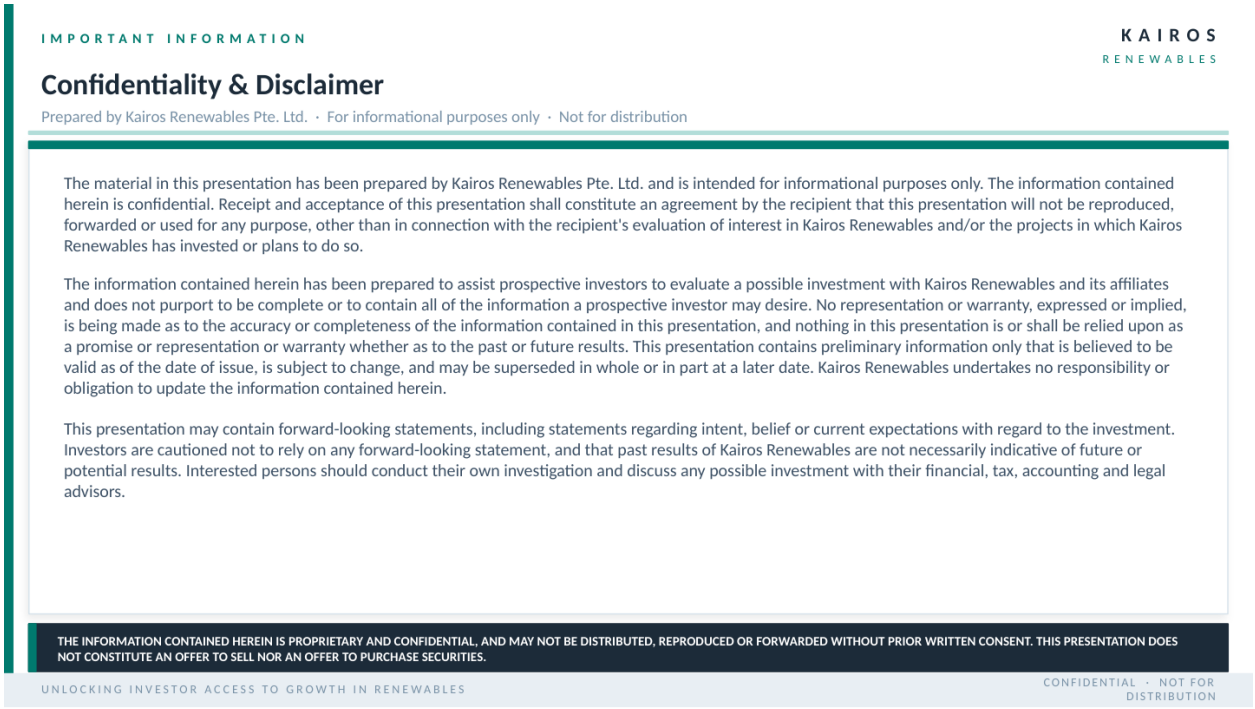

THE INVESTMENT CASE · ACT AT THE INFLECTION
KAIROS RENEWABLES
The window of asymmetric opportunity opens at policy & cost inflection
Credible policy triggers a virtuous cycle · Delay triggers the vicious alternative · Early movers capture the advantage
VIRTUOUS CYCLE
Credible policy signal
→ Investor confidence rises
→ Capital flows into projects
→ Projects built, workforce grows
→ Costs fall, track record builds
→ Policy easier to sustain
→ Stronger signals → repeat
✓ Costs will keep falling — structurally and permanently
VS
VICIOUS CYCLE
Policy uncertainty / delay
→ Capital hesitates
→ Project pipelines stall
→ Skilled workers leave sector
→ Future projects cost more
→ Policy harder to justify
→ Weaker signals → repeat
X Costs will keep rising — structurally and permanently
Technology de-risked
Wind, solar & BESS work at scale today
Policy forming now
ASEAN inflection point — the window is open
Capital lags 2 years
Credible policy → capital flows — early movers win
Skills are the moat
Stickiest constraint — building capability now wins
Import costs rising
Renewables are the structural hedge regardless
The window of asymmetric opportunity closes faster than most participants expect.
Investors who wait for certainty at every node face a fully priced, resource-constrained market.
UNLOCKING INVESTOR ACCESS TO GROWTH IN RENEWABLES


THE DEPENDENCY CASCADE
KAIROS RENEWABLES
Why a solved technology and cost problem doesn't mean a fast rollout
TECHNOLOGY & COST
Already solved
Wind, solar & BESS
work at scale
POLICY
~2-year gestation
Credible signals
unlock capital
CAPITAL
~2-year gestation
Follows policy
needs certainty
PEOPLE
~2-year gestation
Skills take time
stickiest barrier
Sequential, not parallel — total deployment timeline:
6+ years
from policy trigger to full capacity
UNLOCKING INVESTOR ACCESS TO GROWTH IN RENEWABLES

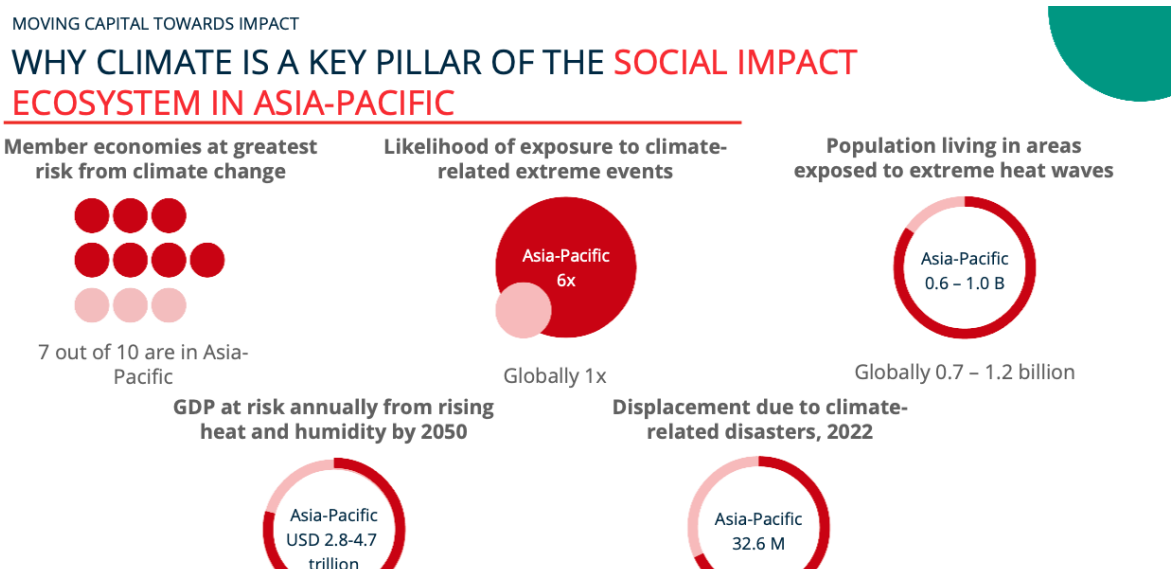

THE PROBLEM
KAIROS
RENEWABLES
Meeting demand will require substantial increases in renewables development capacity & capabilities
The sector is plagued by bottlenecks & quality issues — demand vastly exceeds development capacity
Infrastructure Investors
Energy Companies
Tech Companies/Industrials
Regional Utilities
Private Equity Funds
Project Development Capacity and Capabilities
Demand for Renewable Energy in Southeast Asia
Investors, energy companies, utilities & industrials seeking renewable energy in Southeast Asia.
UNLOCKING INVESTOR ACCESS TO GROWTH IN RENEWABLES

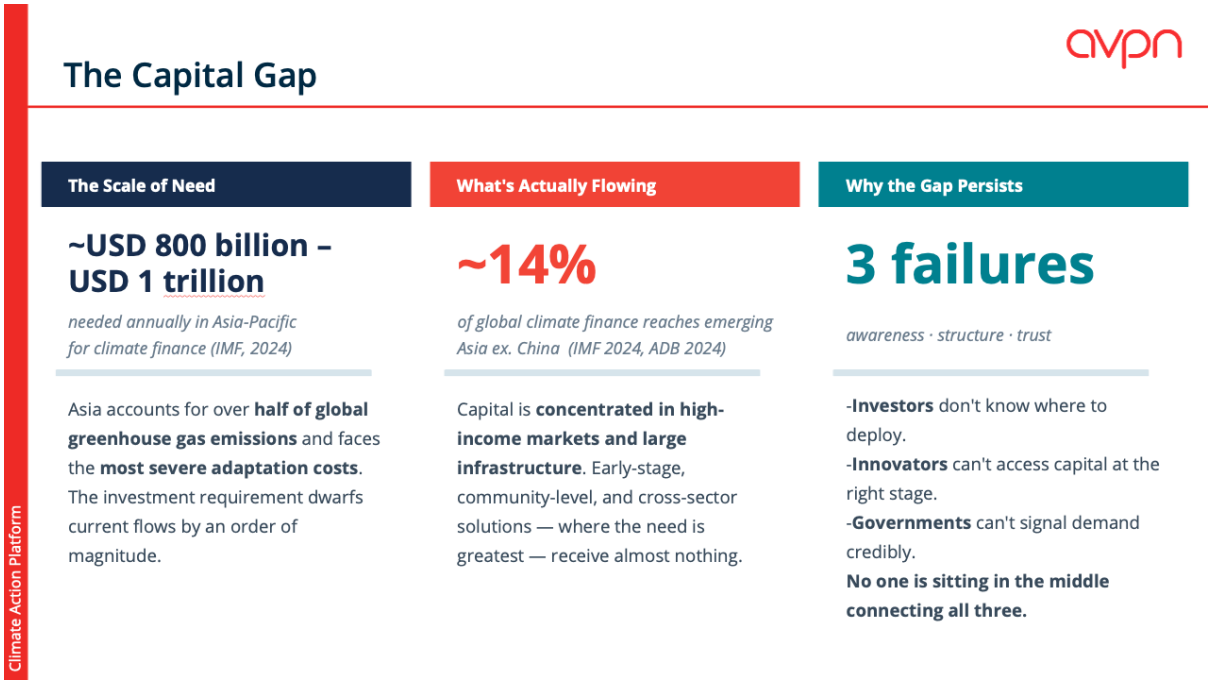

RECOMMENDATIONS FOR APEC POLICYMAKERS
KAIROS
RENEWABLES
The cost case is settled, the policy window is open
Credible policy is the master switch · Every month of delay adds cost, risk and import dependency
BUILDING THE CASE INTERNALLY
Energy security, not climate ideology
LNG import bills are heading above 5% of GDP by 2030. This is money not invested in domestic growth. Renewables are the structural hedge — cheaper, predictable and sovereign.
Use the 2026 LNG shock as a live case study
The Iran/Hormuz spike — JKM +100% in 10 days — is precisely the risk that renewables can help hedge in the future. Quantifying its cost can be presented as the 'avoided-cost' case for RE investment.
Increase profile of the dependency cascade
Policy to capital to people takes 6+ years. The cost of policy delays is magnified in a technology transition. Early movers in policy deployment capture a significant advantage as innovation accelerates the benefits of renewables as a technology, over fuel as a commodity.
SUGGESTIONS
1 · Publish credible, long-term auction pipelines
Capital needs a 3–5 years visible pipeline to mobilize & commit. Ad hoc tenders generate speculative bids and poor pricing. Regular, predictable auctions compress risk premiums and attract high-quality developers.
2 · Enable direct corporate PPAs
Industrials — semiconductor fabs, data centres, EV manufacturers — need green power to satisfy supply chain mandates. DPPA frameworks unlock private capital without government balance sheet exposure.
3 · Permitting — the single biggest bottleneck
Multi-year permitting timelines destroy project economics and deter capital. Dedicated RE permitting offices with statutory timelines and single-window clearance can cut development lead times by 30–50%.
4 · Invest in grid and workforce
Grid investment and workforce development must lead deployment, not follow it. MDB blended finance can de-risk both, at the sovereign level.
UNLOCKING INVESTOR ACCESS TO GROWTH IN RENEWABLES


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Unlocking Investor Access
to Growth in Renewables
March 2026
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Get in Touch
We welcome discussions with investors, partners and institutions aligned with growth in Southeast Asian renewables.
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avpn
APEC Workshop: RE Policies and Investments: Are We on the Right Track?
Bangkok
31 March 2026
Evelyn Wong, Policy Director, AVPN


MOVING CAPITAL TOWARDS IMPACT
WHY CLIMATE IS A KEY PILLAR OF THE SOCIAL IMPACT ECOSYSTEM IN ASIA-PACIFIC
Member economies at greatest risk from climate change
7 out of 10 are in Asia-Pacific
Likelihood of exposure to climate-related extreme events
Asia-Pacific 6x
Globally 1x
Population living in areas exposed to extreme heat waves
Asia-Pacific 0.6 – 1.0 B
Globally 0.7 – 1.2 billion
GDP at risk annually from rising heat and humidity by 2050
Asia-Pacific USD 2.8-4.7 trillion
Globally USD 4.0-6.0 trillion
(with significant raise in unpaid work by women)
Displacement due to climate-related disasters, 2022
Asia-Pacific 32.6 M
Globally 49.4 million
(with 80% being women)


Climate Action Platform
The Capital Gap
avpn
The Scale of Need
~USD 800 billion – USD 1 trillion
needed annually in Asia-Pacific for climate finance (IMF, 2024)
Asia accounts for over half of global greenhouse gas emissions and faces the most severe adaptation costs. The investment requirement dwarfs current flows by an order of magnitude.
What's Actually Flowing
~14%
of global climate finance reaches emerging Asia ex. China (IMF 2024, ADB 2024)
Capital is concentrated in high-income markets and large infrastructure. Early-stage, community-level, and cross-sector solutions — where the need is greatest — receive almost nothing.
Why the Gap Persists
3 failures
awareness · structure · trust
-Investors don't know where to deploy.
-Innovators can't access capital at the right stage.
-Governments can't signal demand credibly.
No one is sitting in the middle connecting all three.

Driving Asian Leadership Toward the Climate Agenda

## The Vision

Climate Action Platform 2.0

"AVPN's Climate Action Platform will drive Asian Leadership in Climate Agenda, to channel more resources into climate action, and *accelerate the global transformation to resilient, sustainable and positive future, for all*."

- "Changes in Asia will significantly contribute to the fight against climate change globally"
- Help build this narrative of climate action leading to a new pathway for growth in Asia
- The impact in this "Asian Decade"

5 | www.avpn.asia

Driving Asian Leadership Toward the Climate Agenda

## We are the connective tissue between thought leadership, committed capital and project execution

Climate Action Platform 2.0

### Climate Mitigation

*Advancing initiatives with strong potential to significantly reduce greenhouse gas (GHG) emissions within the current decade, particularly through active engagement with policies and large scale actions.*

Greenhouse Gas Emissions (GHG) · Decarbonisation · Renewable Energy · Food Systems · Low-Carbon Growth · Waste Management · Forestry & Land Use

**Connect**

### Climate Adaptation

*Enabling AVPN Ecosystem actors to innovate and implement strategies to combat the vulnerability to the impacts of climate change*

Nature-Based Solutions · Ecosystem Restoration · Water Management & Flood Control · Climate Resilient Infrastructure · Resilient Agriculture/ Food Security

**Learn**

**Act**

### Climate Resilience

*Encouraging collaboration and engage with policies that contribute to building resilient communities and actively address climate action in marginalized/vulnerable communities*

Community Resilience · Sustainable Livelihoods · Disaster Preparedness · Biodiversity Conservation · Resource Management · Health & Social Resilience

**Lead**

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## Examples of Our Initiatives

### 1. Capacity building for local climate CSOs: Supporting quality evidence generation and bridging policy and implementation

A strategic and collaborative philanthropic effort aimed to provide high-quality inputs, through validated research and learnings from technical partners to governments in two Asian economies – India and Indonesia, to develop and execute evidence based research and practices that reduce greenhouse gas (GHG) emissions in alignment with national & international climate commitments.

**THE GAP**

- Climate CSOs growing across Asia but unevenly, most lack resources to drive change at scale
- Strong technical evidence exists but is not reaching policy actors or capital providers in decision-ready form
- Limited pathways to translate climate research into investable narratives and regulatory signals, particularly for RE adoption

**THE INTERVENTION**

- Donor fund: unrestricted, multi-year grants enabling research-to-policy translation
- Tailored technical assistance based on organisational needs
- Knowledge-sharing forums connecting researchers with investors and policymakers
- Partner convenings to connect ecosystem actors across RE and decarbonisation (IRADe, AEEE)

**EXAMPLES & IMPACT**

- CEEW: Positioned green economy research (incl. RE pathways) for investment and regulatory audiences
- Development Alternatives: Piloted LC3 low-carbon cement with JK Lakshmi Group, moving from lab to commercial adoption
- IIHS: Policy-relevant research on building energy performance, improve urban sustainability standards
- IRADe: Inception workshop on low-carbon captive power options for the Indian aluminium industry, identifying RE-based alternatives to fossil fuel captive generation
- AEEE: Decarbonising horticulture cold chain launch and e-cart demonstration in Bihar, exploring last-mile delivery models and RE-powered cold chain scaling
- **Collective abatement target: 100M tCO2e annually**

## 2. Facilitating clean growth investment: subeconomy funding vehicles, partnerships, pipelines

This initiative aims to build institutional muscle and momentum in several South Asian states as they takes steps to lower the intensity of its emissions. It enables convergence across key sectors such as energy, industry, transport, buildings, and agriculture, with a focus on emission mitigation, job creation, vulnerability reduction, and broader co-benefits.

**THE GAP**

- Subeconomy climate finance overwhelmingly public, straining limited state budgets
- No established models for private and philanthropic capital to de-risk distributed RE and clean growth at the state level
- Rural enterprises and SMEs lack access to RE financing despite clear economic and environmental benefits

**THE INTERVENTION**

- Leverage investment potential by designing viability gap funding and blended finance structures and providing subsidies and capital investment.
- Facilitate public/private partnerships and city/state grantee agreements.
- Support the scaling of research/ solutions; provide technical assistance and digital tools to implement actionable climate solutions.
- Provide strategic advisory, policy support and design compliance incentives to trigger structural shifts.

**EXAMPLES & IMPACT**

- Capital and Partner Mobilisation: UP MoU: USD 325M expected mobilisation over 5 years. Initial focus: rooftop solar for industrial parks (Gautam Buddh Nagar, Ghaziabad), agri-voltaic solutions in polyhouses, solarisation of agricultural feeders, transition of diesel irrigation pumps to solar
- Direct Deployment: 2 examples of rooftop solar (3.5kW and 35 kW systems) in Maharashtra for farmer associations (FPOs); supported district-wide pipeline development including 35 project design documents representing 220kW solar pipeline.

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## 3. ASCENT: Accelerating Asia's Energy Transition through Blended Finance

This initiative aims to build institutional muscle and momentum in several South Asian economies as they takes steps to lower the intensity of its emissions. It enables convergence across key sectors such as energy, industry, transport, buildings, and agriculture, with a focus on emission mitigation, job creation, vulnerability reduction, and broader co-benefits.

**THE GAP**

- Asia produces >50% of global emissions, receives <20% of global climate finance
- <1% of transition financing reaches people-centric solutions
- Workers, communities, SMEs, and low-income consumers face job losses, rising costs, and inequality during transition
- RE infrastructure is scaling, but without inclusion mechanisms the transition risks being fast in scale and unjust in impact

**THE INTERVENTION**

- Launched ASCENT to mobilise blended capital into socially inclusive energy solutions
- Phase 1 complete: evidence base established, people-centric feasibility demonstrated, ecosystem alignment built
- Impact measurement framework across 4 stakeholder groups: Workers, Communities, Consumers, SMEs
- Published BCG-AVPN framework report (Sept 2025)

**EXAMPLES & IMPACT**

- Case studies documented in BCG-AVPN report include: RE upskilling for workers (Singapore), solar-powered cold storage for fisherfolk communities (Indonesia), rural electrification via off-grid solar and mini-hydro (Malaysia), and SME capability building for clean energy investment (South Africa)
- Growing interest from impact investors in exploring people-centric energy transition opportunities
- Phase 2: designing blended finance mechanisms leveraging philanthropic and concessional capital, expanding investor partnerships, fund launch

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## Read Our Latest Reports













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Bridging the Financing Gap –
What it really takes to get Clean Energy Projects Funded
Peter Storey, PFAN
APEC Workshop on *RE Policies & Investments - Are we on the Right Track?*
Bangkok, 31.03.26

## Contents

THE PRIVATE FINANCING ADVISORY NETWORK

- **Brief Introduction**
- **Overview of the Project Development & Financing Cycle**
- **What are the Challenges**
- **An Eco-system Approach**
  - **Buy-Side**
  - **Sell- Side**
  - **Enabling Environment**
- **Lessons Learned & Recommendations**

*We'll examine how our three-pillar approach creates a cohesive, unified offering that addresses the "missing middle" in climate finance.*



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## 20 Years of Successful Project Preparation for Clean Energy & Climate Projects & SMEs

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### Impact so far:

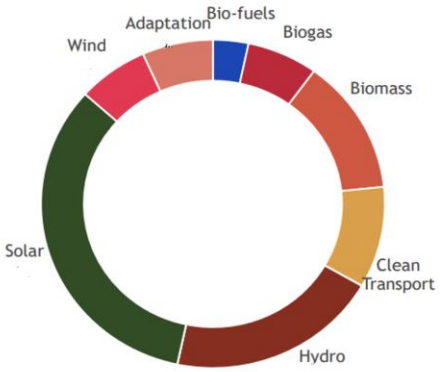
**USD 3.6 billion**
Investment Leveraged

**264**
Projects Financed

**1.847MW**
Clean Capacity Added

**5,2 GT**
Annual CO2 Emissions Mitigated

**1.400+**
Projects Supported






## The Private Financing Advisory Network (PFAN)

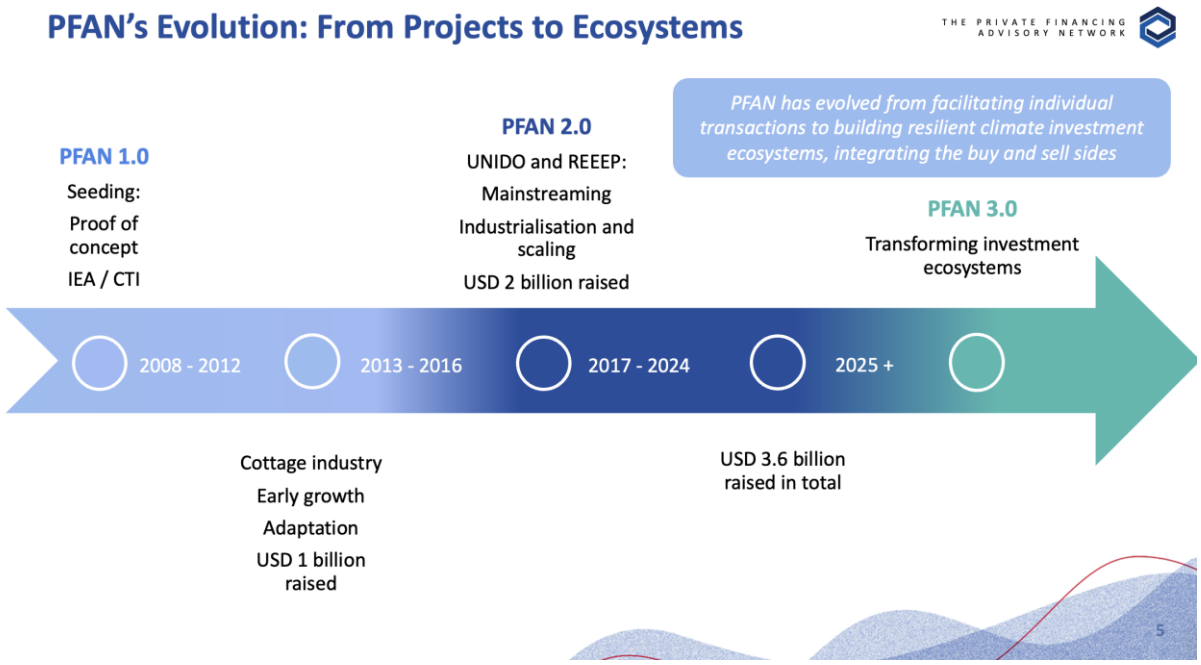
THE PRIVATE FINANCING ADVISORY NETWORK

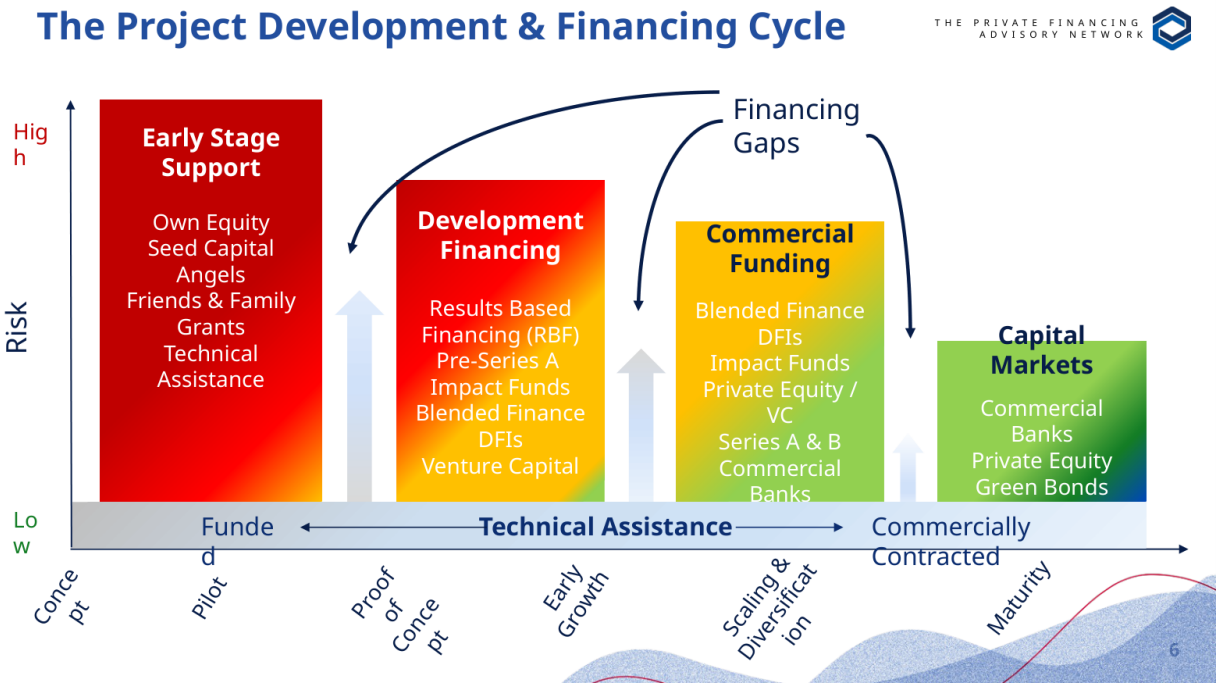



PFAN is a global network of financing experts aiming to transform investment ecosystems through advisory services and transaction support to entrepreneurs developing clean energy and climate adaptation solutions.

Acting as a trusted intermediary, PFAN facilitates increased financing flows between investors and climate adaptation and clean energy businesses by:

- ✓ Creating investor-ready opportunities
- ✓ Building capacity in local financing ecosystems
- ✓ Accelerating project development and investment


PFAN's Evolution: From Projects to Ecosystems
THE PRIVATE FINANCING ADVISORY NETWORK
PFAN has evolved from facilitating individual transactions to building resilient climate investment ecosystems, integrating the buy and sell sides
PFAN 1.0
Seeding:
Proof of concept
IEA / CTI
PFAN 2.0
UNIDO and REEEP:
Mainstreaming
Industrialisation and scaling
USD 2 billion raised
PFAN 3.0
Transforming investment ecosystems
2008 - 2012
2013 - 2016
2017 - 2024
2025 +
Cottage industry
Early growth
Adaptation
USD 1 billion raised
USD 3.6 billion raised in total
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The Project Development & Financing Cycle
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Financing Gaps
Early Stage Support
Own Equity
Seed Capital
Angels
Friends & Family
Grants
Technical Assistance
Development Financing
Results Based Financing (RBF)
Pre-Series A
Impact Funds
Blended Finance
DFIs
Venture Capital
Commercial Funding
Blended Finance
DFIs
Impact Funds
Private Equity / VC
Series A & B
Commercial Banks
Capital Markets
Commercial Banks
Private Equity
Green Bonds
High
Low
Risk
Funded
Technical Assistance
Commercially Contracted
Concept
Pilot
Proof of Concept
Early Growth
Scaling & Diversification
Maturity
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## What are the Challenges?

THE PRIVATE FINANCING ADVISORY NETWORK

### The "Missing Middle"



**Limited Supply of Investor-ready Projects**

- Oversupply of poorly structured projects
- Lack of financial & commercial skills
- 1st time developers
- High perceived risk levels
- Lack of reliable data
- Unrealistic expectations
- Increasing sector & transaction differentiation

**Ecosystem Inefficiencies**

- Regulatory gaps hinder innovative financing approaches
- Unclear Sector Regulation
- Lack of Coordination
- Slow Decision Making
- Incomplete / inefficient Value Chains
- Conservative approach to technology & business model

**(S)Low Investment Levels**

- Large supplies of financing
- Underdeveloped investment cultures and risk assessment
- Low familiarity with technologies & business models
- Low liquidity - limited number of exits
- Lack of resources for investment preparation & post investment Technical Assistance
- Need for transaction volume & scale

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## Integrated Eco-System Approaches

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An integrated service delivery model creates a virtuous cycle where improvements in one area strengthen the entire ecosystem, maximizing impact and sustainability.

**Sell-Side Support to SMES**

- ✓ Origination
- ✓ Deal Preparation
- ✓ Transaction Mgmt
- ✓ Investment Facilitation
- ✓ Integration of Funding
- ✓ Growth
- ✓ Co-financing
- ✓ Impact & ESG
- ✓ Compliance & Governance
- ✓ Gender



**Buy-Side Support to Investors & Facility Managers**

| Pre-Investment | Post-Investment |
|---|---|
| ✓ Pipeline Preparation | ✓ Co-Finance |
| ✓ Investment Preparation | ✓ Growth Strategy |
| ✓ Transaction Mgmt | ✓ Compliance & Gov. |
| ✓ DD & CPs | ✓ ESMS & Gender |
| | ✓ Trouble Shooting |

**Ecosystem Integration**

- ✓ Deepening of Value Chains
- ✓ Co-Creation of Financial Instruments to fill gaps
- ✓ Sectoral Approaches
- ✓ Regulatory Strengthening
- ✓ Identification and solving of bottlenecks
- ✓ Stakeholder co-ordination

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## Lessons Learned & Recommendations

THE PRIVATE FINANCING ADVISORY NETWORK

- **Focus on Sectoral Approaches:** Energy Access / Solar / Energy Efficiency / Bio-Energy / W2E (etc) in respect of Value Chain Approach and to generate efficiencies & respond to investor appetites
- **Need for integrated TA service delivery models** deploying proven methodologies, but with high degree of flexibility for customization, delivering state of the art data, analysis, knowledge products & MRV and built on robust back offices and established systems
- Emphasis on building the **local investment eco-system**, reducing donor and fly-in consultant dependency
- Need for alignment with NDCs, donor programmes and cross-sector stakeholder engagement.
- **Local Task Forces and Communities of Practice** to address market gaps: operational on-ground insight informs research, knowledge products & targeted capacity building as well as development of financial instruments to address critical market gaps
- **Challenges of developing & structuring blended finance instruments** and platforms especially in respect of time to market
- **High leverage effect & transformational impact** at ecosystem level

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PFAN

REEEP



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## Success story – Asia
## ATEC Biodigesters International

- ATEC Biodigesters International, which reached financial close after winning the business plan competition at the 2017 PFAN Climate & Clean Energy Investment Forum in Vienna, has become the world's leading producer of household biodigesters, providing renewable biogas for cooking and organic fertiliser to low-income households.




- **Technology:** Biogas
- **Location:** Cambodia
- **Investment amount:** USD 700,000

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## Success story – Asia
## Frontier Markets Consulting Private Limited

- Frontier Markets is a for profit social enterprise which targets the energy access challenge faced by rural household. Frontier Markets provides villagers in India with access, training, and servicing for clean-energy products.
- They offer a distribution model, collaborating with local entrepreneurs and they are also focused on identifying women leaders and woman-focused NGOs.



- **Technology:** Solar
- **Location:** India
- **Investment amount:** USD 340,000

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## Success story – Asia
## Rooftop Solar Plant Project

- The Rooftop Solar Plant Project converted the rooftops of 27 Big C supermarkets, part of one of Thailand's biggest retail chains, into solar plants. In June 2017, Sharp Solar Solution Asia was selected to build the systems. Discussions continue around the possible expansion of the project to Big C's other 97 stores.



- **Technology:** Solar
- **Location:** Thailand
- **Investment amount:** USD 12.5 million

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## Success Story – East Africa
## Ubuntu Towers

- The most direct benefit to Ugandans provided by Ubuntu is employment. In addition to dozens of direct employees, the business indirectly employs over 2,000 people, providing them with secure and fair employment. Uganda is a primarily agricultural economy with 70% of people engaged in the sector, so enabling smoother communication and payment to empower farmers has a myriad of positive impacts.



- **Technology:** Solar
- **Location:** Uganda
- **Investment amount:** USD 15,950,000

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## Success story – Southern Africa
## Bronkhorstspruit Biogas Project (Pty) Ltd – Bio2Watt

- BBP is the first commercial scale biogas project in South Africa. It is an independent commercial enterprise that will contribute to diversifying the South African energy mix away from coal. The plant came on stream in August 2015 and will generate 4.4 MW at full design capacity. The project will result in the creation of long-term direct and indirect employment in peri-urban South Africa, which currently experiences high levels of unemployment.

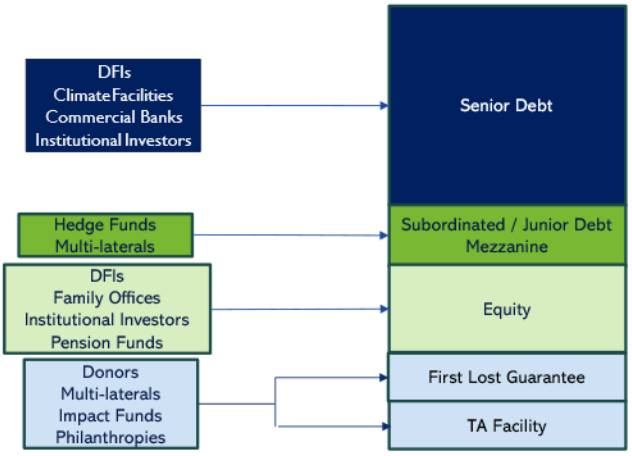


- **Technology:** Biogas
- **Location:** South Africa
- **Investment amount:** USD 12.5 million

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## Typical Blended Finance Capital Stack

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Access to DFIs and Climate Facilities not only potentially helps bridge an equity / debt gap, but also helps attract other lenders

Currently most challenging category to raise for climate funds

First Loss helps mitigate risk for equity & debt investors , but can impose unrealistic conditions on fund manager esp if SFDR 8 or 9 is adopted

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## Expanded Target Sectors & Technologies

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### Clean Energy

- Rural Electrification & Energy Access
- Energy Efficiency & Demand Reduction
- Sustainable Transport
- Clean Cooking
- Renewable Energy & Storage
- Distributed Generation



### Climate Adaptation

- Agriculture & Agribusiness
- Cooling
- Forestry / Carbon Credits
- Water & Sanitation
- Climate Resilient Infrastructure (incl. Tourism)
- Alternative Proteins



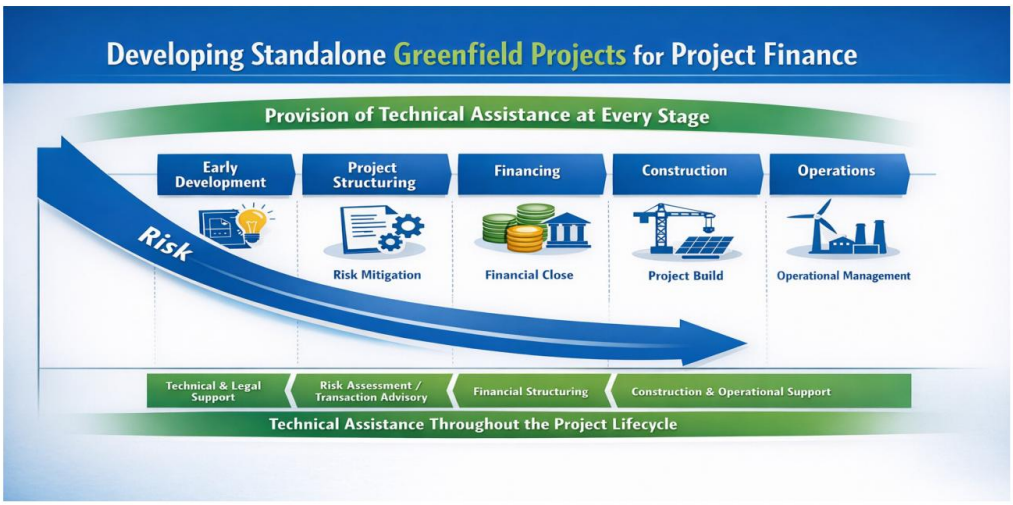
### Circular

- Waste Treatment
- Resource Efficiency
- Sustainable Materials (new materials, plastics, packaging)
- Recycling

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## Raising Project Finance for an IPP

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## Closing and Next Steps

Asia-Pacific Economic Cooperation

APERC

# Way Forward

**Capacity Building Workshop for New and Renewable Energy Policy (EWG_104_2025A)**
**Theme: *RE Policies and Investments: Are We on the Right Track?***

**Amari Bangkok, Bangkok, Thailand | 31 March 2026**

Ms Elvira Torres Gelindon, Research Fellow, APERC



## Outline

- At the workshop
- After the workshop
- Final thoughts

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## At the workshop

- **Post evaluation**
  - Complete the APEC Project Evaluation Survey
- **Theme for Phase 2** and future workshops
  - Any ideas for a theme?
- Did you have a **clearer understanding of which policy approaches** have proven most effective in different contexts?
  - Have you thought of a best practice that you can share with your policy makers?





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## After the workshop




- ***LTEAP*** *(6 months after the project completion date)*

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*Sustainability*

- **Workshops and Surveys**
  - Phase 2 – proposed a Concept Note
  - Next EGNRET (65) meeting
  - Do you have a topic or theme that can be implemented for Phase 2?
  - Post evaluation survey
    - determine whether the recommendations will be adopted
    - priority actions APEC economies can pursue over the next three to five years to accelerate renewable energy deployment.
- **Workshop Summary Report**
  - Published on the APEC and APERC websites
  - Best practices sharing as a reference for addressing challenges and opportunities
  - Reference for recommendations

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## Final thoughts

- Continue collaboration with EGNRET and other APEC fora and expert groups.
- Effective policy implementation depends on robust cooperation across agencies.
- Member exchanges of best practices, challenges, and opportunities serve as a valuable starting point for shaping future policies.
- Finally, thanks to the experts who provided valuable insights and recommendations, to the consultants for ensuring a smooth workshop (who will also deliver a valuable report) and the active participation of all the participants.



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## Thank you.

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