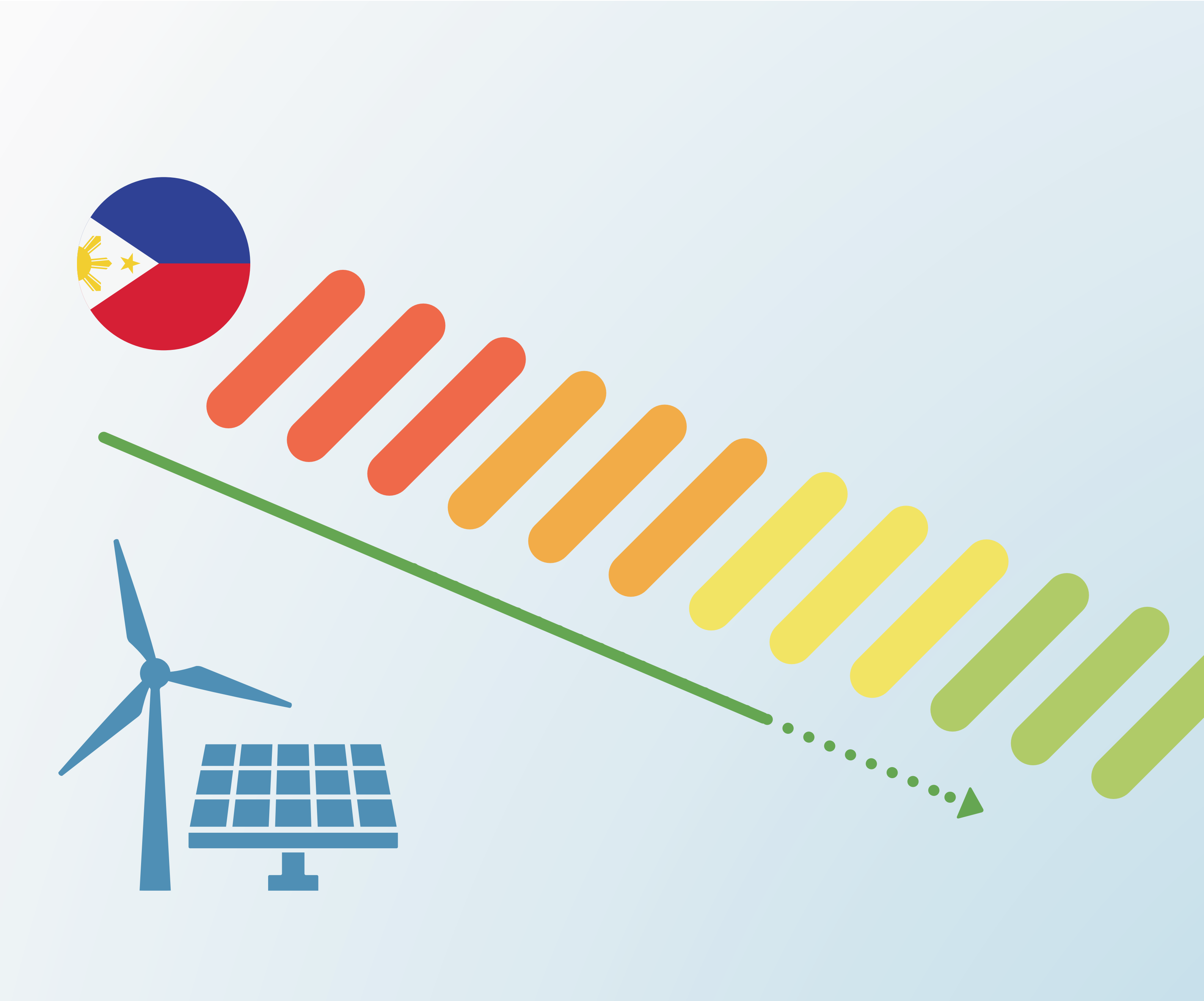
Climate Action Tracker



Climate Action Tracker

Wind and Solar benchmarks for a 1.5°C world

THE PHILIPINNES

February 2026

CLIMATE ANALYTICS

NEW CLIMATE INSTITUTE

Executive Summary

Context

The Philippines' power system is dominated by fossil fuels, with coal, gas, and oil accounting for almost 80% of its electricity generation in 2023.

As a net importer of fossil fuels, the Philippines is highly exposed to energy security risks. High dependence on imported fossil fuels contributes to frequent power supply disruptions and unaffordable electricity prices.

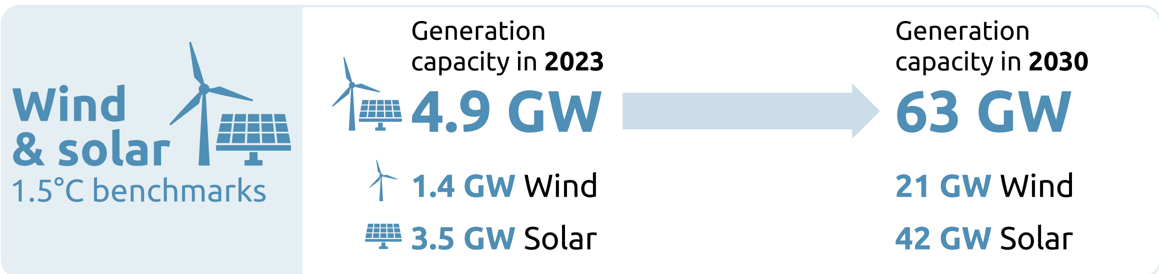
The Philippines' power sector is also the single largest contributor to its overall greenhouse gas emissions, contributing to both global warming and local air quality issues.

Renewable energy has seen significant growth in recent years, driven by government policies, with the majority of new power capacity additions being wind and solar. However, the archipelagic nature of the Philippines poses grid interconnection challenges that threaten to slow progress.

In this report, we look at national studies and global energy system models to assess how much the Philippines wind and solar capacity needs to grow to align with the global goal to triple renewables by 2030 and the Paris Agreement's 1.5°C warming limit.

Key findings

- The Philippines' wind and solar generation needs to grow between 23 to 30 times by 2030 to align with 1.5°C. This equates to 88–117 TWh of wind and solar generation in 2030, up from 4 TWh in 2023.
- Over 60 GW of new wind and solar would be needed by 2030 (40 GW solar, 21 GW wind). This would require average annual capacity additions of 4.5 GW/yr of solar and 2.3 GW/yr of wind from 2023-2030.
- The Philippines' current rollout of wind and solar is not progressing fast enough to achieve this. Under current policies and market conditions, only 30% of the solar and 10% of the wind needed to align with 1.5°C will be installed by 2030.



Context

At COP28, governments agreed to triple global renewable capacity by 2030 globally to stay in line with 1.5°C. This report highlights the potential implications of this COP28 decision at the national level, focusing on **the Philippines**.

Wind and solar deployment is accelerating around the world. However, expected wind and solar capacity deployment under current policies falls short of what is needed for 1.5°C, and is concentrated mainly in a few regions.

Research is needed to understand the pace of wind and solar deployment that aligns with the highest plausible ambition and is compatible with 1.5°C

This project aims at answering the following questions:

- **How much wind and solar generation is needed (TWh) at the national level?**
- **How much wind and solar needs to be built (GW of capacity)?**
- **When does it need to be built by, and how quickly?**

Policy context

The Philippines' 2030 NDC is to cut emissions 75% below a cumulative business as usual (BAU) pathway for 2020-2030 (excluding LULUCF). Of this target, 2.71% is unconditional and 72.29% is conditional on international support. The country does not yet have a formal net zero target for 2050.

The Philippines also aims to reach at least 35% of renewables in electricity generation by 2030, under its National Renewable Energy Program (NREP) 2020-2040, but current policies will only reach a 27% share in 2030.

In terms of installed capacity, the Philippines targets about 15 GW of renewables by 2030. Under current policies and market conditions, the IEA estimates that **solar capacity in the Philippines will reach 12.4 GW in 2030**, up from 3.5 GW of solar in 2023. Meanwhile, **wind capacity is projected to reach 3.9 GW in 2030**, up from 1.4 GW in 2023.

International support

The key analytical elements (high ambition country-level studies and downscaled 1.5°C compatible global pathways, see Methods) do not consider financing requirements.

Significant global resource transfers will be required in line with 'common but differentiated responsibilities and respective capabilities' to achieve these benchmarks.

We do not quantify the technical and financial support needed to achieve the wind and solar rollout presented in this report. This should be a country-driven exercise and some governments have already initiated such processes.

High-income countries will need to provide substantially increased climate finance to support emissions reduction abroad, in line with their 'fair share' of climate action.

Achieving these benchmarks in lower-income countries is therefore a global responsibility, rather than a domestic responsibility. Therefore, ambitious climate finance commitments and delivery are essential to support high ambition at the national level.

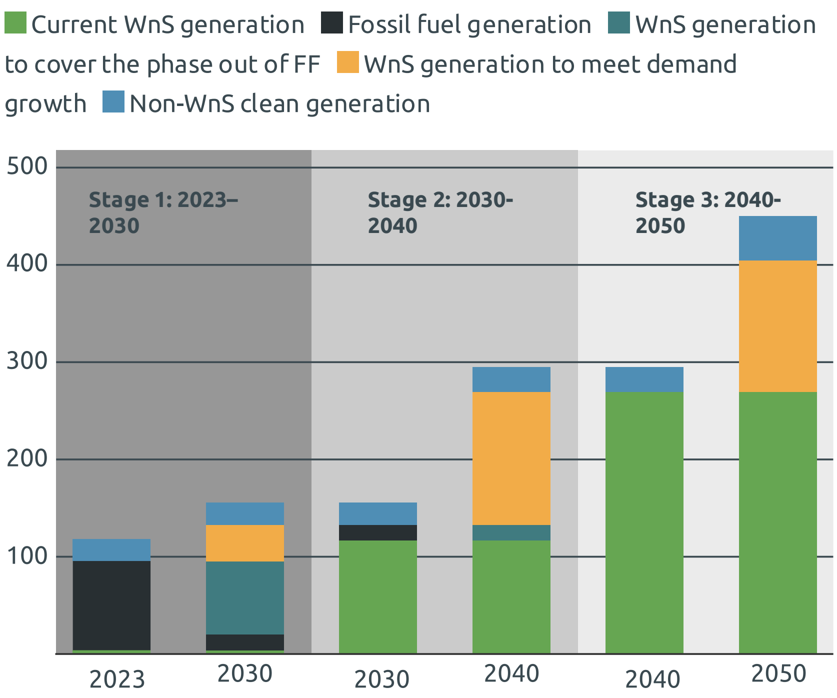
National enabling factors

Key enabling factors for ambitious wind and solar rollout include:

- **Institutional capacity.** A rapid build-out of wind and solar will require the governance and institutional capacity to develop, implement and enforce policy frameworks.
- **Just transition.** A just transition will be needed to take along all stakeholders, particularly those employed by the fossil economy.
- **Grid development.** Substantial increases in both transmission and distribution grid infrastructure will be necessary to integrate large-scale new wind and solar generation into the power system.
- **Fossil fuel phase-out.** Existing fossil fuel infrastructure often will need to be retired earlier than its economic lifetime. Policies need to be developed to achieve the early phase out of fossil fuel plants.
- **System flexibility.** Energy storage (diurnal and seasonal), flexible generation technologies such as hydro and geothermal, and increased demand side flexibility will all be crucial.
- **Market design.** Reform of market designs and regulation adapted to renewable energy-based systems that incentivise and mobilise investments to install renewable energy at the scale needed (e.g., minimise cost of capital, ensure revenue certainty, etc).

Results

Stages of power sector decarbonisation



The stages of the electricity system transition in the Philippines

WnS = Wind and Solar

Figure 1 – Electricity generation in each stage in TWh

In a 1.5°C pathway, countries must add solar, wind, and other clean technologies to meet rising power demand while replacing phased-out fossil fuels. The evolution of the power capacity mix over successive decades varies across countries.

From now until 2030, the Philippines would need to add 6.4 GW of wind and 13 GW of solar capacity to meet growing demand alone. Another 13 GW of wind and 26 GW of solar will be needed to displace the share of fossil fuels in the electricity generation mix.

Power sector transformation and the increasing participation of variable renewable energy (VRE) – mainly wind and solar – in a country's power mix gives rise to a set of technical challenges linked to the integration of VRE sources. Six phases can be distinguished here, from phase 0 (pre-development with negligible amount of VRE shares) to phase E (with over 80% VRE shares). More information about these phases can be found in Annex A.

Meeting the benchmarks for 2030 will put the Philippines in Phase D, with wind and solar making up 75% of the generation mix. Periods in which VRE availability exceeds demand occur more frequently than in earlier phases. Ensuring system stability while continuing to increase renewable penetration requires additional measures, such as expanded demand response, stronger interconnections and large-scale energy storage. Market design and regulatory frameworks become increasingly important to enable these solutions. Although particularly critical in this phase, many of these measures should begin in earlier phases (B and C) to provide long-term investment signals and facilitate a smoother system transformation.

Figure 1 and Table 1 both show the stages of the transition to a decarbonised power sector in terms of the volumes of existing wind and solar and what is needed to displace fossil fuels and meet demand increases. Figure 1 shows the stages in terms of electricity generation, and Table 1 shows it in terms of generation, capacity and share of the electricity mix.

Table 1: Stages of the electricity system transition detailing how much generation capacity of wind and solar will be needed to displace fossil fuels in the system and meet growing electricity demand

	2023	→	2030	→	2040	→	2050
Grid integration phase (share of variable renewable energy in total electricity generation)							
Phase	Phase 0		Phase D		Phase E		Phase E
Share of VRE	**< 5%**		**< 70%**		**> 85%**		**> 85%**
Share of electricity generation							
Wind & Solar	**3.3 %**		**75 %**		**91 %**		**90 %**
Other renewables	19 %		15 %		8.7 %		10 %
Fossil Fuels	**78 %**		**11 %**		**0 %**		**0 %**
Generation capacity							
To displace fossil fuels		**+39 GW**		**+12 GW**		**+0 GW**	
Wind & Solar	**4.9 GW**	**+8.3 GW/yr**	**63 GW**	**+12 GW/yr**	**180 GW**	**+11 GW/yr**	**290 GW**
To meet demand increase		**+19 GW**		**+110 GW**		**+110 GW**	
Generation							
Total	**120 TWh**	33%	**160 TWh**	88%	**300 TWh**	50%	**450 TWh**
Wind & Solar	3.9 TWh		120 TWh		270 TWh		410 TWh
Generation Capacity of VRE (variable renewable energy)							
To displace fossil fuels			13 GW		1.1 GW		0 GW
Wind capacity	**1.4 GW**		**21 GW**		**32 GW**		**43 GW**
To meet demand increase			6.4 GW		9.8 GW		12 GW
To displace fossil fuels			26 GW		11 GW		0 GW
Solar capacity	**3.5 GW**		**42 GW**		**150 GW**		**250 GW**
To meet demand increase			13 GW		95 GW		100 GW

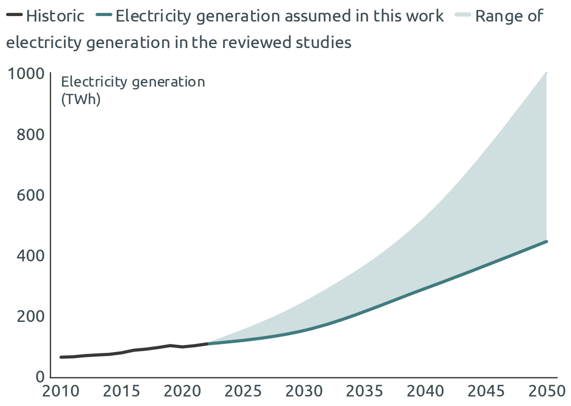
Note: Numbers are rounded to two significant figures, which may contribute to minor differences in totals. The calculations assume that wind, solar, and other renewables contribute equally and proportionally to displacing fossil fuels and meeting demand growth.

Future electricity demand

Electricity demand is taken from Climate Analytics' study, commissioned by the Center for Energy, Ecology, and Development (CEED) exploring net zero pathways for the Philippines. We take demand from the 1.5°C compatible pathway from this study, which achieves a phase-out of coal and fossil gas in the power system by 2035 and 2040 respectively, accompanied by large-scale renewables buildout.

In this scenario, total electricity generation in the Philippines increases almost four-fold by 2050 relative to 2023 levels, reaching 450 TWh. This is mainly driven by increased economic growth assumptions until 2050.

However, there is a significant range in the studies in terms of the expected electricity generation in 2050 ranging from 435.5 TWh to 1018 TWh. This would affect the necessary growth of wind and solar significantly. Our demand estimate is at the lower end of that estimated by country-level studies.



Electricity generation grows 4-9x in the Philippines over 2023-2050

The solid line shows the electricity generation projection used to develop the benchmarks

Figure 2 – Total electricity generation in TWh

Pace of fossil fuel phase-out needed

The rate of fossil fuel phase-out is set by the overlap between country- level studies, downscaled 1.5°C compatible global pathways and the global milestones of the IEA's Net Zero roadmap, in which the Philippines achieves a clean power system by 2045.

To align with 1.5°C, fossil fuels must exit the Philippine power sector before 2045. Fossil fuel generation falls by 51 to 82% by 2030, relative to 2023 levels. Coal and gas will have differentiated phase-out pathways. Coal will phase out much faster due to its higher contribution to the power mix.

To align with 1.5°C, fossil fuels must exit the power sector in the Philippines by 2045, even as electricity demand grows rapidly

The Philippines would need to achieve clean electricity by 2045

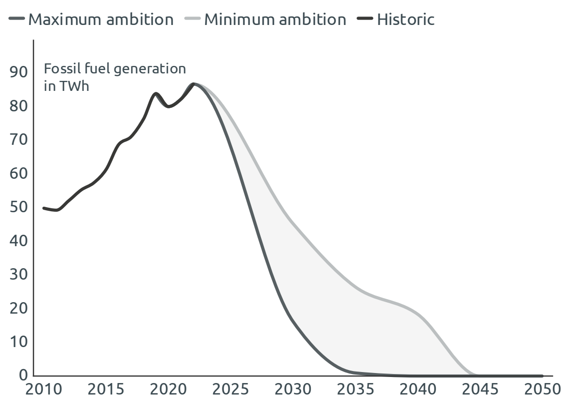


Figure 3 – Fossil fuel generation in TWh

Coal and gas phase-out in the Philippines

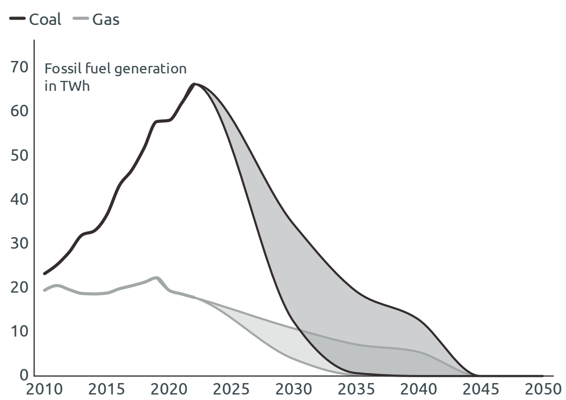


Figure 4 – Fossil fuel generation by fuel type in TWh

The role of other clean electricity generation

While wind and solar will be the workhorse of the energy transition, other clean electricity generation may play a role. We estimate the role of non- wind and solar clean electricity generation* (largely hydro, biomass, nuclear and geothermal) from country-level studies.

In our modelling, we assume that generation from clean technologies other than wind and solar in the Philippines would increase to 23 TWh by 2030 (15% of total generation) and 45 TWh by 2050 (10% of total generation). This generation is provided largely from geothermal, tidal, and a small amount of hydropower. The benchmarks do not assume any deployment of nuclear in the Philippine power sector.

Total wind and solar generation needed to align with 1.5°C

The wind and solar rollout is then calculated by combining projected electricity demand growth, the fossil fuel phase-out necessary to align with 1.5°C, and the assumed generation from other clean technologies.

To align with 1.5°C, **wind and solar generation in the Philippines would need to reach between 88 and 117 TWh by 2030**. Generation in 2023 was 4 TWh. This is therefore a 23 to 30-fold growth in wind and solar.

Wind and solar provides 56–75% of overall electricity generation in 2030, and 90% of overall generation in 2050. A grid powered almost entirely by wind and solar would require substantial rollout of batteries and energy storage, support from dispatchable generation such as hydro and geothermal, flexible demand and grid extension to ensure reliability of the system.

To align with 1.5°C, wind and solar generation would need to grow rapidly in the Philippines

Wind and solar generation needs to grow 23-30x by 2030 relative to 2023 in the Philippines

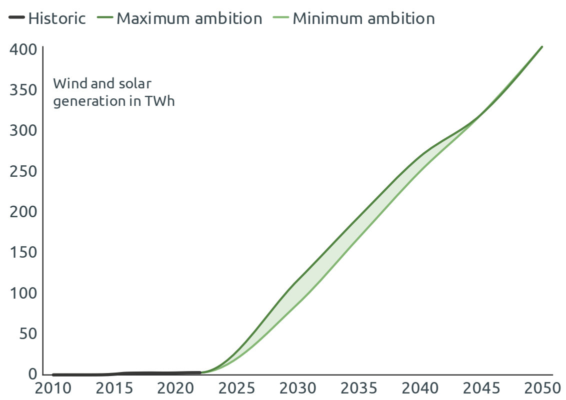


Figure 5 – Wind and solar electricity generation in TWh

Wind and solar need to provide about 90% of electricity generation in the Philippines by 2050

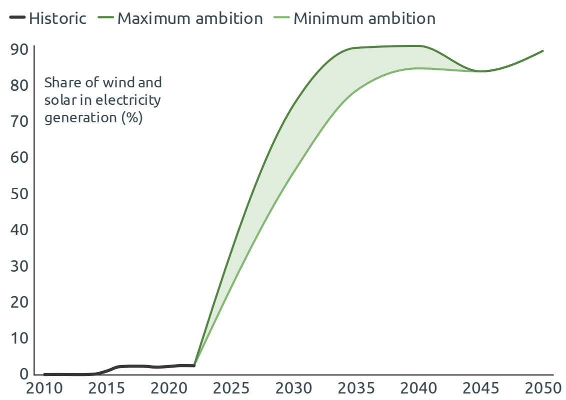


Figure 6 – Wind and solar electricity generation share (%)

* We do not consider CCS in the power sector, as we do not consider CCS a viable source of large-scale emissions reductions in the power sector.

Possible splits between wind and solar

The relative share of wind and solar deployment will vary depending on how various factors develop in the future. We explore one key uncertainty, the relative cost of solar and wind electricity generation (see methods). When accounting for this uncertainty, we see a range of possible future generation mixes between wind and solar.

We highlight the median of the range as our **central benchmark**, but do not suggest this is the only possible breakdown into wind vs. solar. The model includes a simplified representation of the power grid and does not fully capture transmission constraints, spatial effects, curtailment, or detailed integration costs. These factors could influence the relative balance between wind and solar in practice.

In this scenario, **the Philippines would need to deploy almost 63 GW of wind and solar by 2030 to align with the 1.5°C warming limit**. By 2050, total wind and solar capacity would need to reach to 290 GW. Solar becomes the main source of generation, providing almost six times as much generation as wind in the electricity mix by 2050. This will require a rapid uptake of non-fossil flexibility options.

Importantly, these are cost-optimised modelled pathways that give a useful indication of the pace and scale of wind and solar deployment needed for 1.5°C, but they cannot fully the capture real-world context, where industry development, supply chains, workforce, and infrastructure will require stable and sustained development.

The Philippines needs to reach almost 63 GW of wind and solar installed capacity by 2030 to align with 1.5°C

Solar capacity in the Philippines would reach 42 GW by 2030 in a 1.5°C-aligned scenario

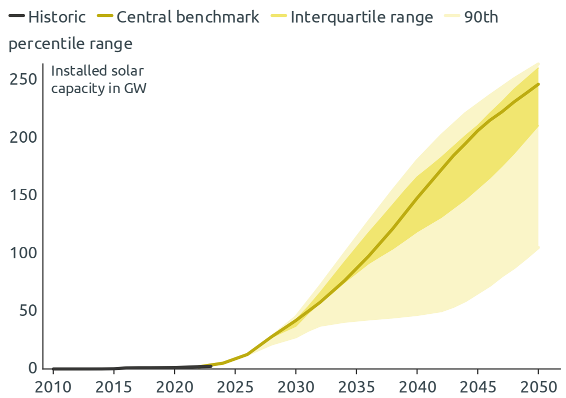


Figure 7 – 1.5°C compatible capacity benchmarks for solar in GW

Wind capacity in the Philippines would reach 21 GW by 2030 in a 1.5°C-aligned scenario

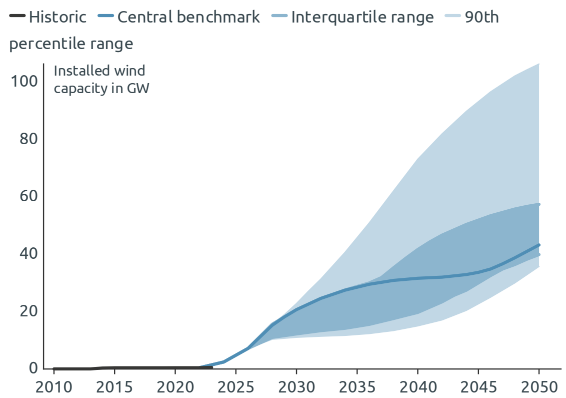


Figure 8 – 1.5°C compatible capacity benchmarks for wind in GW

The following table shows the wind and solar deployment needed to align with the central 1.5°C compatible benchmark produced. 2023 is historical data. All benchmark data from 2030 onwards is reported to two significant figures.

Table 2: Wind and solar electricity generation and capacity (2023–2050)

Scenario	Variable	Unit	2023	2030	2035	2040	2050
Central 1.5°C benchmark	Solar generation	TWh	2.6	50	100	170	270
Central 1.5°C benchmark	Wind generation	TWh	1.3	67	90	98	140
Central 1.5°C benchmark	Solar capacity	GW	2.3	42	87	150	250
Central 1.5°C benchmark	Wind capacity	GW	0.5	21	29	32	43

Table 3: Benchmarks translated into CAT format

Variable	Ambition	Unit	2030	2035	2040	2045	2050
Share of coal	Minimum	%	22	9	4	0	0
	Maximum	%	8	0	0	0	0
Share of gas	Minimum	%	7	3	2	0	0
	Maximum	%	2	0	0	0	0
Share of renewables	Minimum	%	71	88	94	100	100
	Maximum	%	90	100	100	100	100
Share of wind and solar	Minimum	%	56	79	86	84	90
	Maximum	%	75	91	91	84	90

Comparison to current rollout and country target

Under current policies and market conditions, deployment of wind and solar PV in the Philippines would not align with 1.5°C. There would be a capacity gap of **around 30 GW of solar PV** and **almost 17 GW of wind** in 2030 between current rollout and the 1.5°C compatible benchmarks highlighted here.

The Philippines has an explicit renewables capacity target of 29 GW by 2030, with 20 GW coming from solar and just over 1 GW from wind. These targets fall short of what is needed to align with a 1.5°C-compatible pathway.

The Philippines' wind and solar rollout needs to accelerate to align with 1.5°C

In the Philippines, the current solar energy rollout is well behind 1.5°C-aligned levels

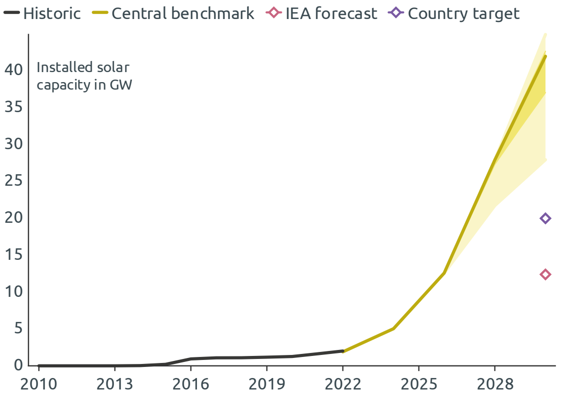


Figure 9 – Installed solar capacity in 2030 compared to targets and current policy projections in GW

In the Philippines, the current wind energy rollout of wind is well behind 1.5°C-aligned levels

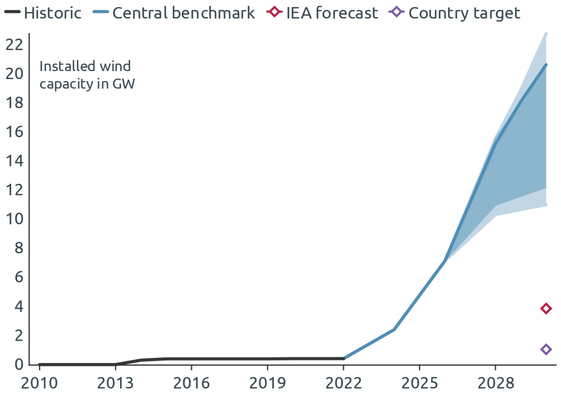


Figure 10 – Installed wind capacity in 2030 compared to targets and current policy projections in GW

Note: The target data was last pulled from Ember in January 2025. The current policies data was last pulled from the IEA in February 2026.

Wind and solar capacity additions in the Philippines need to accelerate to align with 1.5°C, requiring international financial support

The Philippines would need to add on average 4.5 GW/yr of solar capacity until 2030, and 10.2 GW/yr over 2030–2050 compared to 0.21 GW/yr from 2020–2023

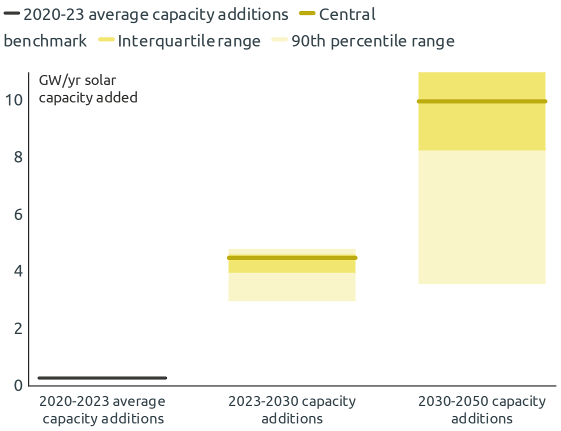


Figure 11 – Solar capacity additions per year in GW/y

The Philippines would need to add on average 2.3 GW/yr of wind capacity until 2030, and 1.3 GW/yr over 2030–2050, compared to 0.03 GW/yr from 2020–2023

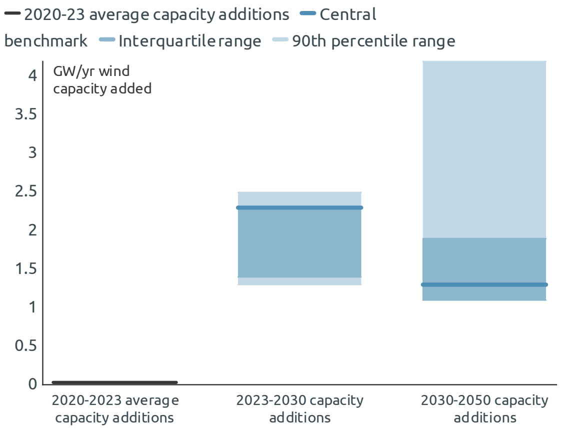


Figure 12 – Wind capacity additions per year in GW/y

Comparison with other studies

We compare the wind and solar generation seen in our analysis to that in the literature review of country-level studies. We highlight the results of modelling from [Climate Analytics](), where we particularly highlight the results from the *1.5°C compatible scenario.*

We see that the wind and solar generation that our method produces is broadly comparable to the Climate Analytics modelling in 2050. However, our benchmarks envisage a faster rollout of solar until 2040 and a slower rollout of wind than the Climate Analytics modelling.

Our benchmarks are broadly aligned with the literature

Electricity generation from solar: comparison with literature in the Philippines

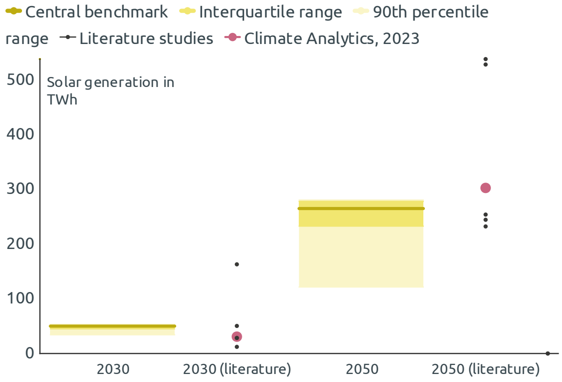


Figure 13 – Solar electricity generation in TWh

Electricity generation from wind: comparison with literature in the Philippines

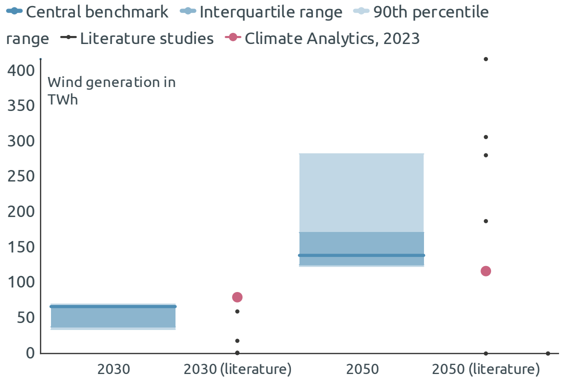


Figure 14 – Wind electricity generation in TWh

In the Philippines, our benchmarks generally suggest that solar will provide more generation than wind

Share of wind and solar generation that comes from solar: comparison with literature in the Philippines

The area above the blue dashed line represents a power system in which solar provides more electricity generation than wind

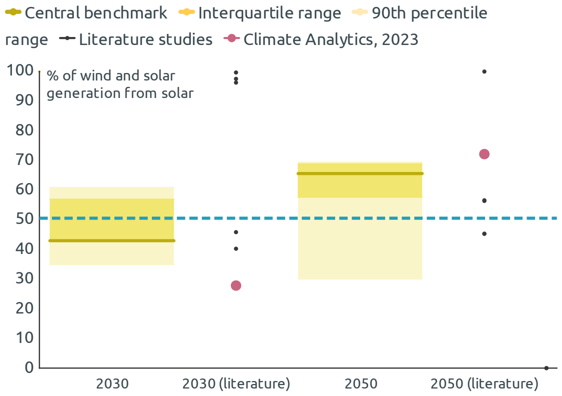
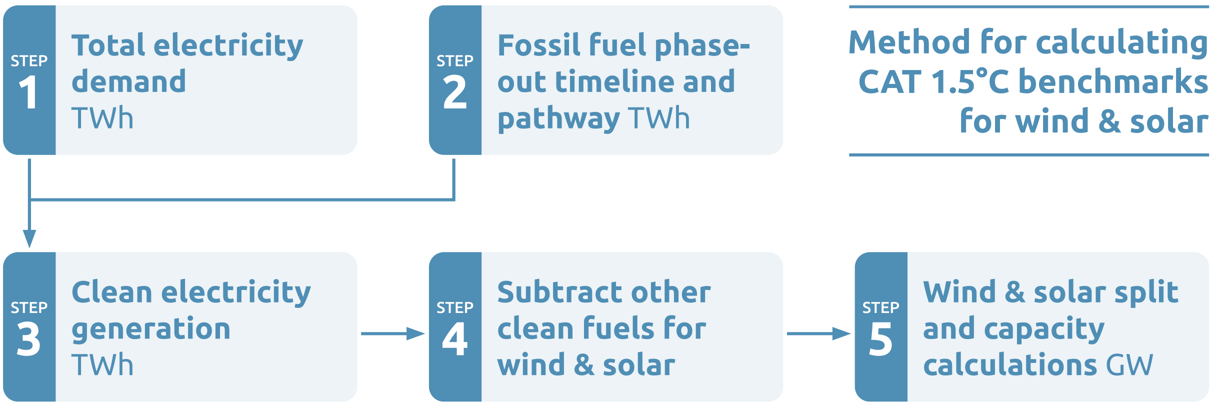


Figure 15 – Generation split between wind and solar (%)

Methodology

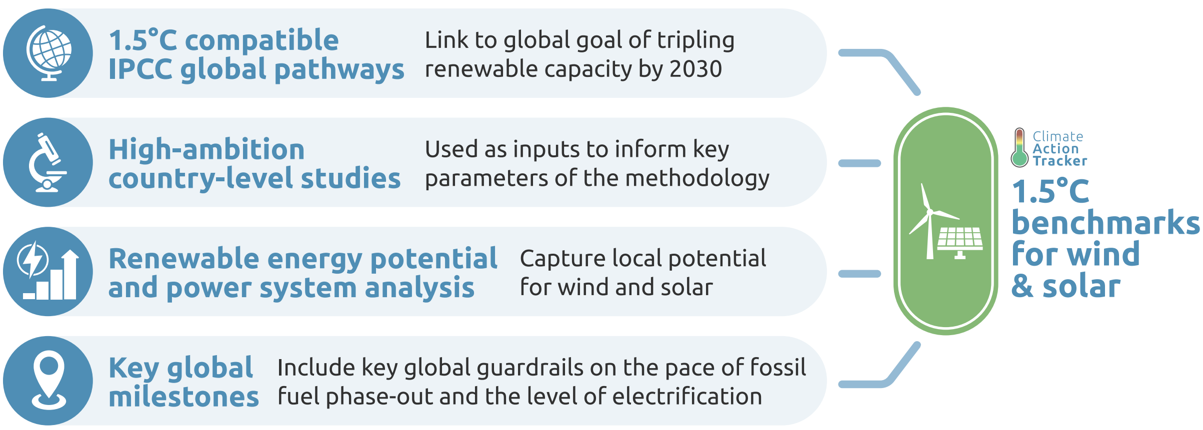
Summary of our method



Our method takes a series of steps to calculate the wind and solar generation needed for 1.5°C, and the resulting capacity deployment. The key methodological steps are highlighted below.

1. We project future electricity demand in the country.
2. We calculate the pace of fossil fuel phase-out needed to align with 1.5°C.
3. Bringing these trajectories together defines the level of clean electricity generation required to meet electricity demand growth while phasing out fossil fuels in the power sector.
4. We project non-wind and solar clean electricity generation based on country-level literature. This allows us to identify the wind and solar generation necessary to align with 1.5°C.
5. Having produced this wind and solar generation trajectory, we feed it into a simplified electricity system model (PyPSA), which calculates for a given set of cost assumptions around wind and solar, a split into wind versus solar and the associated capacity requirements.

Overlap of different elements



Our method focuses on the overlap between different elements. By looking at the range of fossil fuel phase-out which is outlined in both high ambition country-level studies and downscaled 1.5°Ccompatible global pathways, and is informed by key global milestones, we identify benchmarks which are both consistent with a global least cost pathway to limiting warming to 1.5°C but are also aligned with national–level modelling.

Combining multiple different analytical elements can help identify the most robust path to achieving a zero-carbon energy system.

For more details see the Methods Annex.

List of scenarios selected

Table 4: Country level studies for the Philippines

Study	Publication	Scenario selected
Dixon et al., 2025	The Philippines' Energy Transition: Assessing Emerging Technology Options Using OSeMOSYS (Open-Source Energy Modelling System)	• Net Zero (NZ) • Net Zero, No Nuclear (NZNN)
Gulagi et al., 2021	Transition pathway towards 100% renewable energy across the sectors of power, heat, transport, and desalination for the Philippines	100% RE
Hörsch et al., 2023	A 1.5°C future is possible: getting fossil fuels out of the Philippine power sector	1.5C compatible
Handayani et al., 2022	Moving beyond the NDCs: ASEAN pathways to a net-zero emissions power sector in 2050	Net zero emissions
Alexander et al., 2023	Evidence-Based Policy Making: Analysis and Policy Recommendations for how the Philippines can manage a Cost-Effective Clean Energy Transition	Net zero

Annex A

Phases of grid integration

The grid integration phase is adapted from a de Vivero et al. report detailing a qualitative assessment framework for power system transformation and an IEA report on integrating solar and wind. We use the share of VRE sources in electricity generation to classify countries into a phase. More information about the characteristics and key challenges of each phase can be found in the report.

Phase 0 (less than 5% annual VRE share): we assign this phase when wind and solar make up 0-5% of a country's electricity generation mix. Installed VRE capacity is limited, and the impact on power system operation is negligible. Integration does not require significant operational or structural changes.

Phase A (between 5% and 15% annual VRE share): we assign this phase when wind and solar make up 5-15% of a country's electricity generation mix. Conventional power system operation remains largely sufficient for day-to-day system management. However, system planning must anticipate higher future VRE shares. This includes improving forecasting tools, integrating forecasting into dispatch decisions and moving toward shorter scheduling intervals and more real-time system operation.

Phase B (between 15% and 25% of annual VRE share): we assign this phase when wind and solar make up 15-25% of a country's electricity generation mix. The contribution of VRE varies significantly over time, with periods of very low output and periods of high penetration. This variability increases the need for operational flexibility. Enhanced coordination between system operators, network operators, and distribution system operators becomes critical to maintain system efficiency and security.

Phase C (between 25% and 40% of annual VRE share): we assign this phase when wind and solar make up 25-45% of a country's electricity generation mix. Periods in which VRE dominates system behaviour become increasingly frequent. A key operational challenge is maintaining system stability during sudden disruptions in supply or demand. Curtailment of VRE may become necessary to preserve system security. Without structural adjustments, integration constraints of VRE into the system may slow further increases in renewable energy shares despite additional installed capacity.

Phase D (between 40% and 70% of annual VRE share): we assign this phase when wind and solar make up 45-80% of a country's electricity generation mix. Periods in which VRE availability exceeds demand occur more frequently than in earlier phases. Ensuring system stability while continuing to increase renewable penetration requires additional measures, such as expanded demand response, stronger interconnections and large-scale energy storage. Market design and regulatory frameworks become increasingly important to enable these solutions. Although particularly critical in this phase, many of these measures should begin in earlier phases (B and C) to provide long-term investment signals and facilitate a smoother system transformation.

Phase E (more than 70% share of annual VRE share): we assign this phase when wind and solar make up 80-100% of a country's electricity generation mix. The power system reaches very high VRE penetration. The primary challenge becomes ensuring adequacy during extended periods of low wind and solar availability. Addressing this requires long-duration energy storage, sector coupling allowing for export and import of power between economic sectors in the same country and extensive electricity trade both within regions and between countries.

Authors

Climate Analytics
Corbin Cerny
Fadil Abdul Razak
Tommaso Ficara
Neil Grant
Anna Kanduth
Alexandra Pröpper
Danial Riaz
Baltazar Solano Rodriguez
Olivia Waterton
Lara Welder

NewClimate Institute
Chetna Hareesh Kumar

Emily Daly
Gustavo de Vivero
Judit Hecke
Markus Hagemann
Pablo Blasco Ladrero

Editing Cindy Baxter

Design Designers For Climate

Acknowledgments
We would like to thank the wider CAT team for their work on country assessments, which contributed to this briefing.

Authors names are listed with country lead first, then alphabetically.

The Consortium

The Climate Action Tracker (CAT) is an independent scientific analysis produced by three research organisations tracking climate action since 2009. We track progress towards the globally agreed aim of holding warming well below 2°C, and pursuing efforts to limit warming to 1.5°C.

climateactiontracker.org

Climate Analytics is a non-profit institute leading research on climate science and policy in relation to the 1.5°Climit in the Paris Agreement. It has offices in Germany, the United States, Togo, Australia, Nepal and Trinidad and Tobago.

climateanalytics.org

NewClimate Institute is an independent non-profit organisation that develops solutions to tackle climate change and drives their implementation worldwide. Through research, policy advice and knowledge sharing, we aim to raise the ambition for climate action and support sustainable development.

newclimate.org