

STATE OF THE MARKETS: PRICES, TRENDS AND DEVELOPMENTS ACROSS THE REGION



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Wednesday, 22 April 1:30-2:00 PM

From Vision to Viability: Developer insights on building a net zero future

Renewable Energy Markets Asia Conference

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A global power market and grid analytics firm

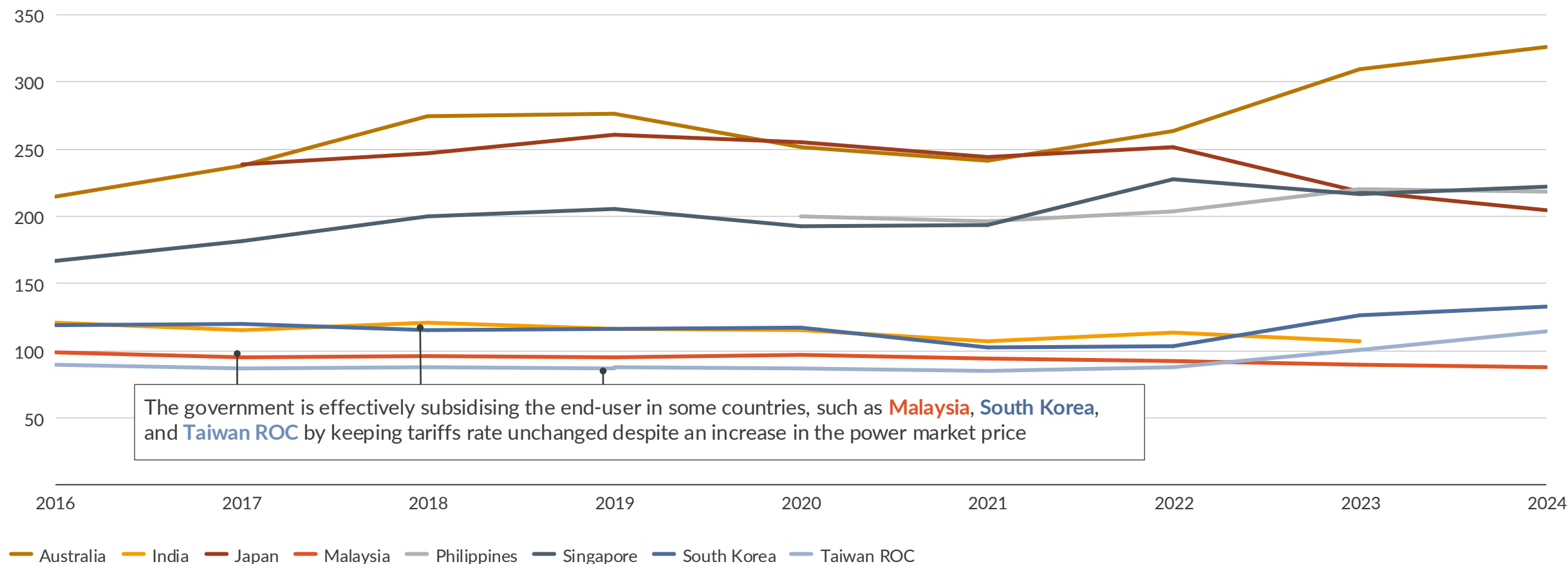
More precise valuation with long-term grid curtailment forecast

>\$45bn USD worth of bankable transactions with Aurora's forecast to-date globally

- I. Energy trilemma – Affordability vs. Reliability vs. Sustainability
- II. Renewables potential and risks
- III. Potential of cross border trade / ASEAN Power Grid

Affordability: Tariffs are typically lower in Single Buyer markets due to government intervention, but also creates financial challenges amid global commodity volatility

Historical retail tariff
US\$/MWh, real 2024

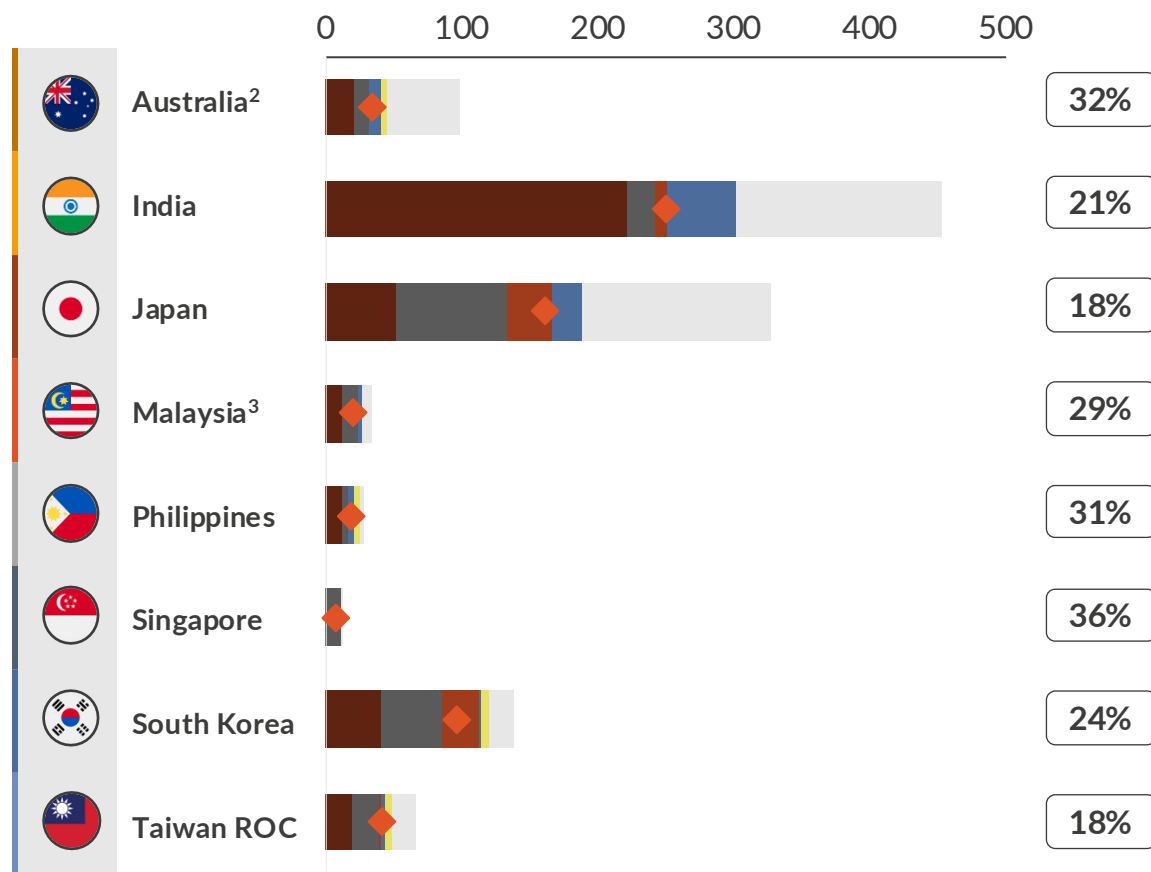


1) Assuming the rate during the winter season and 4-person household typical consumption. 2) Low voltage residential data. Comparing 2017 to 2020 rather than 2016 to 2020 due to data availability. 3) Comparing 2020 to 2023 rather than 2020 to 2024 due to data availability.

Reliability: There are sufficient margins in the systems to meet growing demand, however it is critical to enable renewables economically and out-compete coal

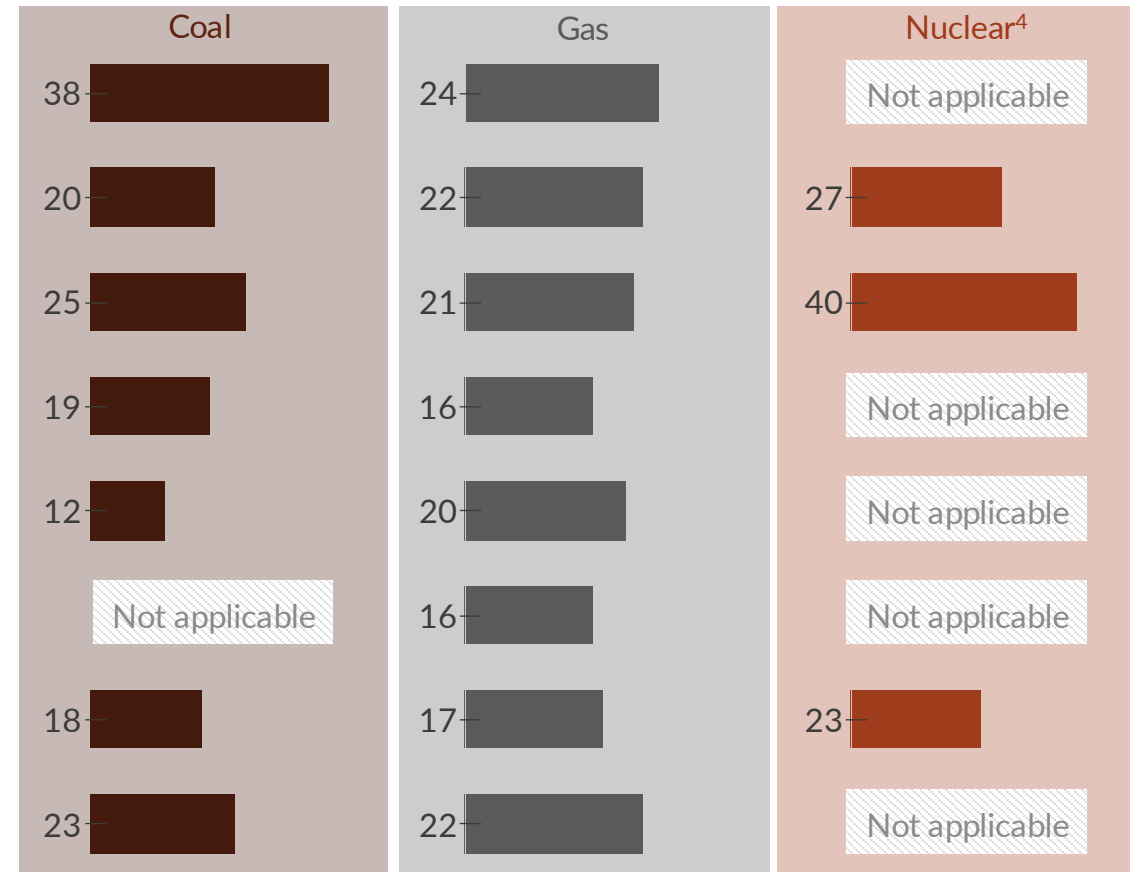
1 Reserve margin¹ varies between 18% and 36%..

Total dispatchable capacity compared to peak demand in 2024
GW



2 however, most of the capacity are slated to retire over the coming decades

Indicative average age of dispatchable generators in 2024
years

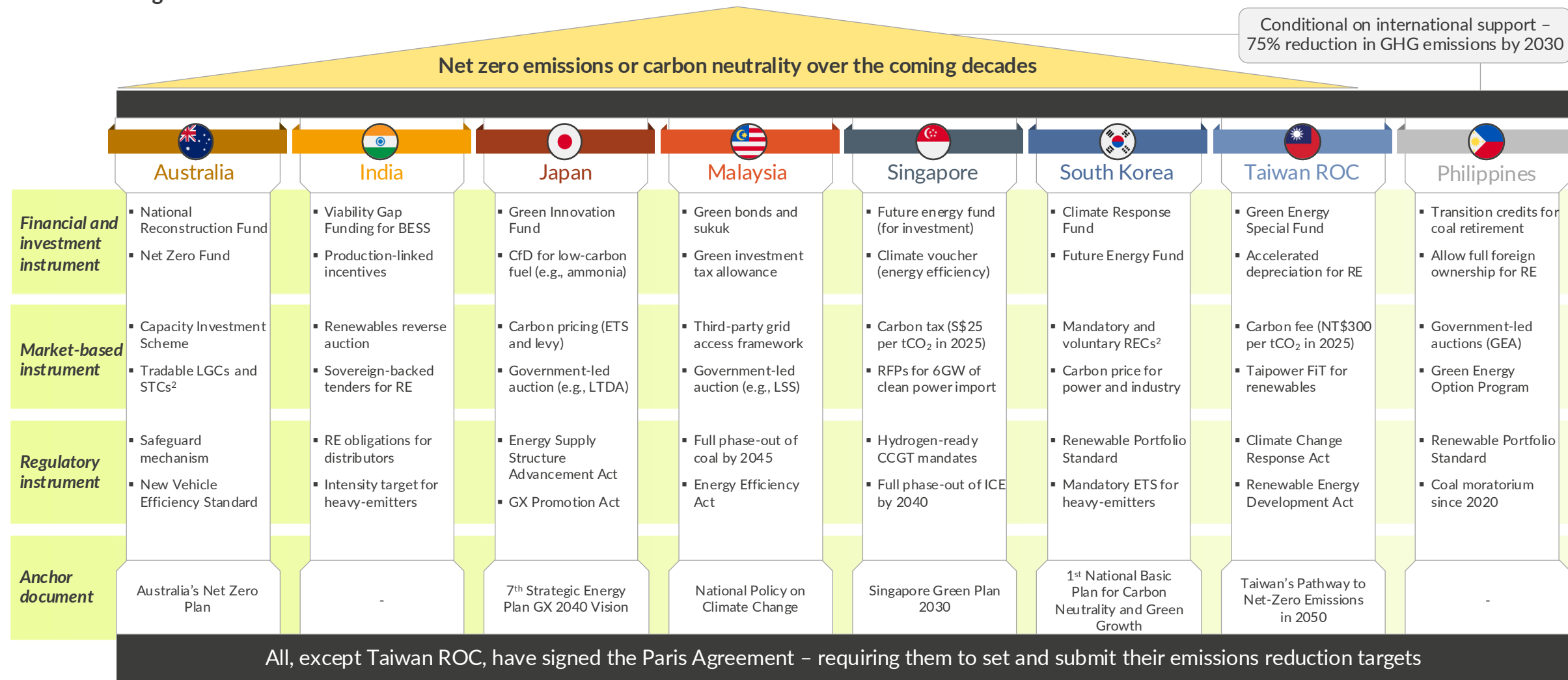


◆ Peak demand ■ Coal ■ Gas ■ Nuclear ■ Hydro ■ Other dispatchable ■ Non-dispatchable Reserve margin

1) Reserve margin is defined as percentage of extra dispatchable capacity available above the system's peak demand 2) Includes only National Electricity Market (NEM) data. 3) Includes only Peninsular Malaysia. 4) Japan nuclear power plants average age data does not account for safety shutdowns since Fukushima.

Sustainability: Over the last decade, governments have made ambitious commitments to meet net zero emissions / carbon neutrality, implementing varied strategies

Net-zero strategies¹ in various APAC economies

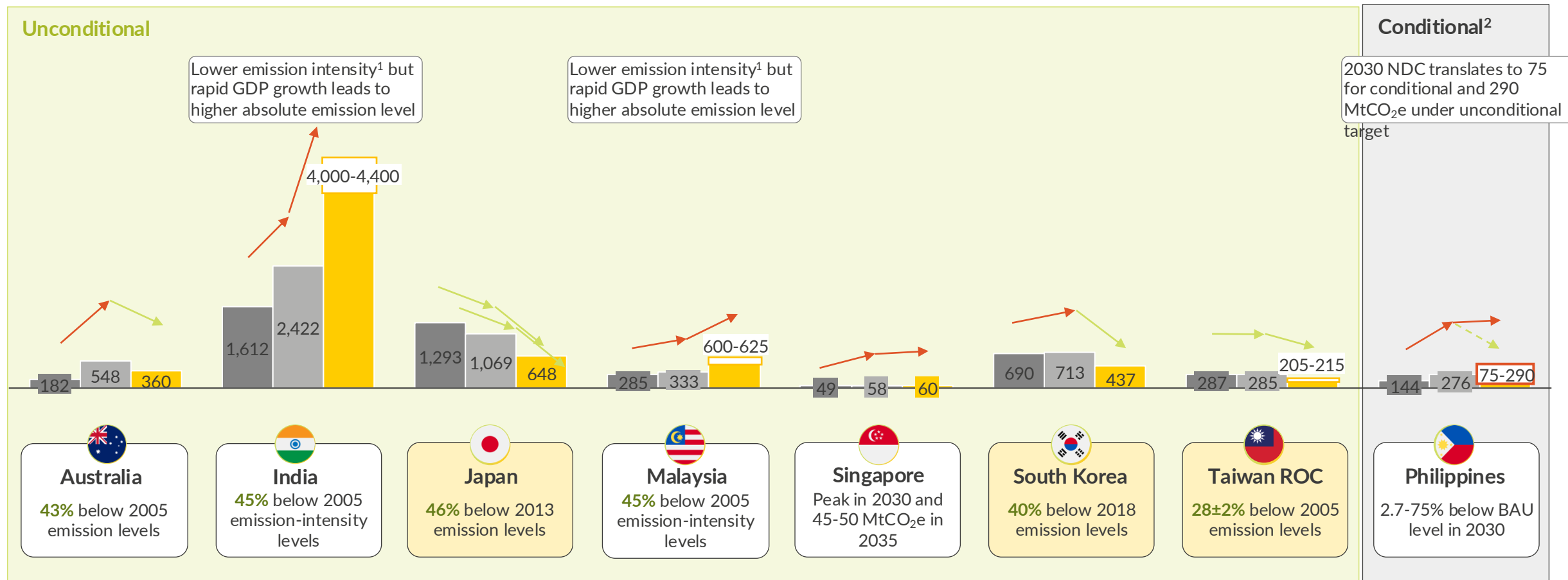


1) List of instruments provided is illustrative and non-exhaustive. 2) LGC stands for large-scale generation certificate. STC stands for small-scale technology certificate. REC stands for renewable energy certificate.

Sustainability: Japan, Korea and Taiwan ROC are setting themselves the steepest emissions reductions among their APAC peers

Historical economy-wide emissions and 2030 target levels

MtCO₂e



■ 2010 ■ 2020 ■ 2030

1) Emission intensity refers to amount of greenhouse gas emissions produced per unit of GDP. 2) Conditional target means a country will only achieve that goal if they receive international support. While Malaysia and India also have conditional components, the Philippines stands out as its unconditional cut is only 2.71% below BAU.

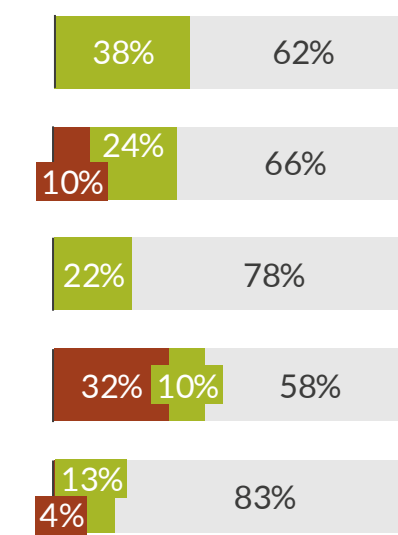
Sources: Aurora Energy Research, United Nations Framework Convention on Climate Change, Ministry of Environment of Japan, South Korea National Index Portal

Sustainability: All governments aim for the integration of large shares of renewables, however, for nuclear policies vary significantly

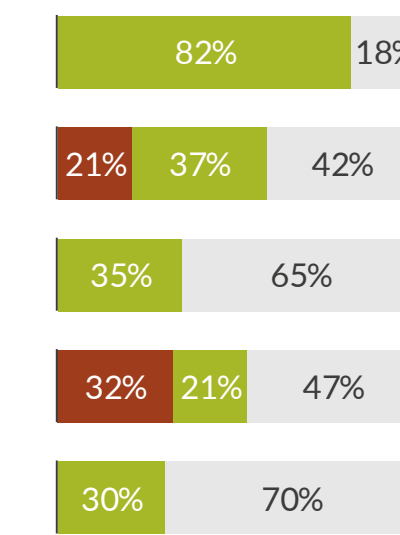
Actual 2024 and 2030 government target **generation share (% of generation)**



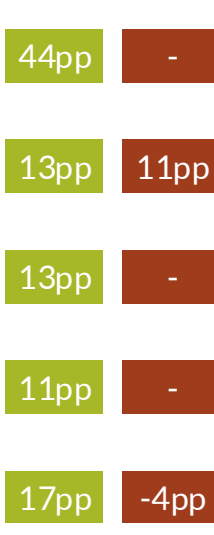
Zero-carbon power (2024 mix)



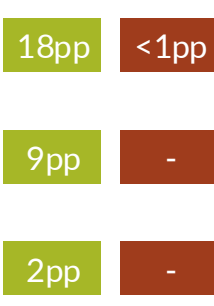
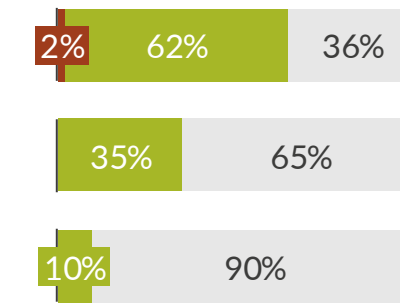
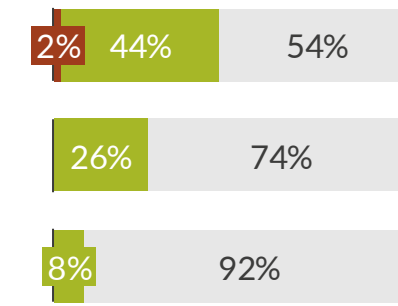
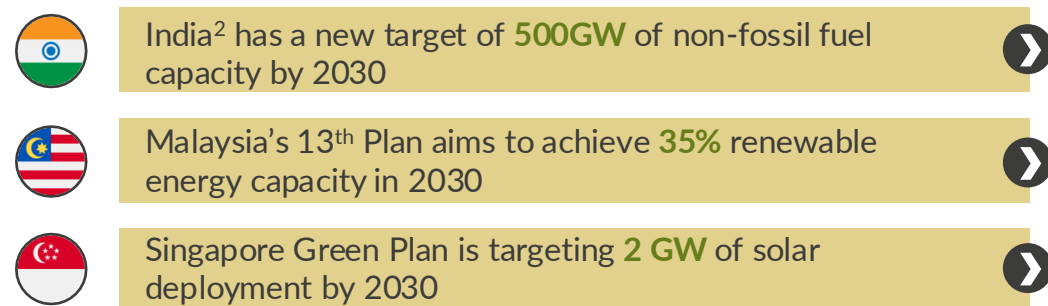
Government target (2030 mix)



Gap to close



Actual 2024 and 2030 government target **capacity share (% of capacity)**



■ Nuclear ■ Renewable ■ Other

1) Japan released its 7th Strategic Energy Plan (SEP) in February 2025, which sets targets for 2040. The 2030 targets referenced here remain those established under the 6th SEP. 2) India reached its original 2030 goal of 50% non-fossil fuel capacity ahead of schedule, accomplishing it in 2025. The 2030 target is calculated based on the total capacity forecasted in Aurora Central in 2030.

Agenda

I. Energy trilemma – Affordability vs. Reliability vs. Sustainability

II. Renewables potential and risks

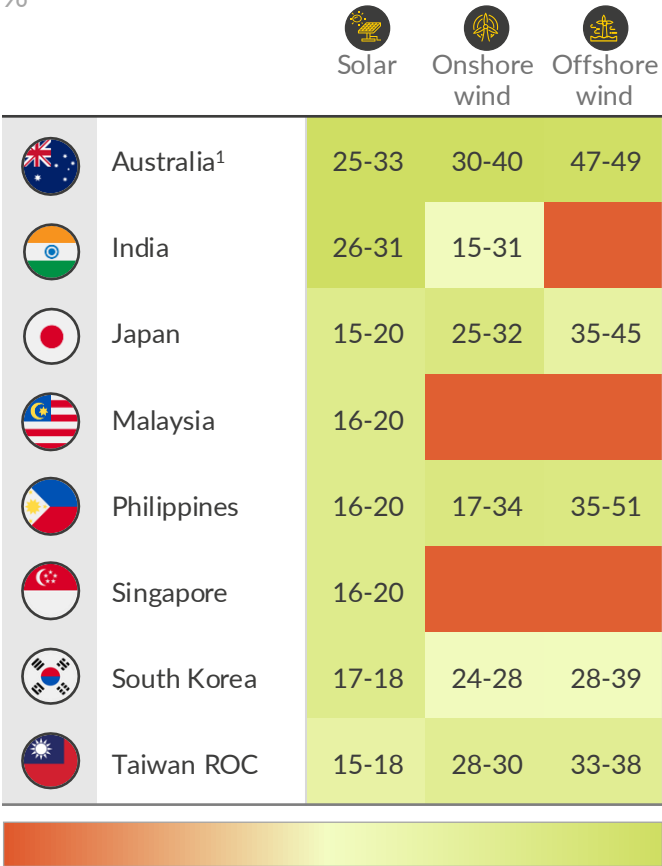
III. Potential of cross border trade / ASEAN Power Grid

Opportunities: Japan, Korea and Taiwan ROC are deploying renewables broadly consistent with net zero, but population density and terrain imply challenges lie ahead

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Although resource quality is high...

Capacity factor
%



land availability limits the maximum capacity that can be built in some countries...

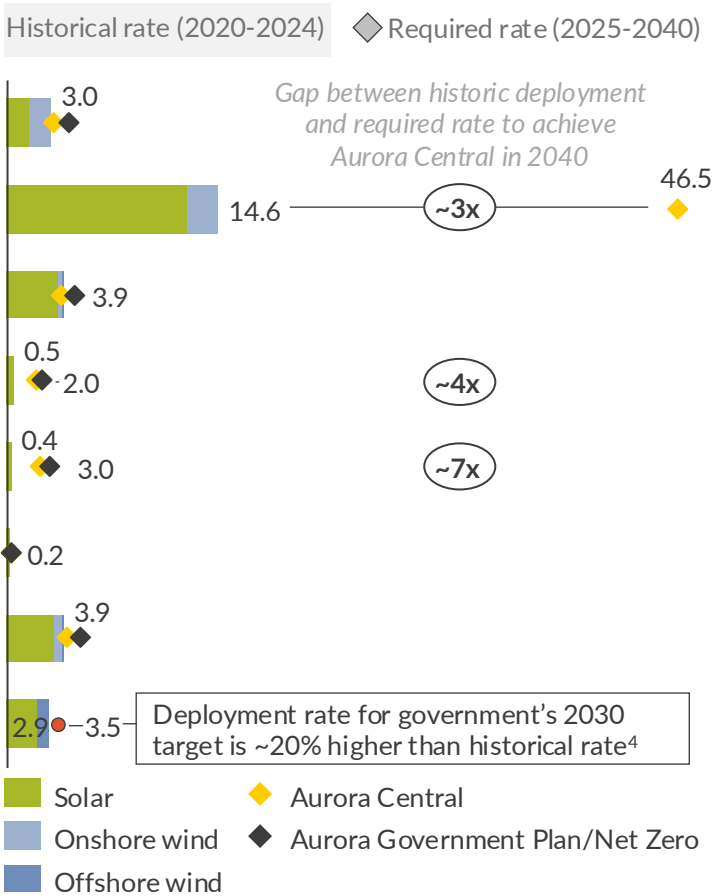
Land area
km², rounded

	Total	Reserved	Agriculture	Urban	Other	Steep/hilly area (%)
	7.7m	1.7m	3.6m	20k	2.4m	6-8
	3.3m	0.2m	2.0m	0.2m	0.9m	18-30
	380k	111k	48k	110k	111k	65-75
	330k	44k	86k	16k	184k	40-50
	300k	47k	128k	11k	114k	55-65
	735	33	10	600	92	<3
	100k	20k	16k	22k	32k	65-70
	36k	7k	8k	3k	18k	60-70

Reserved areas refer to protected conservation zones such as state parks and forestry
Agriculture areas include cropland and grazing land
Urban areas (indicative) include densely populated regions such as residential, industrial, and commercial

while infrastructure and other constraints² can further limit the rate of build out

Renewables³ deployment rate
GW/year

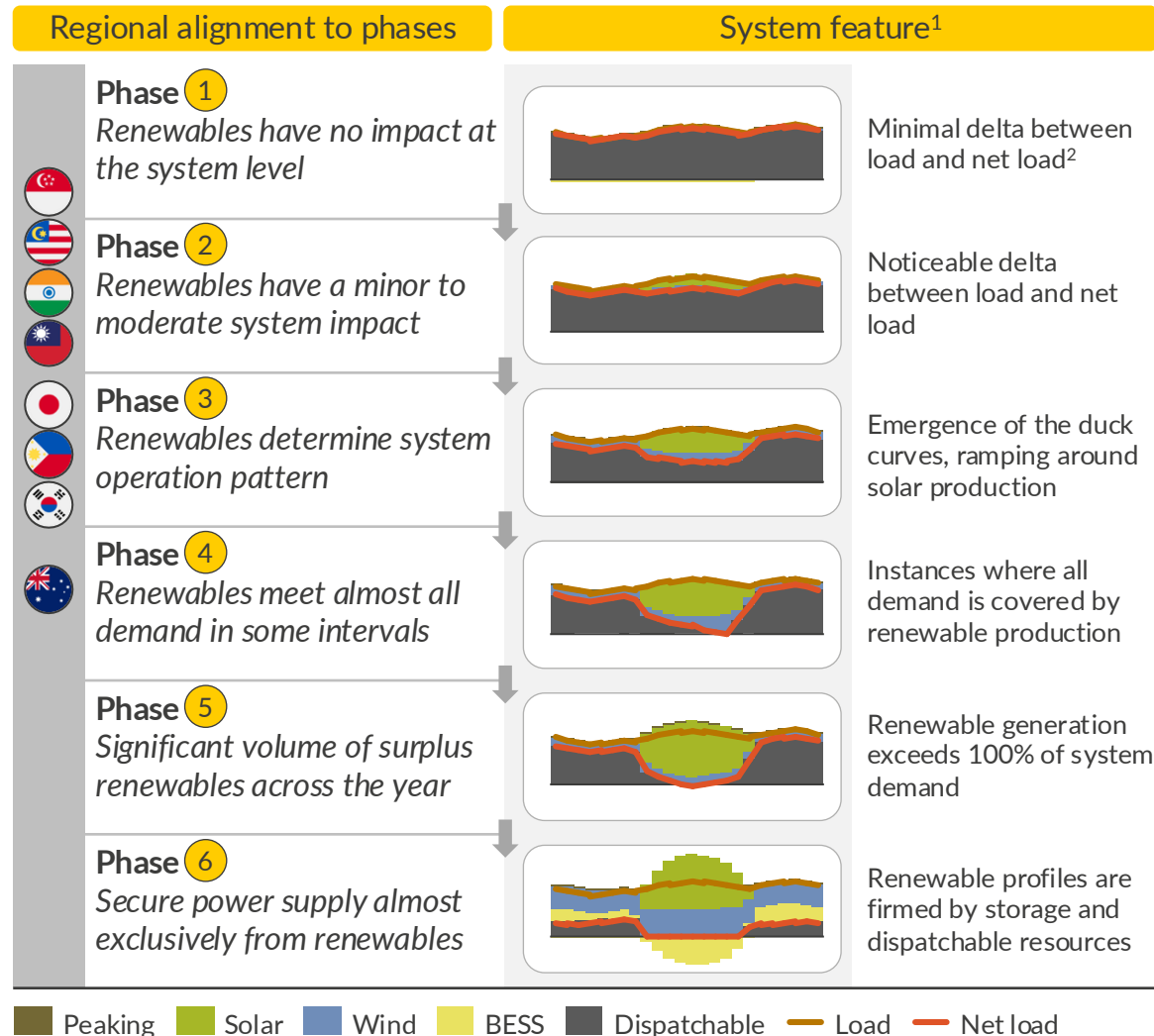


1) Renewables deployment data includes only NEM regions. 2) This includes factors like grid capacity, available workforce, permitting processes, supply chain, and other infrastructure required to deploy renewables. 3) Includes only utility-scale solar and wind energy. 4) Aurora forecasts are not available yet for Taiwan ROC, as such the government's 2030 target is used as a proxy.
Sources: Aurora Energy Research, World Bank, Food and Agriculture Organisation, Protected Planet

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Risks: Integration of renewables introduces power balancing and system stability challenges that will need to be actively managed by operators and planners

IEA six phases of VRE integration – where each APAC region sits in the transition



1) Charts below represent intra-day generation and demand of a sample day where the x-axis represents the hour of the day and the y-axis shows values in GW. 2) Net load being defined as total system load less renewable production within the dispatch interval.

Sources: Aurora Energy Research, International Energy Agency

IEA challenges with system integration at different flexibility timescale

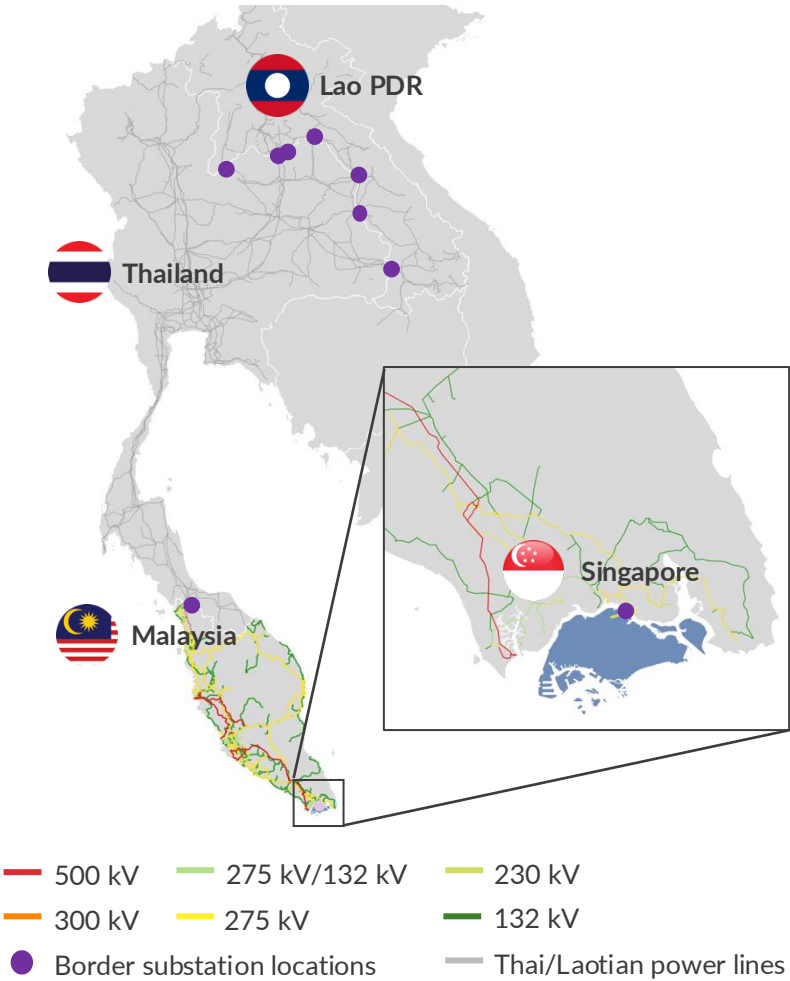
	Issue addressed	Example issue	Phase
Sub-seconds	System stability	Managing contingency / loss events	4
Seconds	Frequency control	Fluctuations in renewable resource availability	2 3
Minutes	Changes in demand and supply	Intraday ramp around solar production	2 3
Hours	Dispatch and operation scheduling	Maintain minimum operational limits on baseload units	3 4
Days	Maintenance schedules and surplus deficit management	Dunkelflaute/ extended period when there is little to no wind or solar power generation	4 5
Months	Seasonal and interannual variability	Hydro availability variance and weather patterns (e.g., La Nina and El Nino)	5 6
Years			

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Existing grid network allows Singapore to access electricity generated in Thailand and Lao PDR through Peninsular Malaysia

Map of existing SEA transmission lines between Singapore and Lao PDR



Details of selected existing electricity interconnections from Peninsular Malaysia to neighbouring countries

Interconnector (start and end locations)	Line capacity MW	Line rating kV	Grid operators	Import projects	Contracted capacity ¹ MW	Current energy flows
Singapore – Peninsular Malaysia (1,000 MW)						
Senoko (SGP) – Plentong (MYS)	1,000	230	SP Group & Tenaga Nasional Berhad (TNB)	ENEGEM Import/ Hydropower & others	50 (Phase I) ²	Sembcorp is contracted as the offtaker for Phase I
				LTMS-PIP / Hydropower	100 ³	Stalled in 2024 and resumed in January 2026
Peninsular Malaysia – Thailand (380 MW)						
Gurun (MYS) – Khlong Ngae (THA)	380	300	TNB & Electricity Generating Authority of Thailand (EGAT)	LTMS-PIP / Hydropower	300	Imported energy flows via the existing HVDC System Interconnection Agreement between TNB and EGAT
Thailand – Lao PDR (1,100 MW)						
Dongphosy- Nongkhai	100	115	EGAT & Électricité du Laos (EDL)	LTMS-PIP / Hydropower	300	Imported energy flows via the existing PPAs signed between both EDL-EGAT and Laotian GenCos-EGAT for electricity transfer
Thanalang-Nongkhai	100	115				
Pakxan-Bueng Kani	200	115				
Thakhek-Nakhon Phanom	200	115				
Pakbo-Mukdahan	100	225				
Bang Yo-Sirindhorn	300	115				
Tha Li-Kenthao	100	115				

1) The values in this column refer strictly to the contracted import capacity pertaining strictly to the ENEGEM and LTMS-PIP agreements. The lines running from Lao PDR to Thailand likely see more power flows due to other existing import agreements between the two countries that the lines stretch across. 2) Phase 2 of ENEGEM was announced in September 2024, aiming for transfer capacity increase to 200 MW. 3) Existing line supports a maximum of 300MW, but only 100MW contracted as of 2026.
Sources: Aurora Energy Research, ASEAN Centre for Energy, EGAT, TNB, ERIA

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State of the Markets: I-REC Prices across voluntary market in Asia

Ahmad Afiq

Price Reporter – Energy Transition

April 2026

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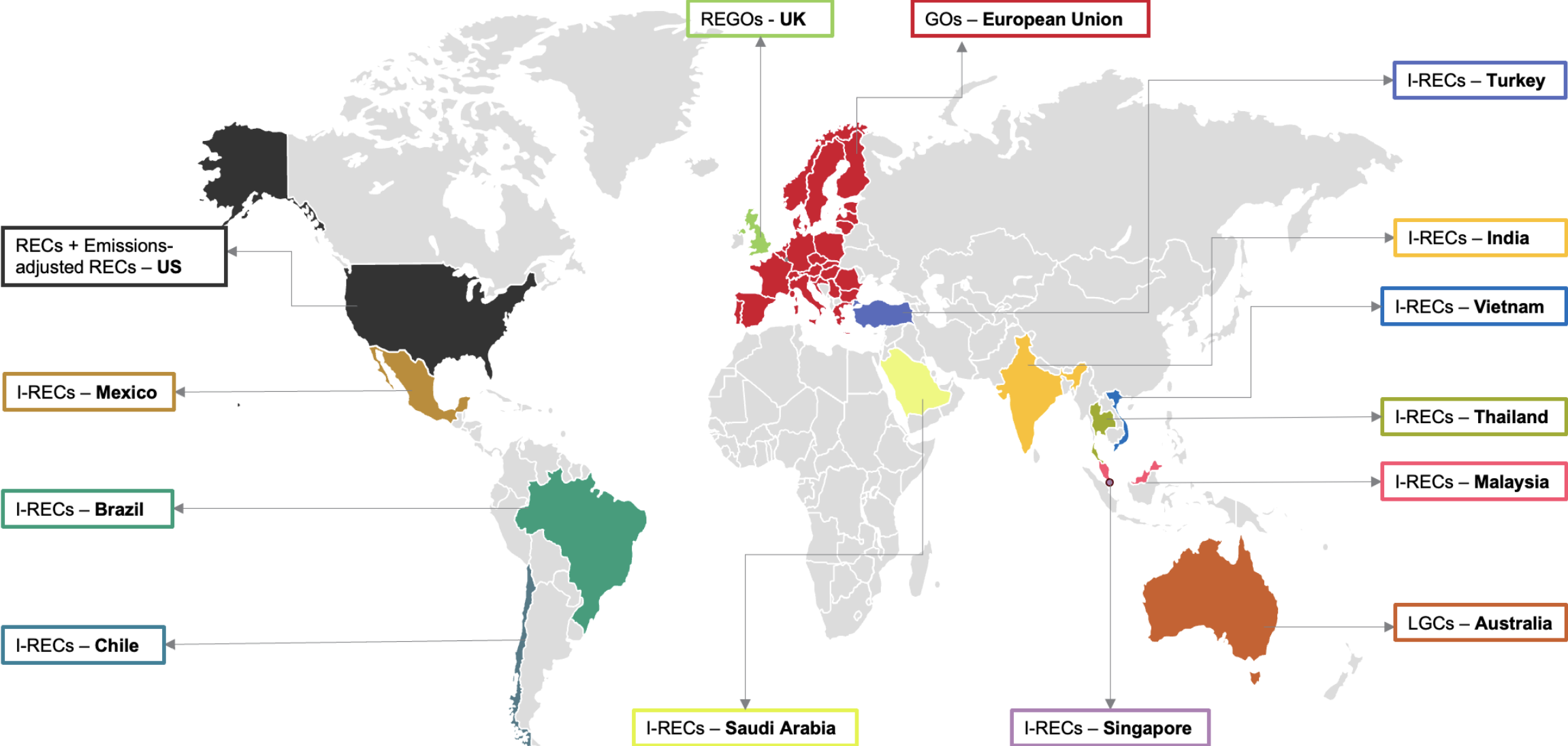
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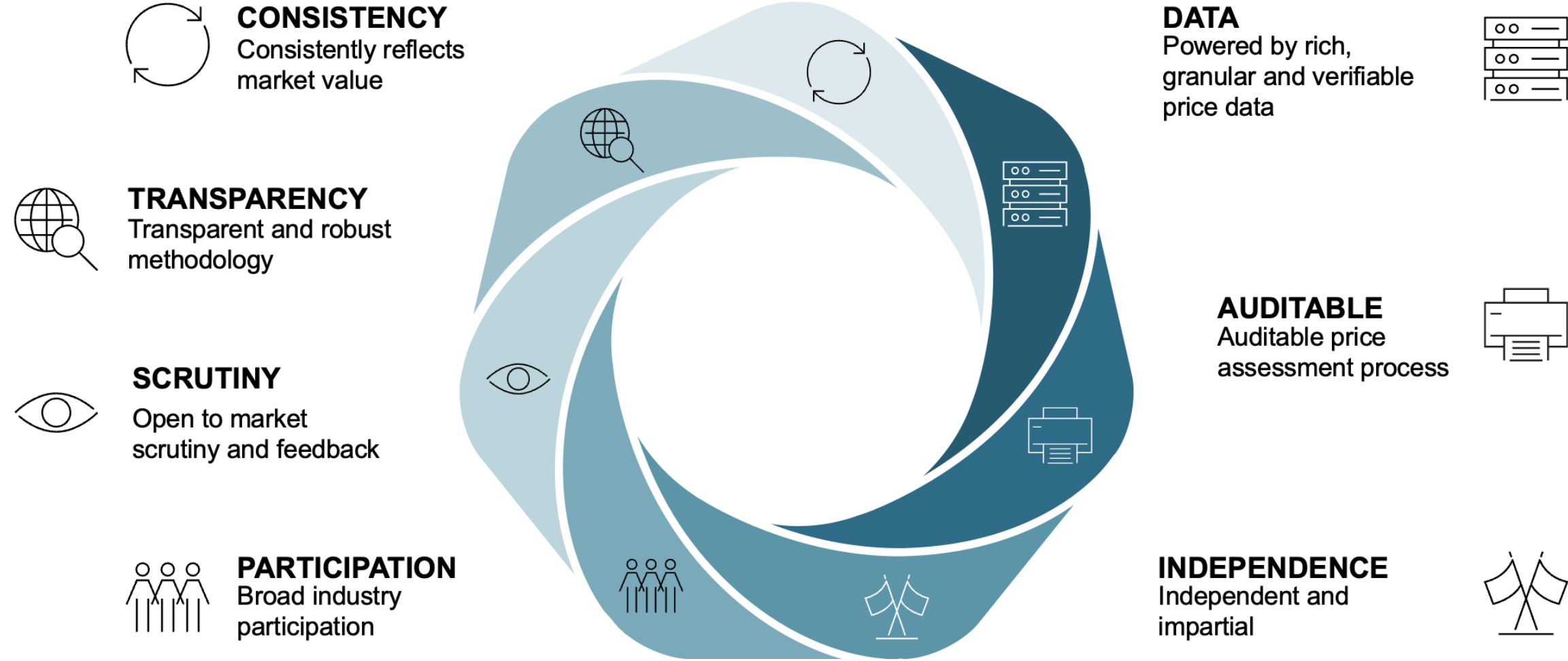
year legacy as the trusted voice of energy markets



Platts' RECs Pricing Coverage



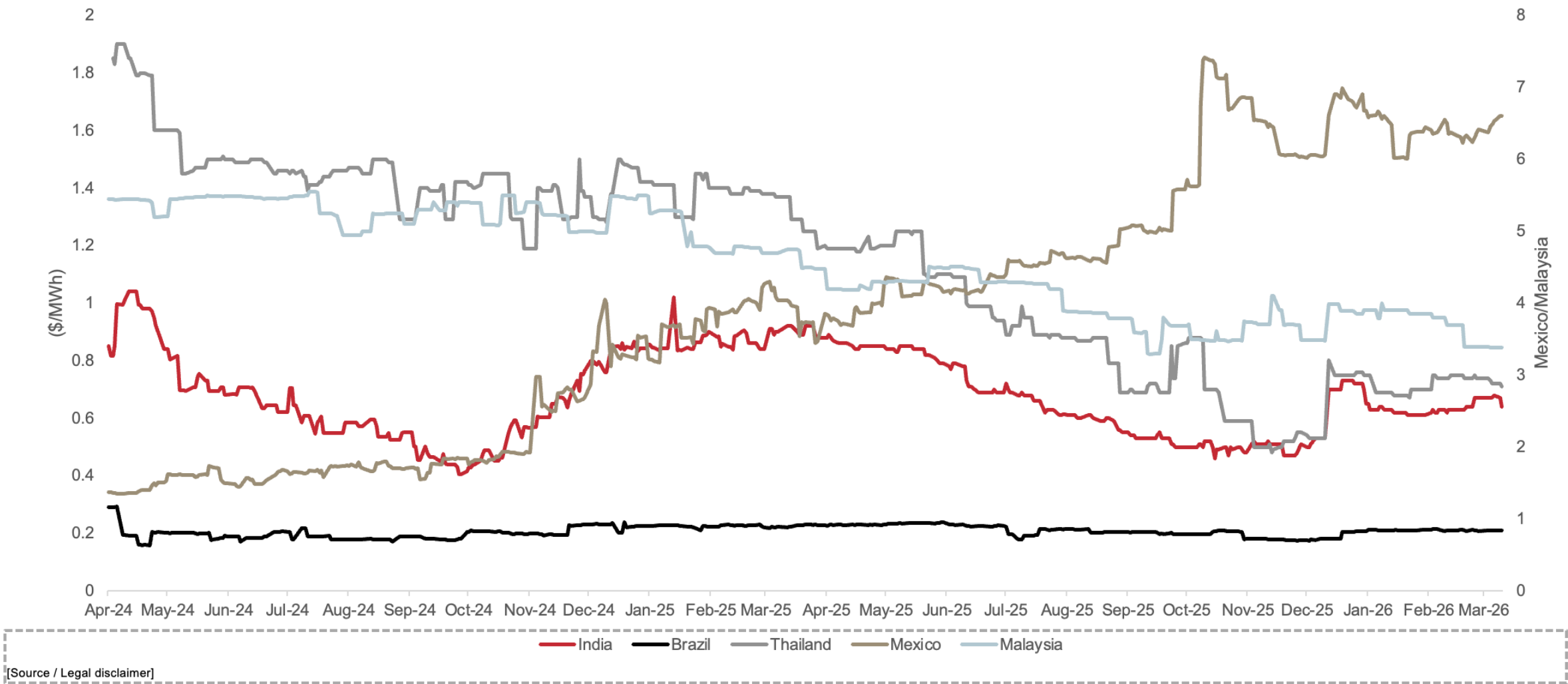
What makes a robust price assessment?



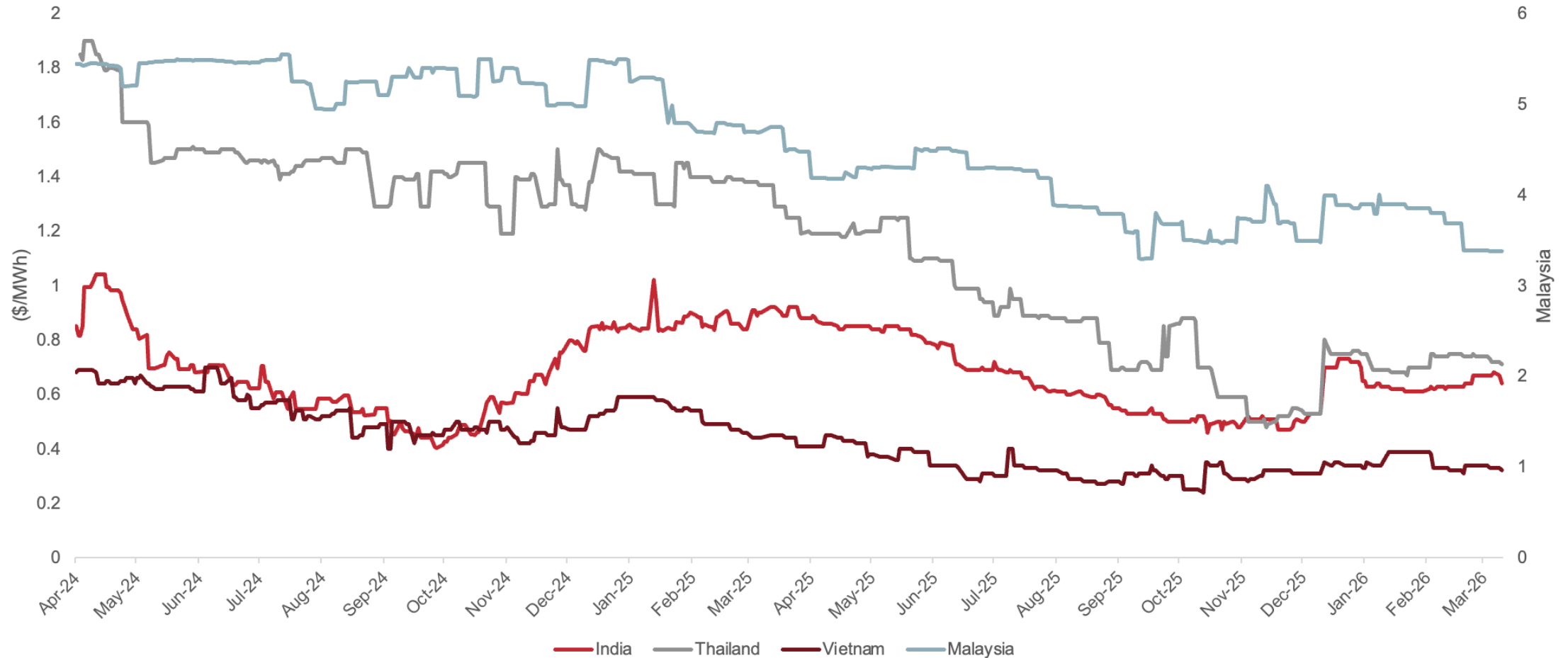
Asia I-REC price trends in few key market



Global I-REC markets mostly in decline, except Mexico, which has surged since 2024 on tightening supply

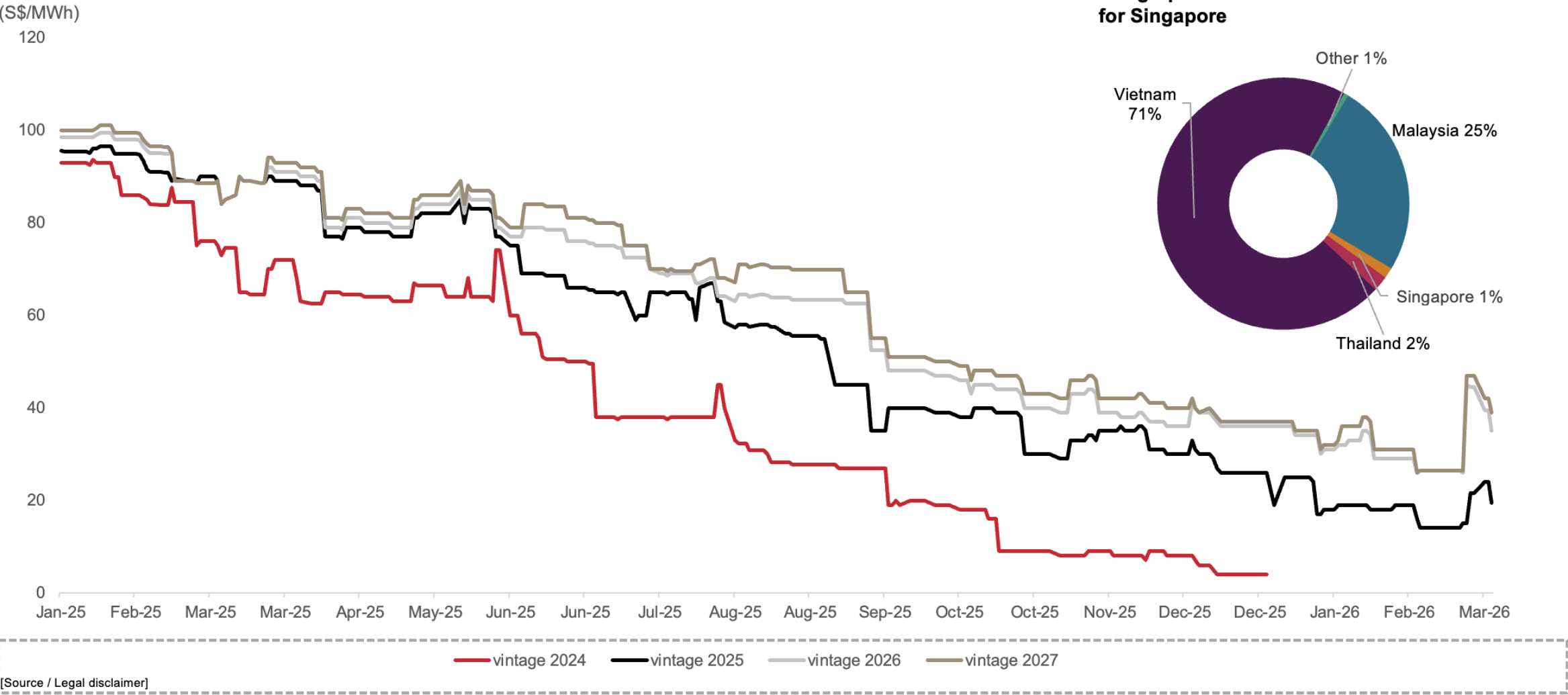


Most APAC key markets saw price declines amid oversupply, while India stabilizes post-ICX transition



[Source / Legal disclaimer]

Singapore I-RECs - Data Centers shifted to PPA, FX Volatility & Vietnamese Imports pressure prices



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