Agora Energiewende

DOCUMENTATION

Sun and wind for net zero – benchmarking renewables growth in South, Southeast and East Asia

Methodology – November 2023

Contents

1 Bottom-up approach

The "2030 Solar and Wind Benchmark in Asia" analysis builds on a structured review of more than 35 country-specific, regional and global long-term energy and power scenarios. The scenarios evaluated here are all bottom-up analyses that have been performed by local institutions in close consultation with various stakeholders, including government agencies, electric utilities, industry associations, and civil society organisations. They consider specific geographic constraints and political economic developments. As such, they complement global analyses such as those by the IEA and IRENA by highlighting local circumstances and specificities such as technology costs, resource potentials and social development targets. Assumptions and framing conditions vary from study to study and reflect diverse local debate and visions about future developments.

Several factors are considered in the structured review process:

→ Level of decarbonisation ambition
- CO_2 emissions pathways (including peaking years, and potentially long-term net-zero trajectories)
- Estimation of carbon budget (trajectory)
- Emission perimeter
- Estimation of carbon sinks (e.g., assuming a carbon sink for the power sector increase the sector's emissions budget)

→ Energy demand projections
- Role of electrification to decarbonize end-uses (e.g. some scenarios assume adoption of electric vehicle and electric heat, which increases electricity demand)
- GDP growth
- Efficiency gains

→ Technology supply options
- Role of other low-carbon options under discussion aside from renewables
- (e.g., CCUS, nuclear and H_2)
- Role of other RES (hydropower, geothermal, biomass) aside from wind and solar PV

→ Political economy dimensions
- Existing and expected policies supporting RES development (FiT or carbon pricing, etc)

Differences in these factors make it challenging to compare scenarios, therefore the results are formulated as a range of capacity expansions (GW) and renewables share in power generation (%).

In the absence of a long-term energy and power scenario performed by local non-governmental institutions (for example in Bangladesh as of 2022), a back-casting methodology is used. Back casting means starting with a desirable future outcome and then working backwards to define specific milestones to reach the goal. For the example of Bangladesh, the following steps were taken into account:

→ **Step 1:** Goal setting: the review from other countries' scenarios highlights a goal of about 50 percent renewable energy in 2030 for the region, with 30 percent solar and wind generation. In the case of Bangladesh, we assumed 20 percent are supplied by solar power and 10 percent are supplied by wind power.
→ **Step 2:** Demand projection: The country's power demand in 2030 is calculated based on expected growth rate from various government energy plans.

→ **Step 3:** Calculating the expected solar power and wind power generation (in TWh). Example: Solar power generation (TWh) = Power demand (TWh) x Share of solar power (%).
→ **Step 4:** Calculating the solar and wind capacity (in GW) based on average capacity factors. Example: Solar capacity (GW) = Solar power generation (TWh) / Capacity factor / 8760 (hours)

2 Scope of countries

Agora Energiewende reviewed more than 35 specific long-term energy scenarios from Japan, South Korea, Taiwan, Vietnam, Indonesia, the Philippines, Thailand, Pakistan, and Bangladesh. Together, these geographies cover about 1.1 billion people representing about 14% of the world's population, 10% of global electricity demand, and 10% of global emissions power sector emissions. Although the emerging and developing geographies from the region currently emit less greenhouse gas emissions per capita than the world average, these emissions could effectively double in the next decades without concerted decarbonisation efforts. Ensuring the rapid and sustained deployment of renewable energies and an accelerated phase-out of fossil fuel use is crucial to remain on track with net-zero commitments.

3 List of modelling studies & references

Country	Name of scenario	Organisation
Japan	Best Policy	REI, Agora, LUT
	Transition scenario	REI
	100% RE	WWF
	6th Energy Plan	METI
	100% RE	RITE
Korea	K-Map scenario	Next Group, GESI, IGT, Agora
	10th Basic plan for electricity supply	MOTIE
	Speeding up energy transition in Korea	GESI
Taiwan	Carbon Neutrality scenario	APEC
	Taiwan's 2050 Net-zero transition	National Develoment Council
	A Decarbonization Roadmap	Rice University
	Low coal scenario	NTU, GCAA Taiwan
Indonesia	Accelerated scenario	PLN
	MEMR Net Zero	MEMR
	RE Medium	IESR, Agora
	RE High	IESR, Agora
	Best Policy	IESR, Agora
	Delay Policy	IESR, Agora
	NZE	IEA
	APS	IEA
	STEPS	IEA
Thailand	Gov's draft pdp8	EPPO
	NZE 2065	ONEP
	Green PDP	Thammasat
	CN 2050	Agora, CASE
	CN+	Agora, CASE
Vietnam	Net Zero	DEA
	100% RE	UTS ISF
	Gov's draft PDP	MOIT
	JETP 1	Agora (forthcoming)
	JETP2	Agora (forthcoming)
	JETP3	Agora (forthcoming)
Philippines	Carbon Neutrality scenario	APEC
	Clean energy scenario	PH DOE
	Higher renewables scenario (APS3)	ERIA
Pakistan	Renewables-Target Scenario	Intn'l Food Policy (IFPRI)
	IGCEP 2022	NTDC (Government of Pakistan)
	IGCEP 2021	NTDC (Government of Pakistan)
	High RE scenario	Agora
	ARE	LUMS

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