Energy Transition in Asia-Pacific and Japan's Role

The Future of Renewable Energy in Southeast Asia

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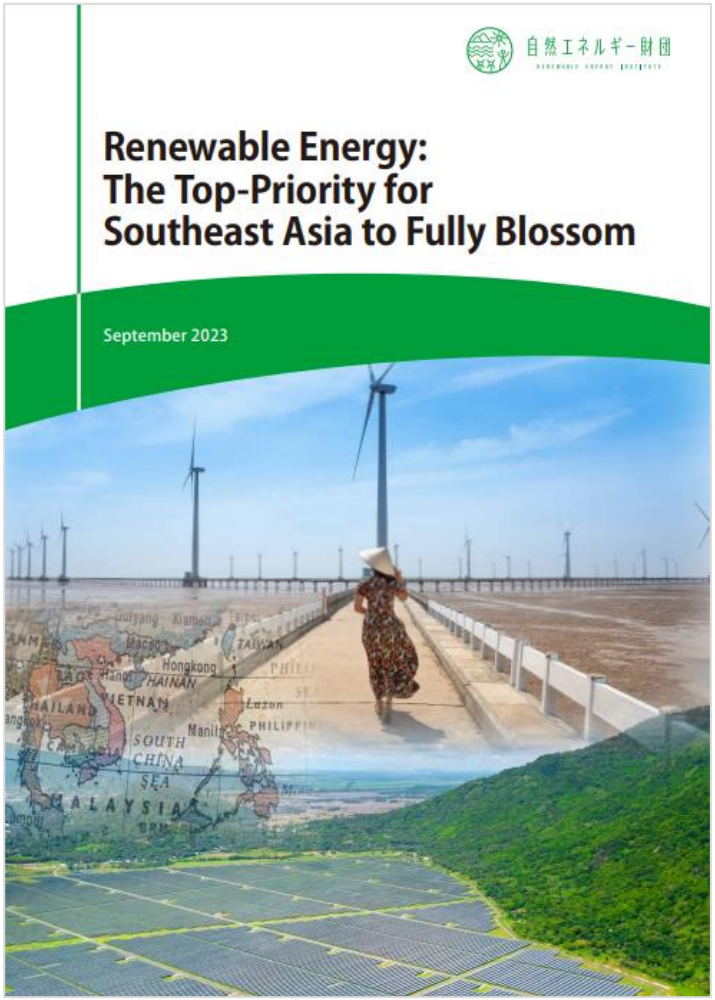
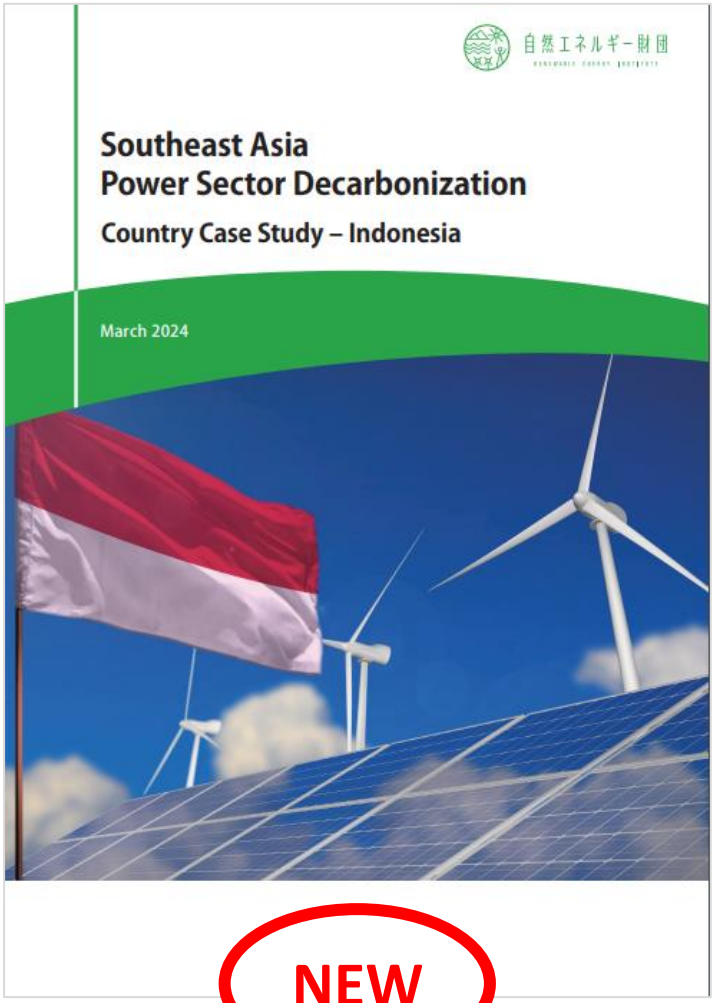
Renewable Energy Institute

Dr.Eng. Romain Zissler
r.zissler@renewable-ei.org

REI's Recent Dedicated Publications





NEW

KEY FINDINGS

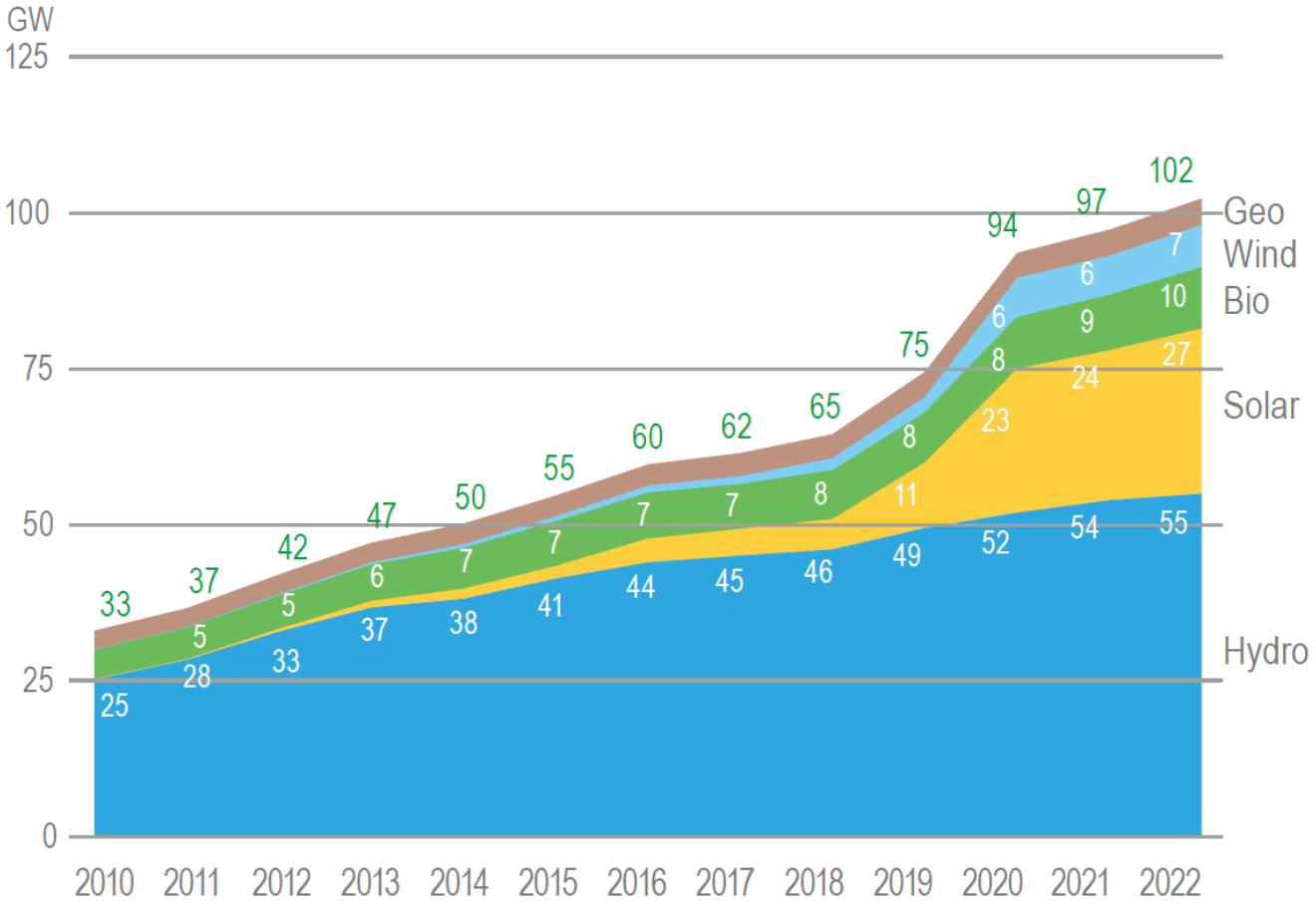
1. RE is the most important supply side solution to decarbonize Southeast Asia's electricity:
- Abundant and largely untapped potential, and
- Cost competitiveness against fossil power.

2. Challenges to accelerate RE growth are mainly political and regulatory.

The Great Renewable Energy Opportunity

Growing Fast

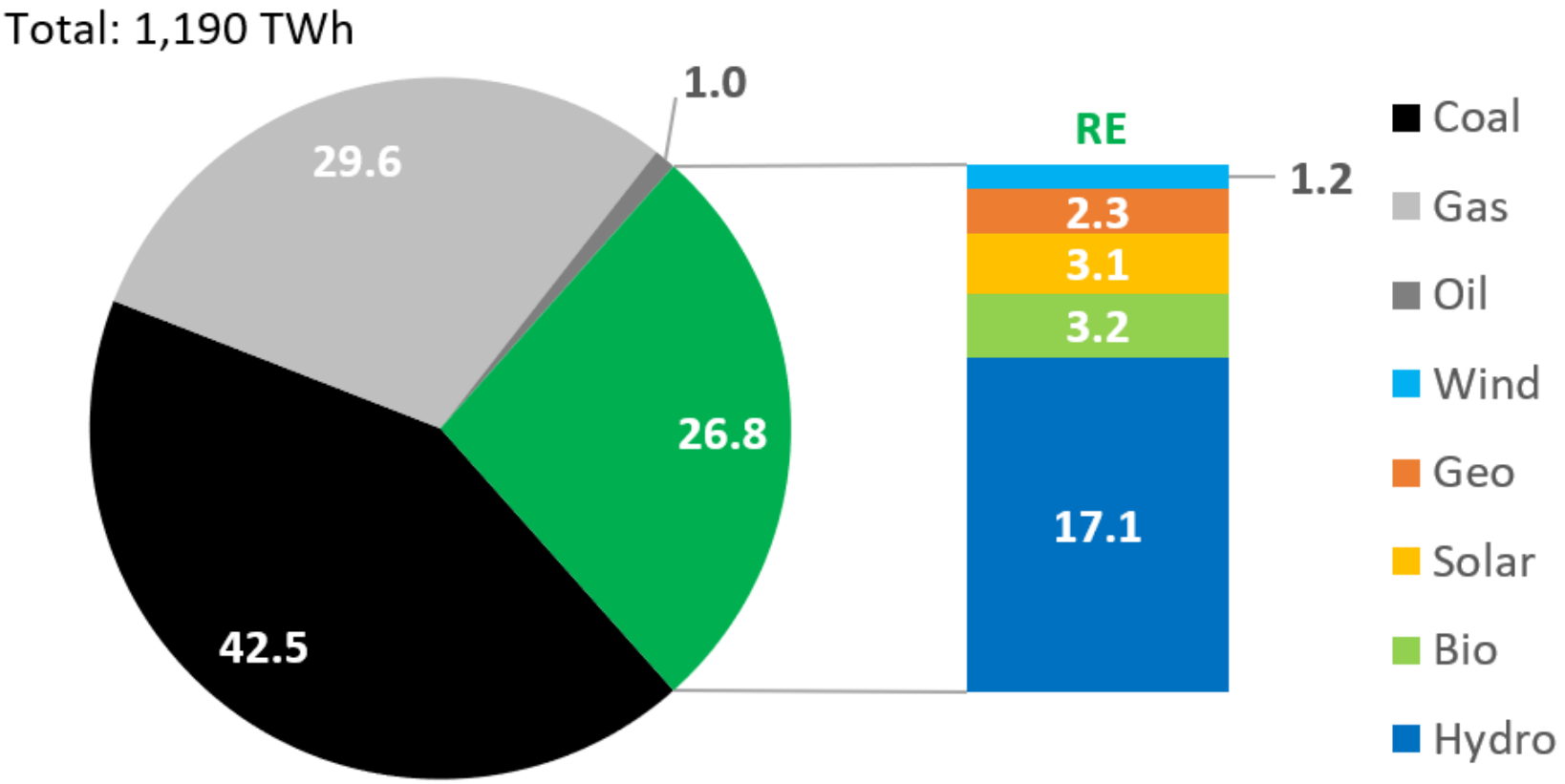
Southeast Asia Cumulative RE Installed Capacity 2010-2022



Source: IRENA

Third Largest Source

Southeast Asia Electricity Generation Mix 2022 (%)



Source: BloombergNEF

RE Potential Exceeds Needs by Many Folds

RE ECONOMIC POTENTIAL ≈40,000 TWh/year

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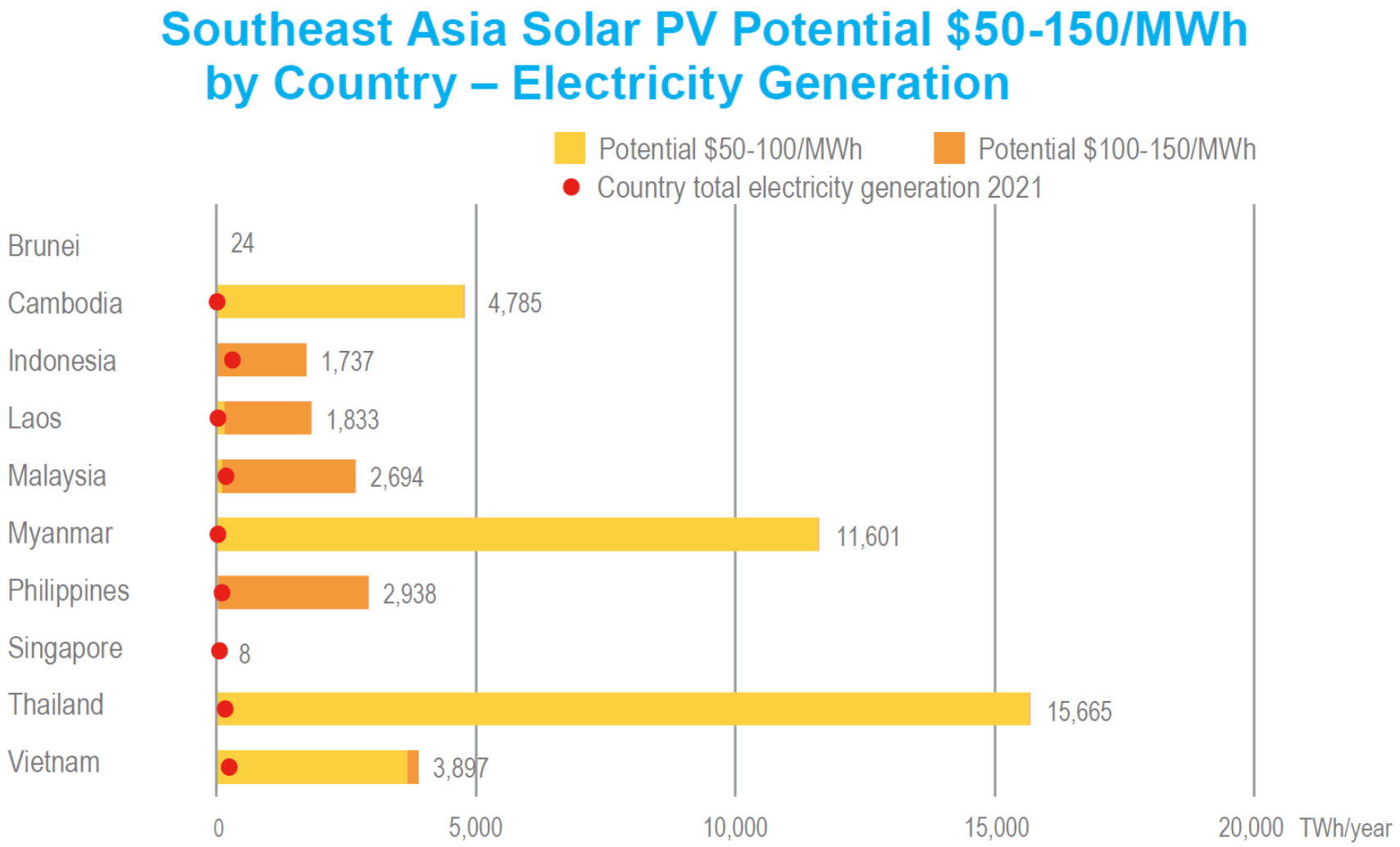
Actual generation 2022 ≈1,200 TWh

Projected generation 2050 ≈4,500-6,400 TWh

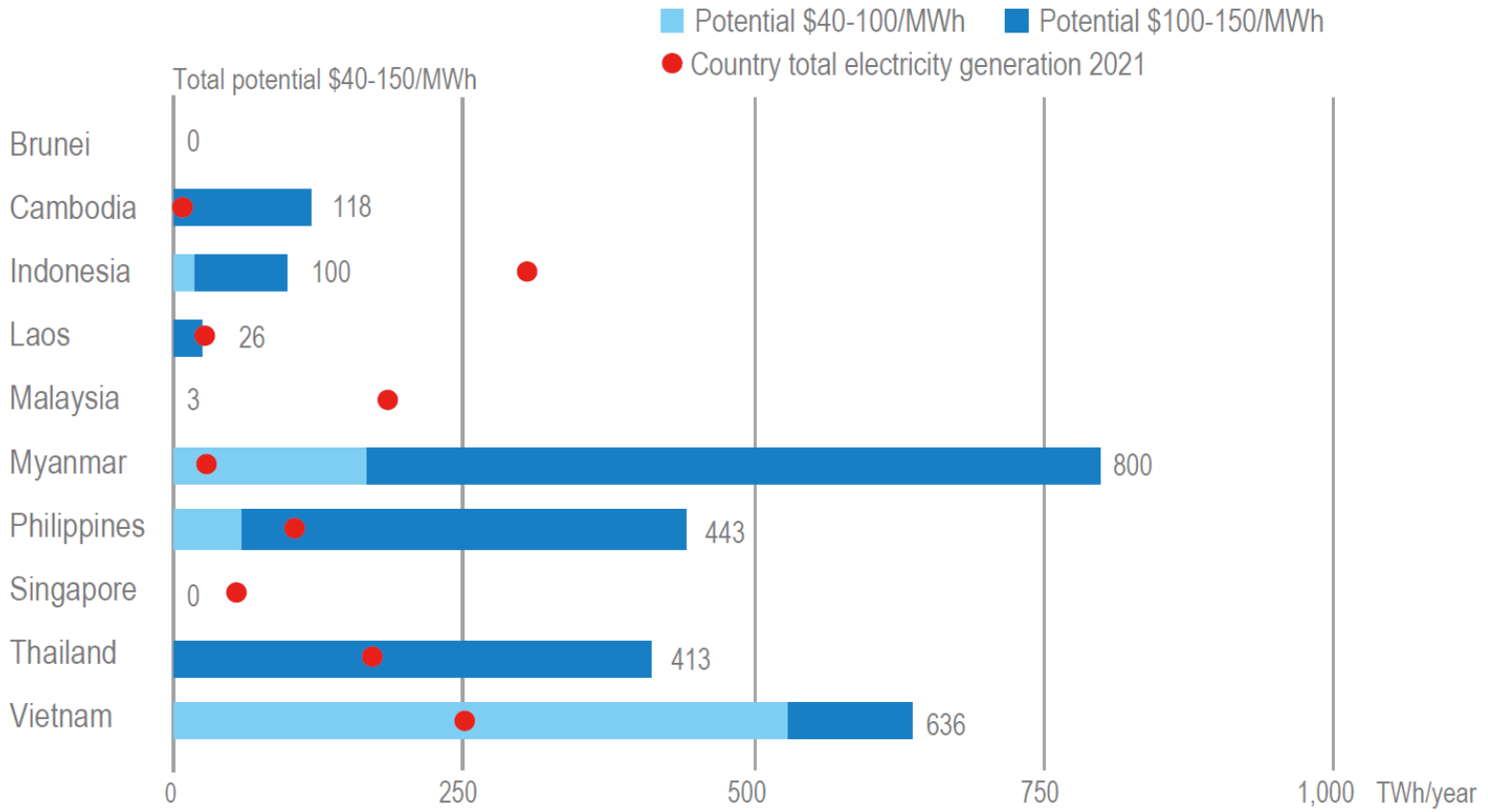
Enormous Solar PV Potential [36,000-45,000 TWh/year]



Source: NREL

Significant Onshore Wind Potential [800-2,500 TWh/year]

Southeast Asia Onshore Wind Potential $40-150/MWh by Country – Electricity Generation

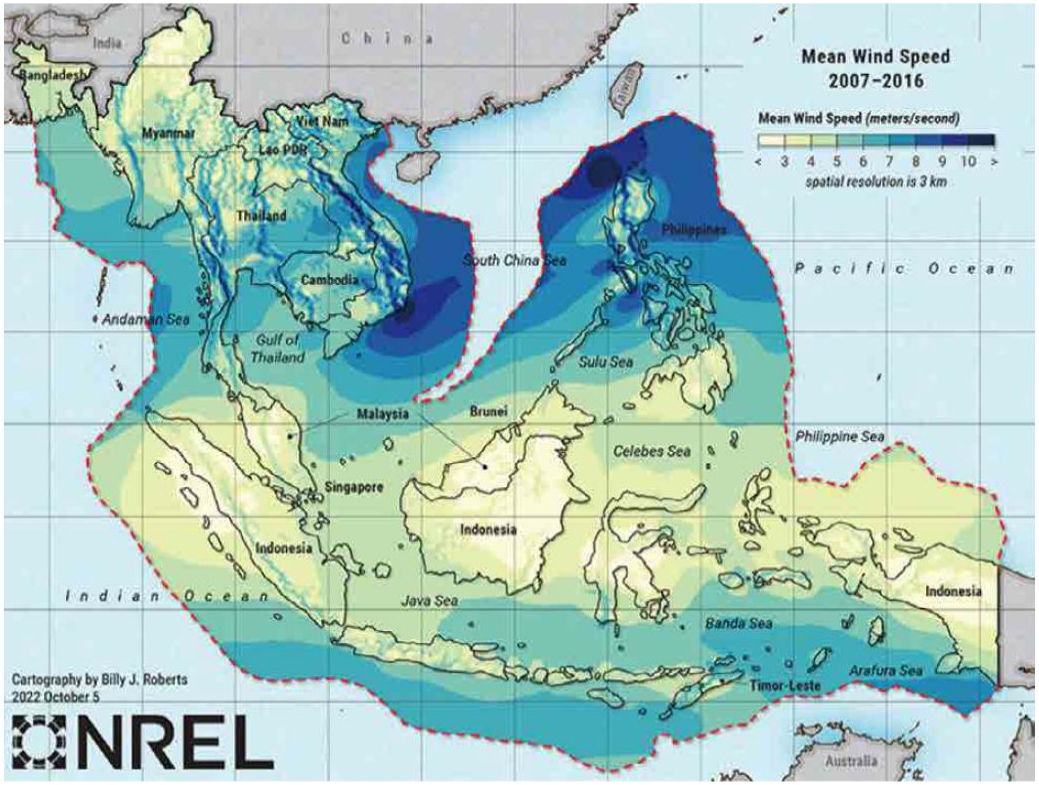


Source: NREL

Offshore Wind Situation

- Potential like that of onshore wind.

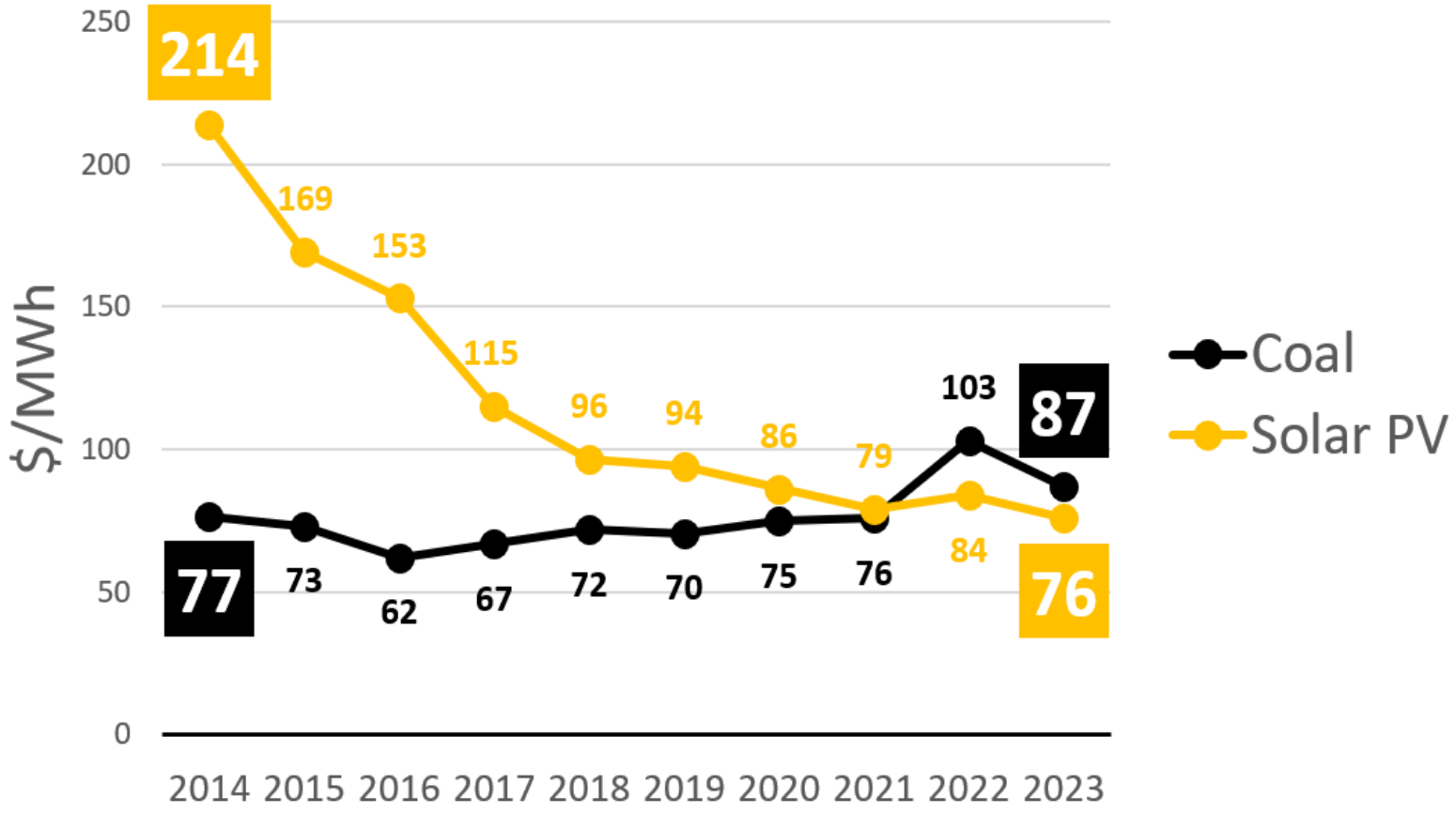
Southeast Asia Mean Wind Speed Map



- Positive developments observed in Vietnam (targets of 6 GW by 2030 and 70-91.5 GW by 2050) and the Philippines.

Solar PV Outcompetes Coal

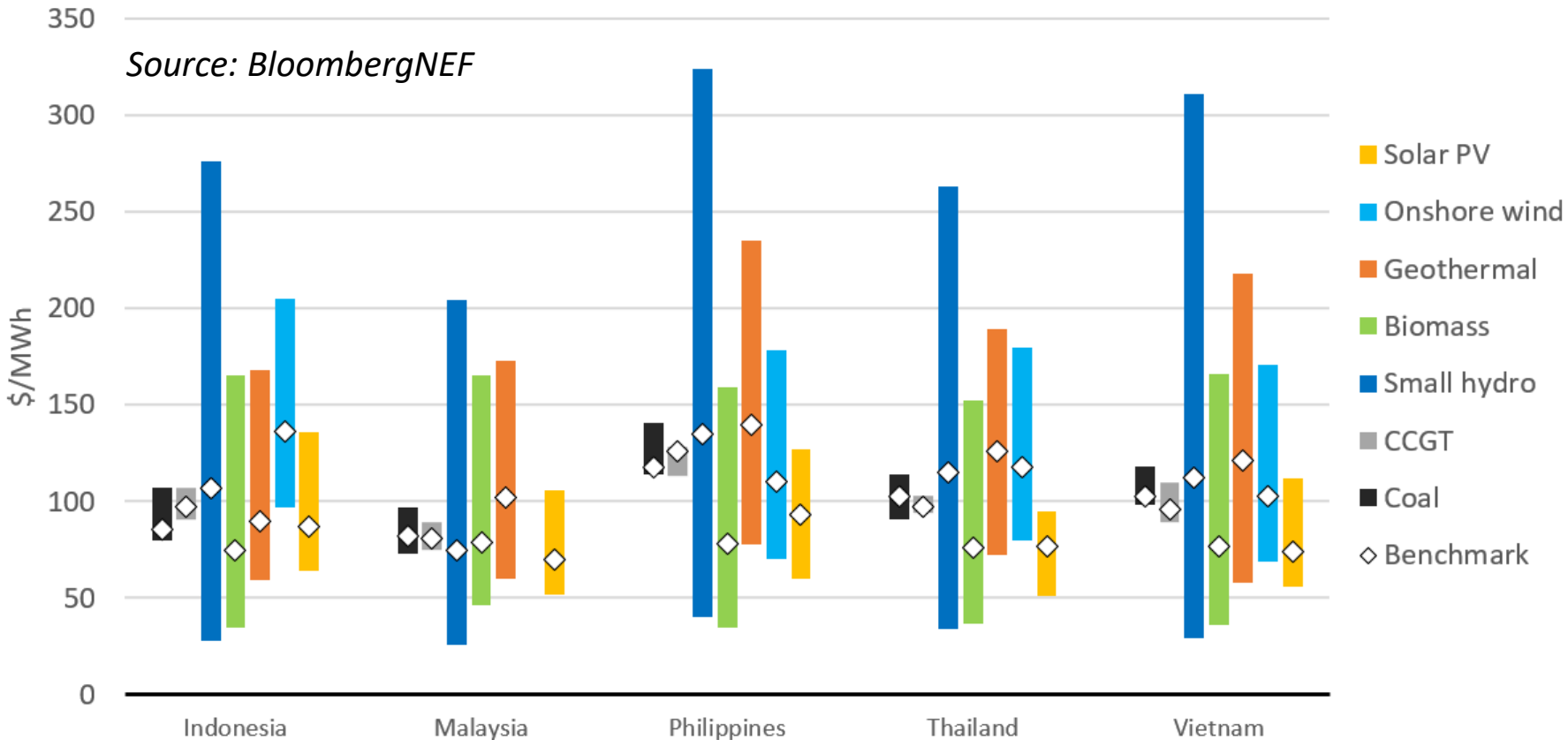
Average Benchmark LCOEs of Solar PV and Coal in Southeast Asia 2014-2023 2H



Source: BloombergNEF

Overall, RE Cost Competitiveness is Good

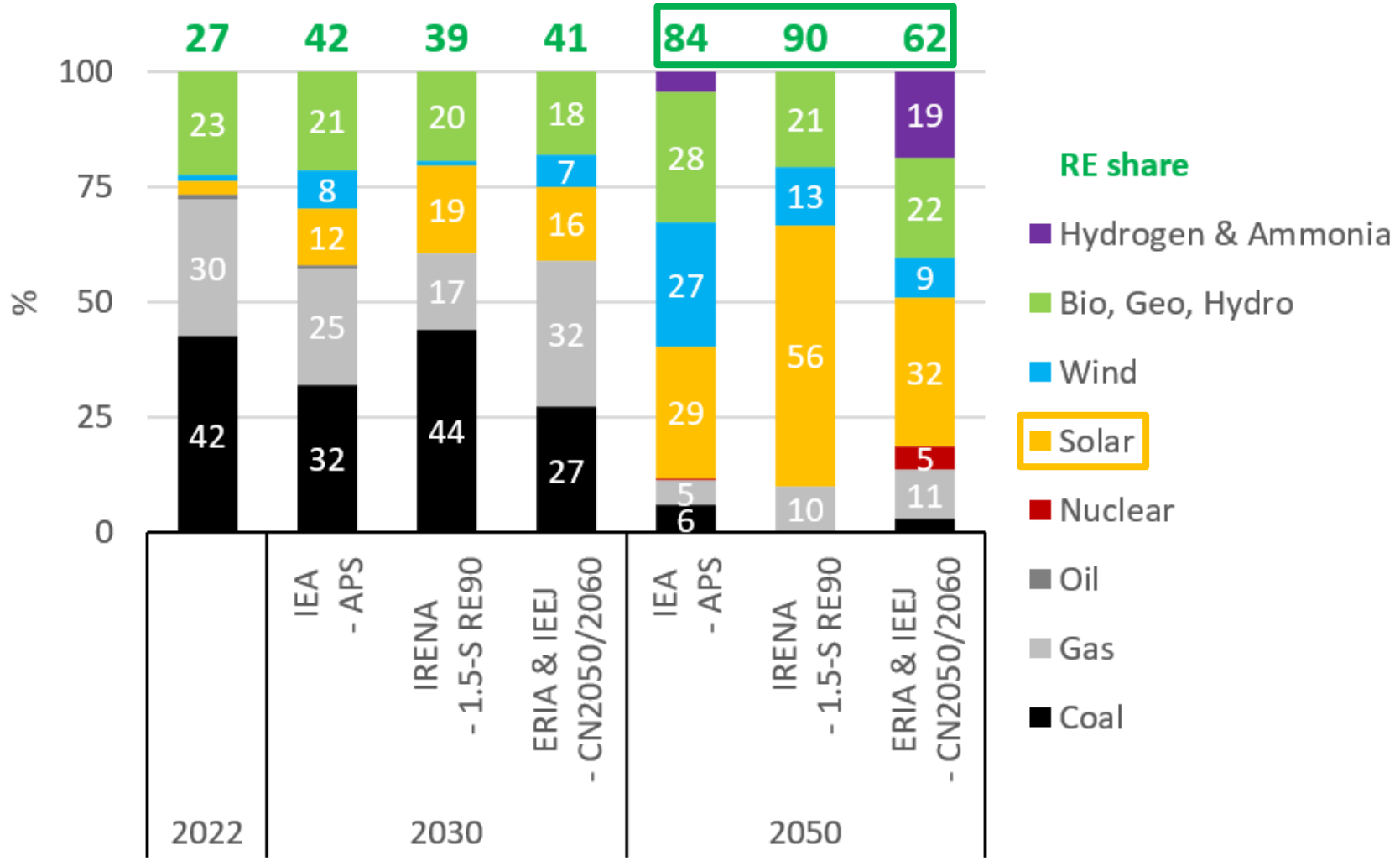
LCOE in Selected Southeast Asian Countries 2023 2H



Technology	Coal	CCGT	Small hydro	Biomass	Geothermal	Onshore wind	Solar PV
Benchmark range ($/MWh)	70-105	85-110	70-140	75-80	95-140	100-145	60-90

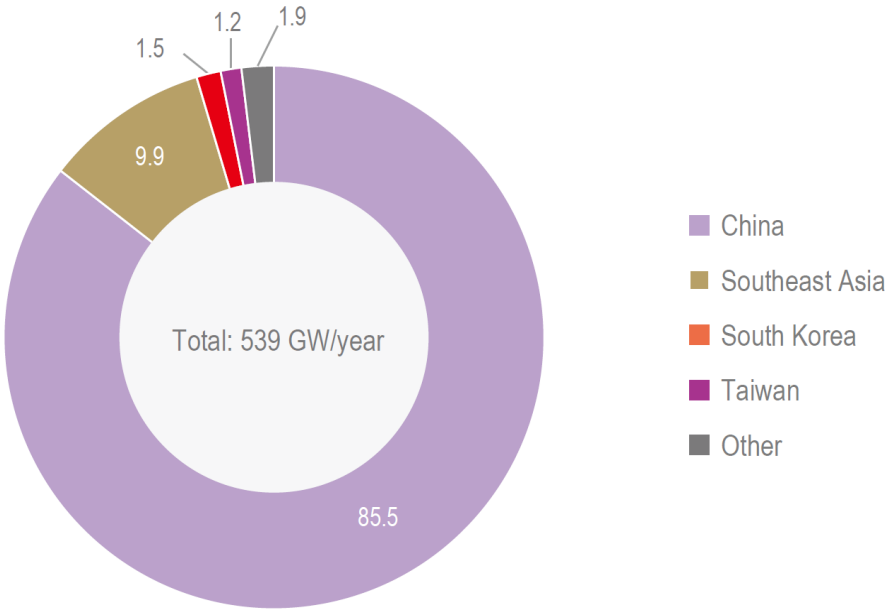
Decarbonization Means High RE Shares

Southeast Asia Electricity Generation Mix Projections

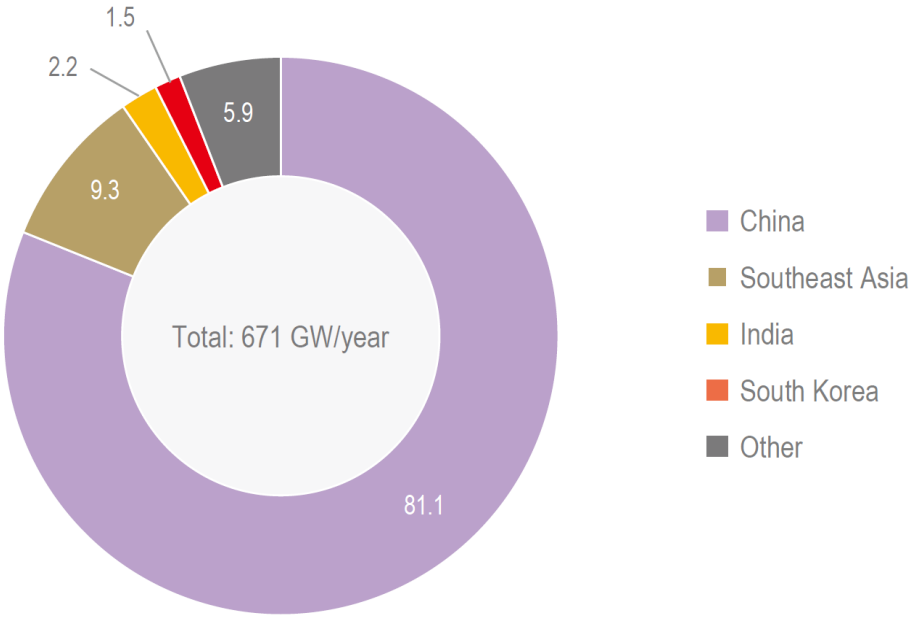


Leadership in Solar PV Manufacturing Capacity

Solar PV Crystalline Silicon Cells Manufacturing Capacity by Country 2023 (%)



Solar PV Modules Manufacturing Capacity by Country 2023 (%)



Benefits:

- Facilitates domestic adoption,
- Strengthens energy security, and
- Sustainable source of income.

Source: BloombergNEF

Four Challenges to Accelerate Renewable Energy Growth

Medium-Term Decarbonization Policies – Problem / Unambitious

Long-Term Decarbonization Goals in Selected Southeast Asian Countries

Country	Goal(s)
Indonesia	Net-zero by 2060
Malaysia	Carbon neutral by 2050
Philippines	X
Thailand	Carbon neutral by 2050 and net-zero by 2065
Vietnam	Net-zero by 2050

Medium-Term RE Electricity Targets in Selected Southeast Asian Countries (%)

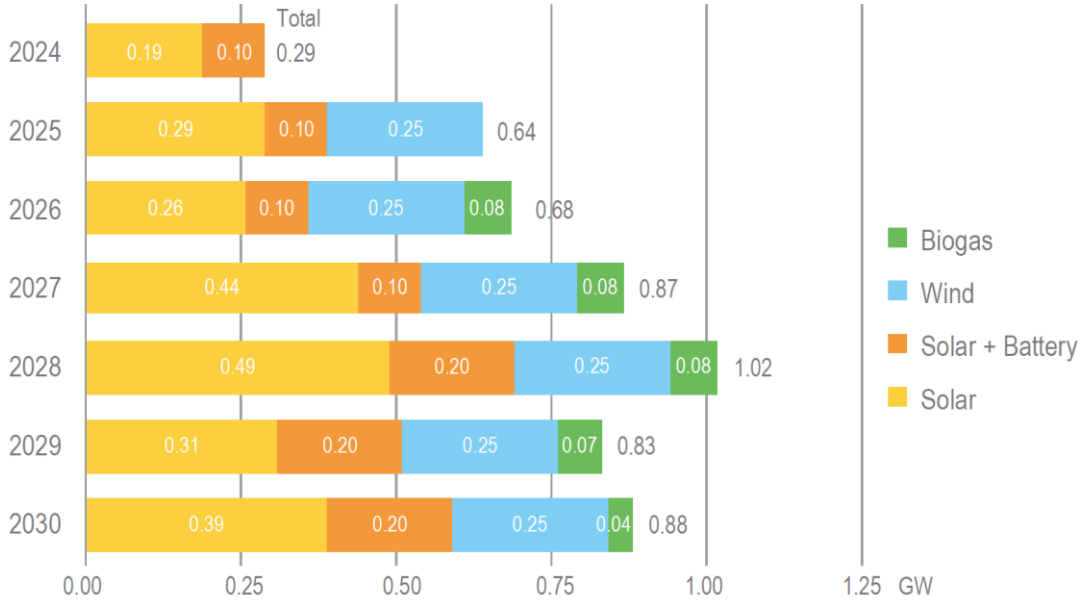
Country	Scope	Progress	Target	
		2022	2030s	2040
Indonesia	Generation mix	20	25 (2030)	X
Malaysia	Installed capacity	23	40 (2035)	X
Philippines	Generation mix	23	35 (2030)	35
Thailand	Installed capacity	32	44 (2037)	X
Vietnam	Installed capacity	58	54 (2030)	X

Sources: BloombergNEF for progress, national energy policy documents for decarbonization goals and RE electricity targets

Medium-Term Decarbonization Policies – Solutions / More Ambitious and Continuity

- Promoting multiyear planning with control of incentives and volumes:
- Thailand FiT, and
- Malaysia large-scale solar PV auctions and Philippines Green Energy Auction Program.

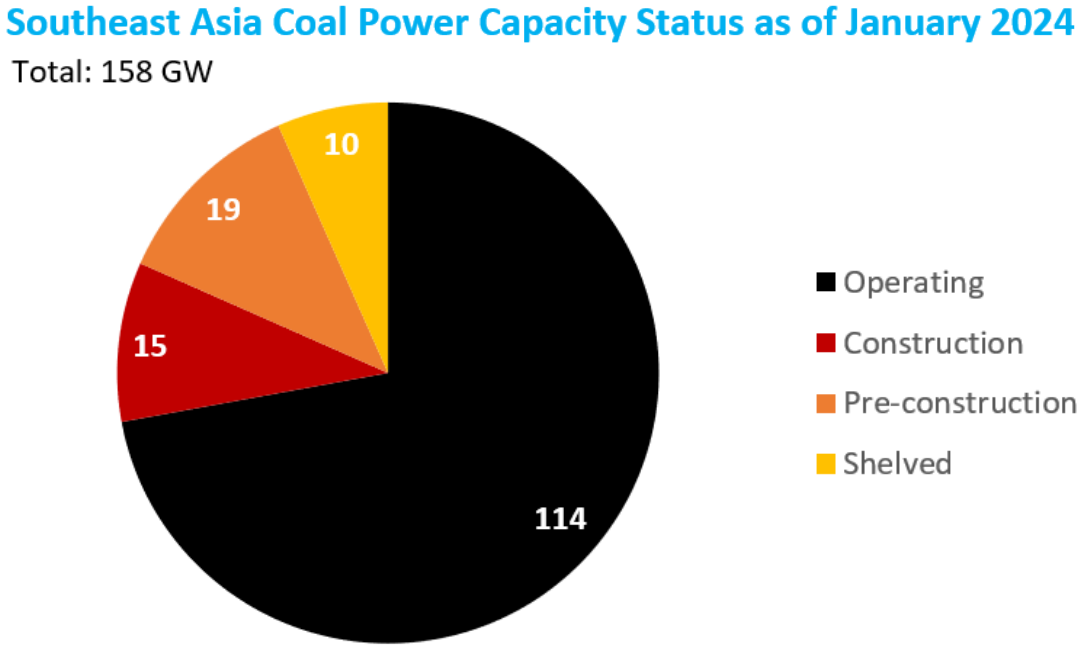
Thailand FiT Capacity Quotas by RE Technology and Commissioning Year



- Introducing mandatory carbon pricing mechanisms (e.g., Indonesia ETS).

Coal Power – Problem / Lock-In

- Obstacles:
- Massive young operating capacity (<15 years), →
- Significant pipeline of new plants, →
- Long-term power purchase agreements (25-30 years), and
- Unfair subsidies (billions of $ annually).



Source: GEM

Coal Power – Solutions / New International Financing Initiatives

- Just Energy Transition Partnership (JETP):

Developed countries fund a coal-dependent developing country to support its own path to phase-out coal and transition towards clean energy (social consequences of such plans are also addressed).

- Energy Transition Mechanism (ETM):

Asian Development Bank program aiming at reducing GHG emissions in Asia-Pacific. Concessional and commercial capital is to be used to accelerate the retirement or repurposing of fossil fuel power plants and replace them with clean energy.

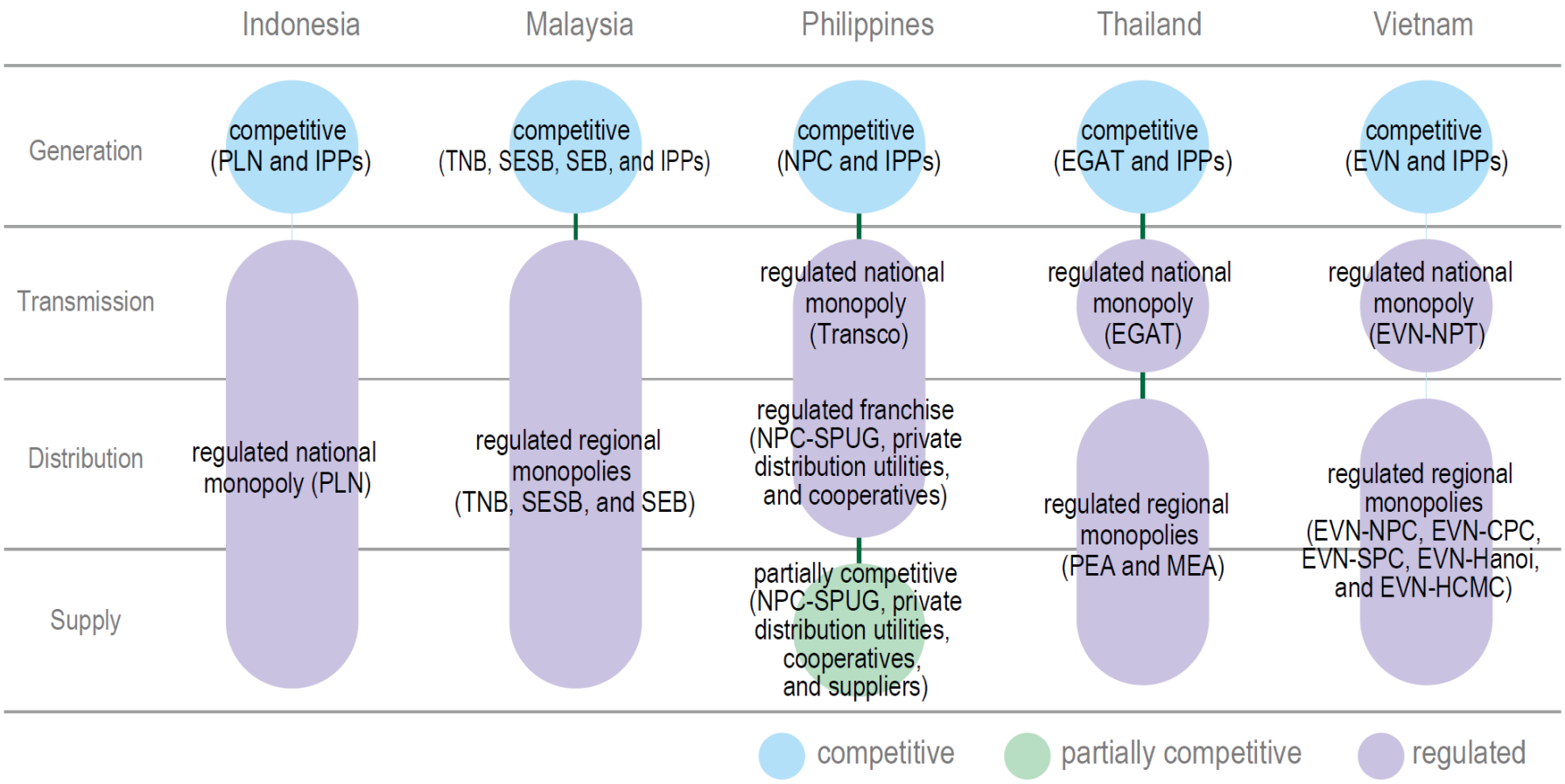
- Example of Indonesia:

- JETP's Comprehensive Investment and Policy Plan launched in November 2023. Aims to mobilize $21.7 billion to support the acceleration of emissions reduction in the power sector, and
- ETM program explores the early retirements of the Pelabuhan Ratu (969 MW) and Cirebon-1 (660 MW) coal power plants.

Electricity System Reform – Problem / Incomplete

- Lack of competition and inadequate regulations.

Simplified Power Structure of Selected Southeast Asian Countries



Electricity System Reform – Solutions / Forward-Thinking Power Market Participants

- Daring independent power producers (e.g., INPEX, ITOCHU and Kyushu EPCO in Indonesia, ENGIE in Malaysia…), and
- Demanding consumers (e.g., ≥ 175 "RE100" companies have activities in Southeast Asia).

Corporate Clean Power Procurement Options in Selected Southeast Asian Countries

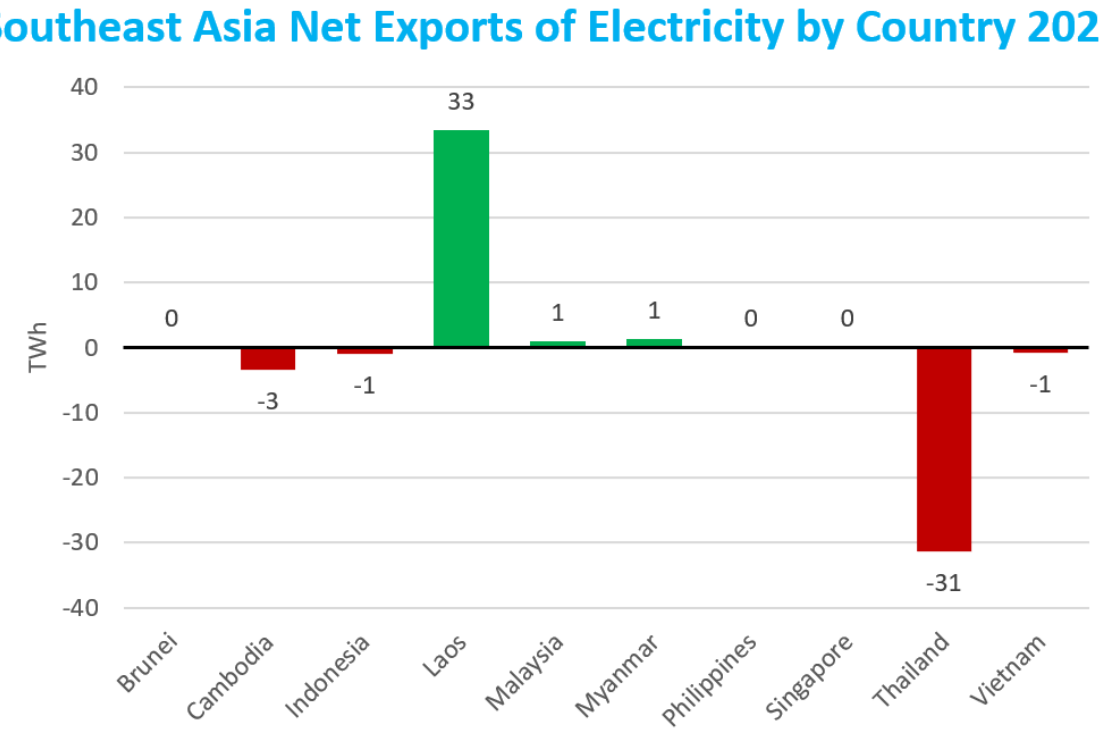
Country	RE certificate	Net metering	Onsite PPA	Offsite PPA
Indonesia	✓	✓	✓	O
Malaysia	✓	✓	✓	O
Philippines	✓	✓	✓	✓
Thailand	✓	O	✓	X
Vietnam	✓	Regulation expired, under review	✓	Under discussion

+ Revising artificially low retail electricity prices

International Electrical Grid – Problem / Significant Expansion Required

- To improve economic efficiency, strengthen energy security, and meet environmental objectives (RE integration).

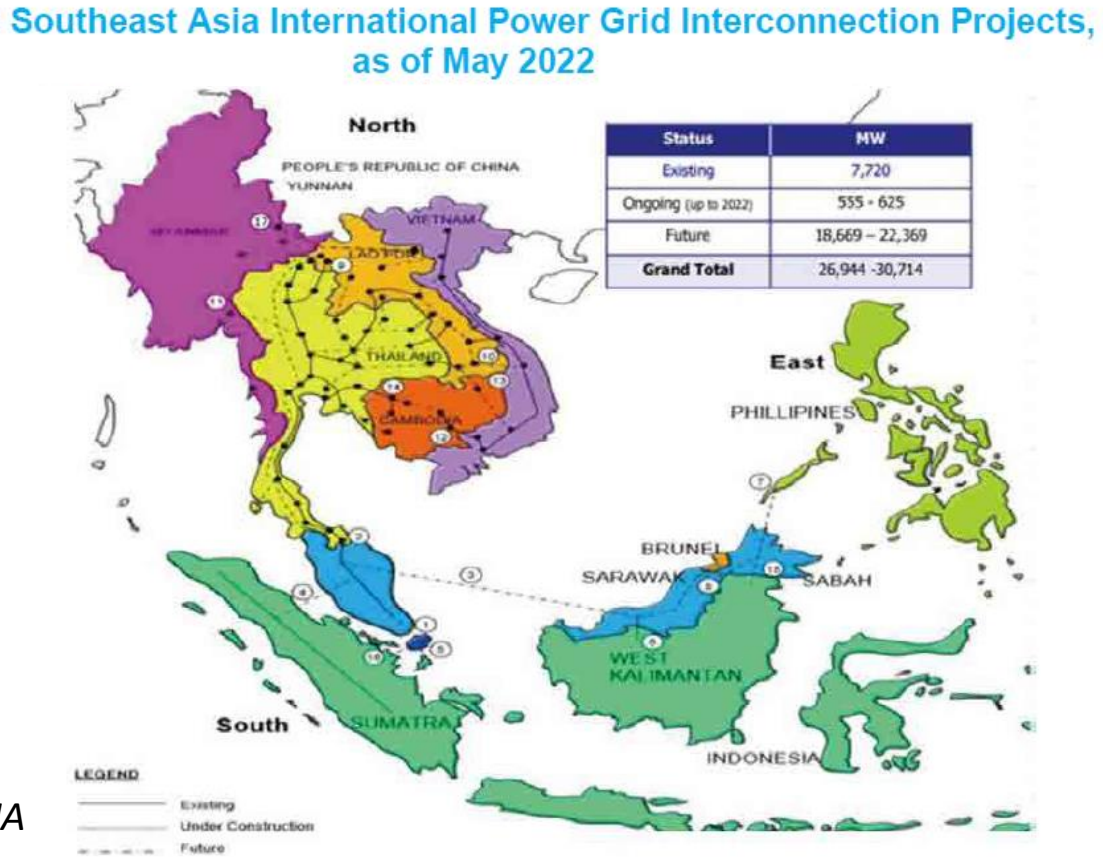
- 8 GW of cross-border interconnection capacity (as of May 2022).



Source: IEA

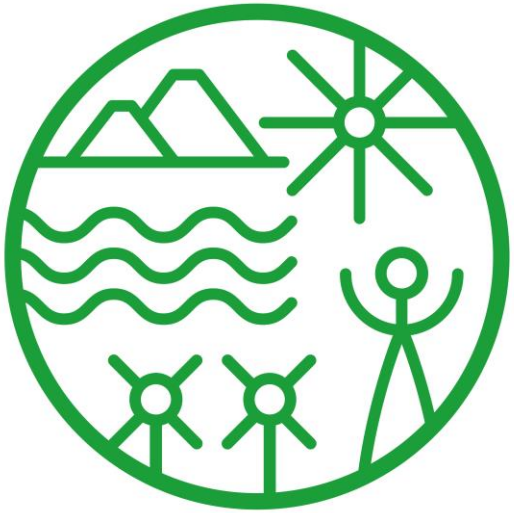
International Electrical Grid – Solutions / Plan for Even More Infrastructure & Multilateral Trade

- Develop even more ambitious grid expansion plans (27-31 GW ➡ × 5).



Source: HAPUA

- Switch from bilateral to regional multilateral power trade (e.g., Laos-Thailand-Malaysia-Singapore and Brunei-Indonesia-Malaysia-Philippines).



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