Transitions Towards Low-Carbon Power Systems in ASEAN

Dr.Tharinya Supasa, Project Lead Southeast Asia Energy Policy

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About Agora Energiewende – an overview of who we are

Independent think tank and policy lab;

more than 150 experts

Financed primarily by philantrophic foundations; diverse financing structure

Our vision: a prosperous and carbon-neutral global economy by 2050

Approach: scientific research and exchange with stakeholders; Programs in ~20 countries, with offices in Berlin, Brussels, Beijing and Bangkok

Agora Think Tank Family

www.agora-thinktanks.de

Agora Energiewende

www.agora-energiewende.de

www.agora-energy-transition.org

2012

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2020

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Agora Energy Transition China

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2021

Agora Agriculture

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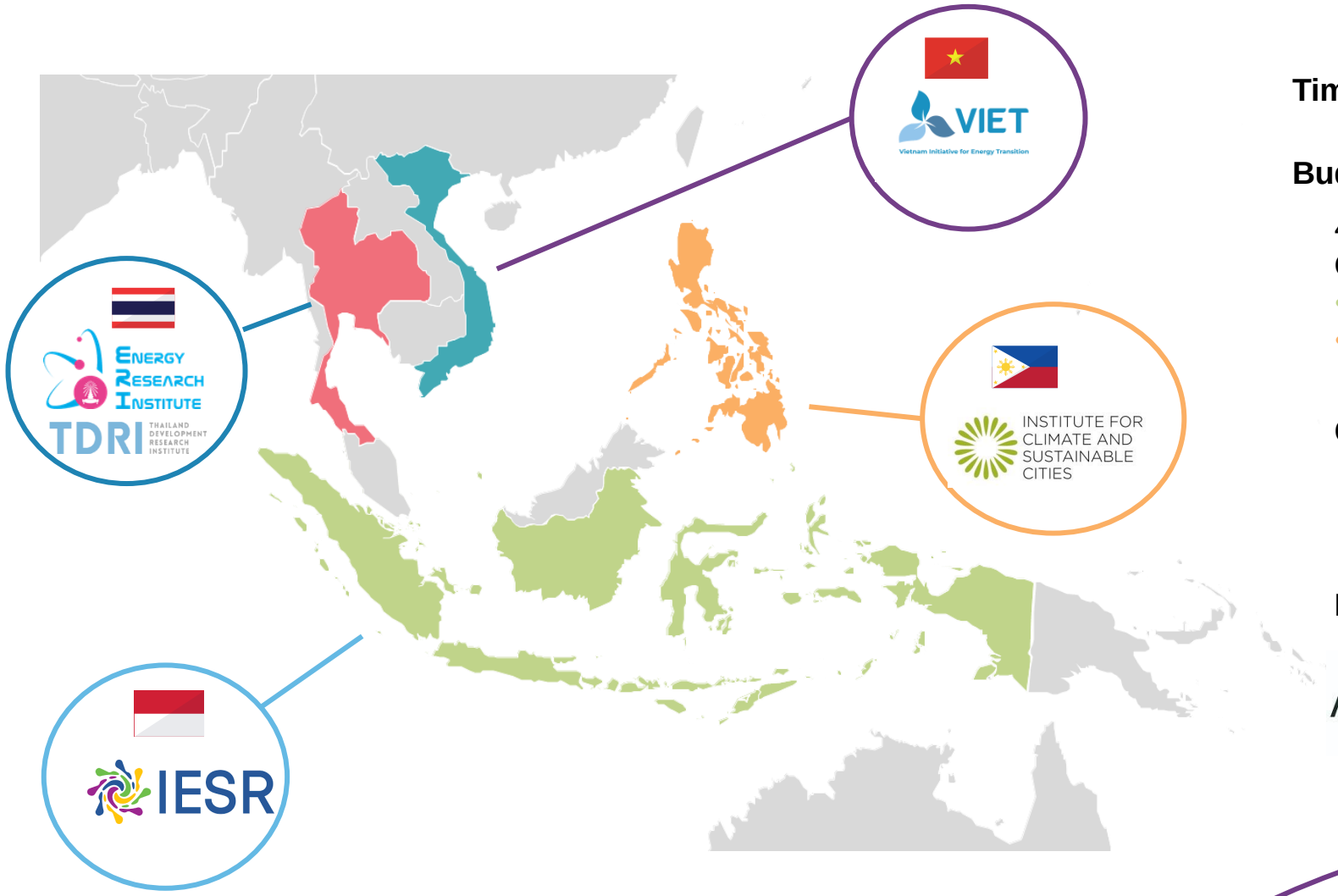
2022

Agora in Southeast Asia



Supported by:

CASE for Southeast Asia

Federal Ministry for Economic Affairs and Climate Action

IKI INTERNATIONAL CLIMATE INITIATIVE

on the basis of a decision by the German Bundestag

Timeframe: March 2020 – February 2027

Budget: EUR 30 million

4 countries with **Local Expert Organisations** in:

- Indonesia
- Philippines
- Thailand
- Vietnam

Coordinator:

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

International Expert Organisations:

Agora Energiewende

NEW CLIMATE INSTITUTE

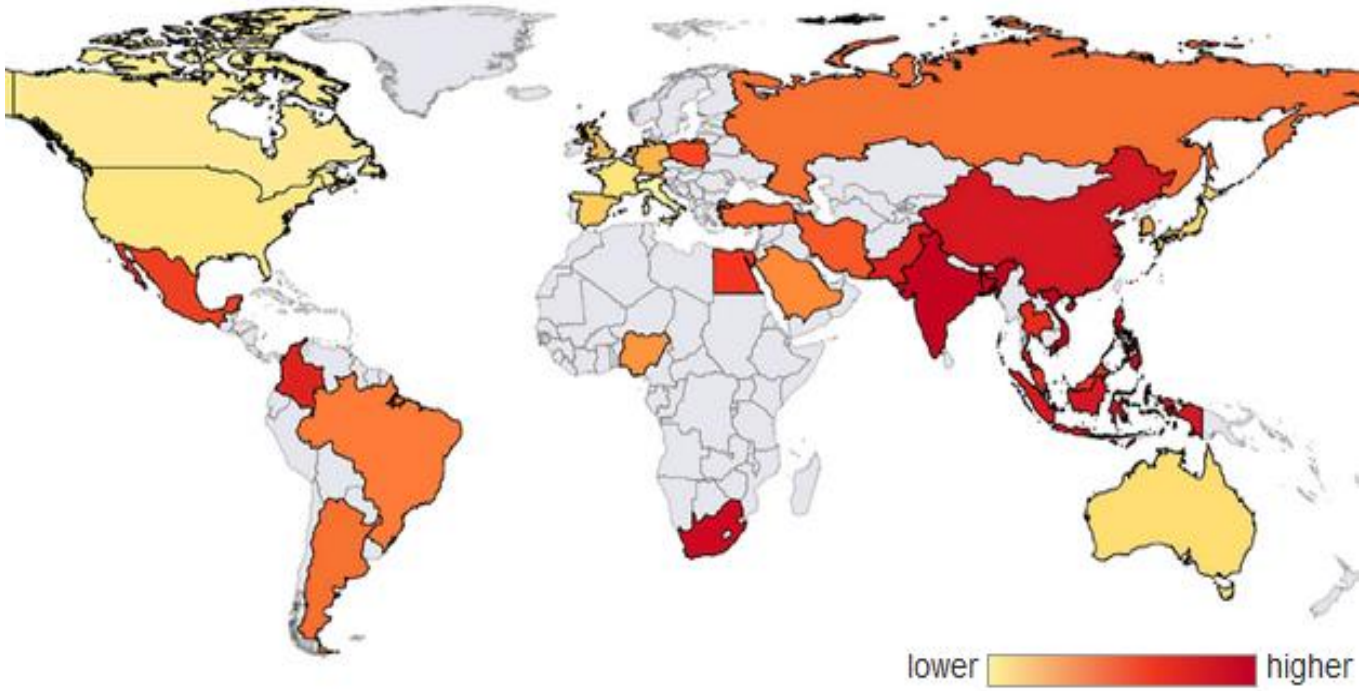
Aligned programme of

ENERGY TRANSITION PARTNERSHIP

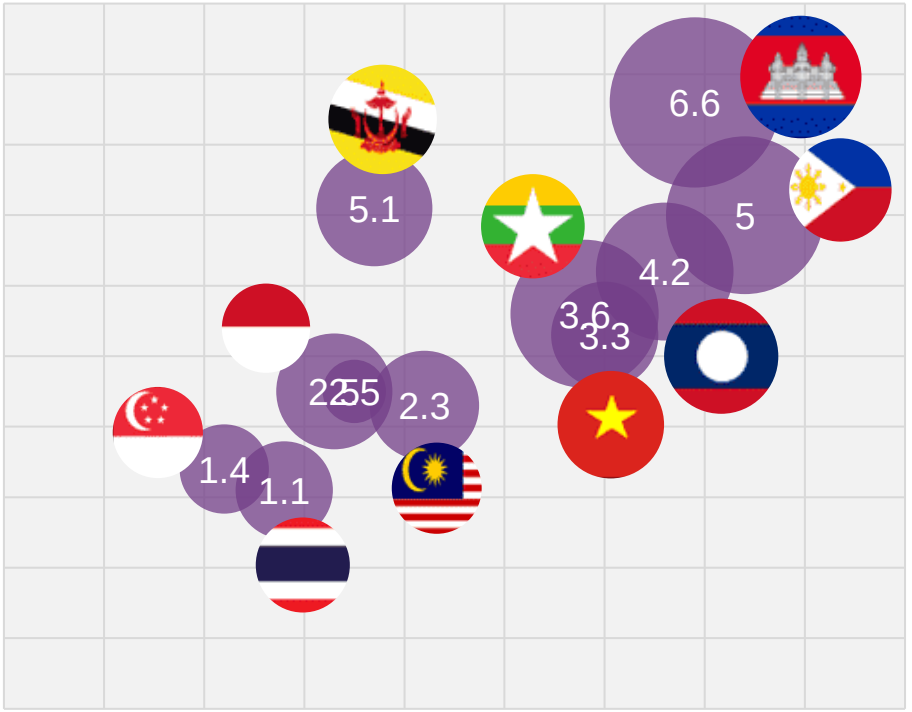
Powering Prosperity and Enabling Sustainability in South East Asia

ASEAN Power Sector Picture

ASEAN countries will become the fast-growing economy in long-run to 2050. This tackles rapidly electricity demand growth. Thus, power infrastructure need to be enhanced to align with economic growth potential, and net zero target.



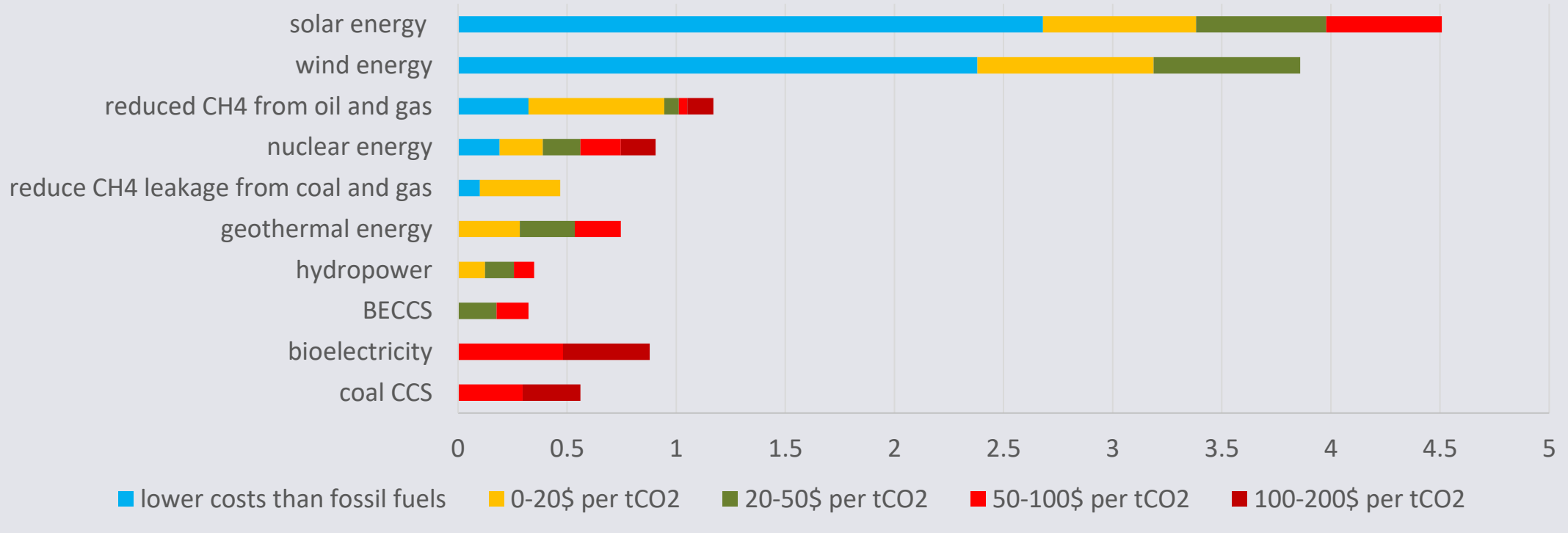
Average annual growth of power generation output in 2030 -2050 (%)



PWC, 2023 [https://www.pwc.com/id/en/not-migrated/shift-of-global-economic-power-to-emerging-economies-set-to-cont.html], **ERIA** (2023), Energy Outlook.

Taking into account the emission abatement potential versus costs. Wind and Solar are the cheapest sources of electricity generation which perfectly conform with ASEAN high RE potential.

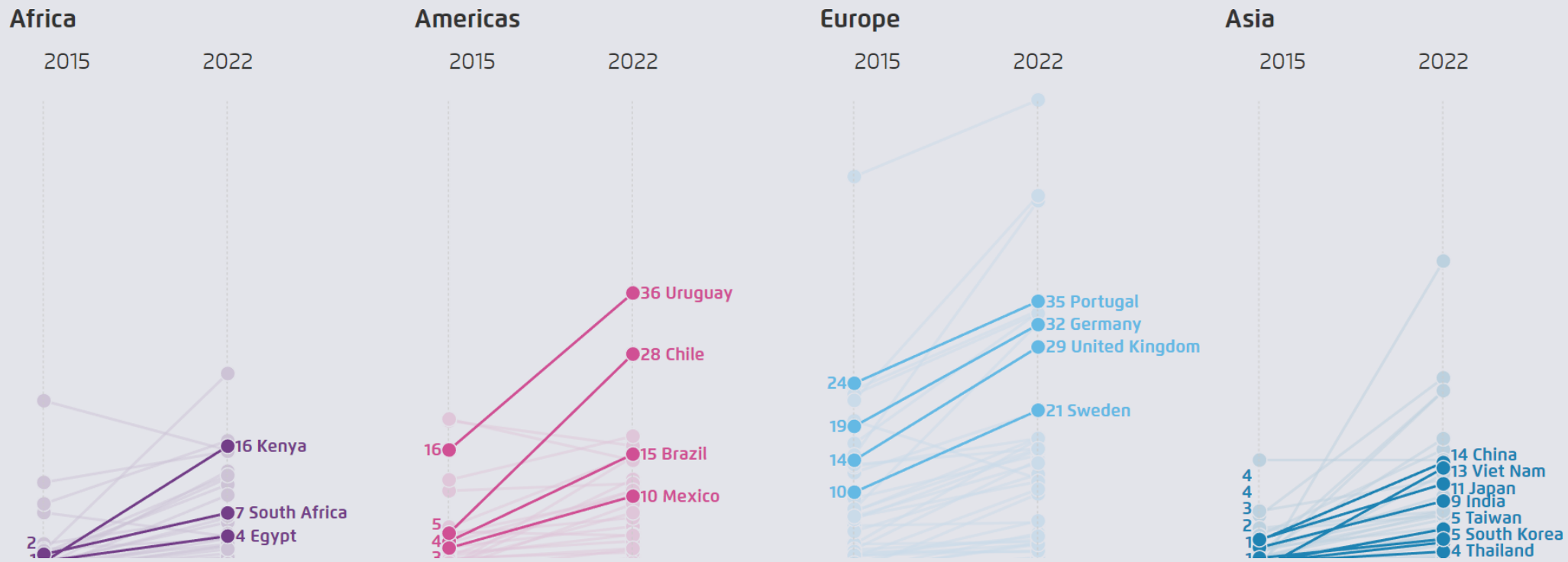
Overview of mitigation options (electricity generation only) and their estimated costs and abatement potentials in 2030 ($GtCO_2$-eq/yr)



IPCC, 2022

Wind and solar shares have broken the 20% barrier in several places. Yet, some Asian geographies are struggling to get out of the starting blocks.

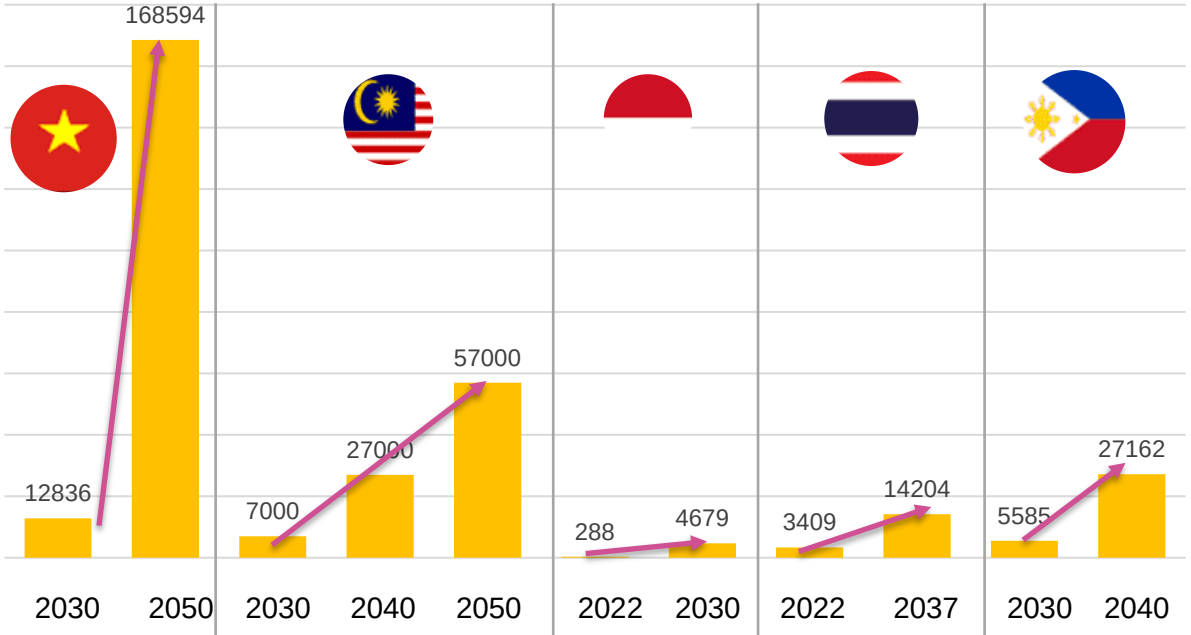
Share of solar and wind in total electricity generation, 2015-2022 (%)



EMBER, 2023

Most countries are highlighting more ambitious renewable energy shares in power mix. However, grid upgrading is required to avoid delaying renewable energy ramp up.

Solar capacity expansion in selected ASEAN Countries (MW)



*the country will publish new PDP in early 2024

Transmission & Distribution Upgrading Toward Higher VREs

New Development [MOIT] *2021-2030, need to build 86 GVA with a capacity of 500kV per station and nearly 13,000 km of transmission line.*
2031 – 2045 - 103 GVA with a capacity of 500kV and nearly 6,000 stations, 220kV of 95 GVA with nearly 21,000 km and 108 GVA with 4,000 km.

TNB: upgrading Malaysia's power grid RM 90 Billion (39%for ET) for 2025 – 2030 [09.2023]

PLN: revising power master plan to add more 32GW RE and upgrade grid infrastructure [09.2023]

EGAT: to align with Energy Alternative plan and APG, the construction of transmission lines of 1,358 circuit-kilometers till 2030

NGCP: grid expansion, reinforcement, and upgrading until 2025 are under-discussion of NGCP – ERC –DOE [07.2023]

The state of play of Energy Storage Technology in ASEAN

Brunei Darussalam	Cambodia	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
Studying Grid-scale/Utility Scale Battery Energy Storage Systems (BESS)	Utility Scale Battery Energy Storage Systems (BESS) in PDP 2022 - 2040, 200 MW in 2030	Piloting Grid-scale/Utility Scale Battery Energy Storage Systems (BESS)		The first 50MW Battery Energy Storage Systems Facilities in Bataan in 2023	Opened the largest Battery Energy Storage Systems (BESS) in Southeast Asi, 285 MWh, in 2023	Studying Grid-scale/Utility Scale Battery Energy Storage Systems (BESS)	By 2030: stored Hydropower 2400 MW
		Pumped storage hydropower Jakarta - Bundung		Several Pumped storage hydropower projects	Floating BESS	Solar-Hydro-Battery Energy Storage (SHB)	Utility Scale Battery Energy Storage Systems (BESS) 300 MW in 2030
		Studying Off-river pumped hydro energy storage (PHES)	Hybrid Hydro-Floating Solar PV (HHFS), Hydro plant acts as energy storage	Studying Seawater pumped energy storage technology in the Luzon region			by 2050: 30,650 – 45,550
				Compressed air energy storage			
				Flywheel Energy Storage (FES)			

Stated target in MW in national plan

Commercialize

-

Key messages

1. ASEAN is projected a fast-growing economy in global economy in the next decades. The expansion of the power sector portfolios are planned to meet the needs. To align with future growth, new power installed capacity investment and grid planning need to be further integrated to climate targets to ensure low carbon and sustainable transition.

2. Enhancing grid integration to remains a priority and shall be developed in parallel with VREs growth direction.

3. Energy storage can mitigate intermittent issue of VREs and can help to offset the system peak load and potentially defer grid infrastructure upgrades. However, the most suitable ESS applications might depend on the local context. Lesson learned can be shared among AMS.

Tharinya Supasa
Project Lead Southeast Asia Energy Policy
Agora Energiewende
Tharinya.Supasa@agora-energiewende.de

Thank you