Renewables 2025

Renewable electricity

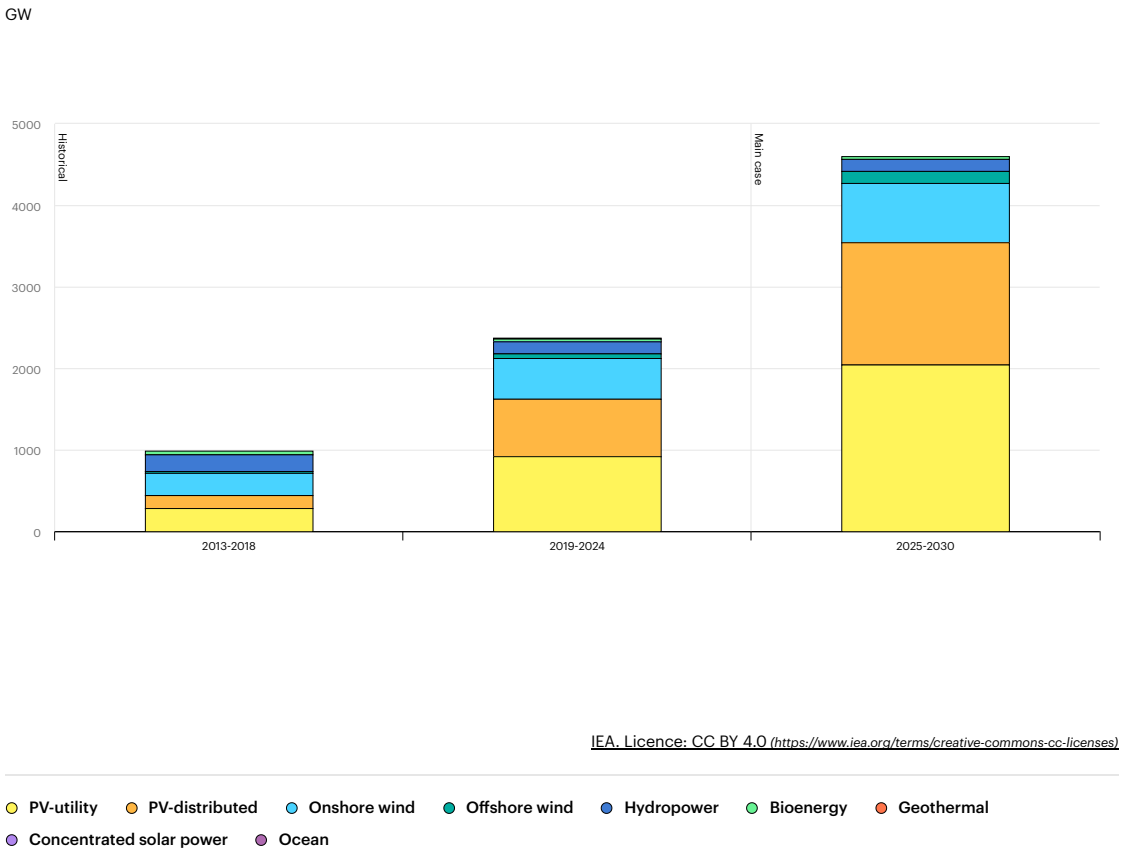
Renewable electricity additions for 2025-2030 total 4 600 GW – equal to the combined installed power capacity of China, the European Union and Japan

Globally, renewable power capacity is projected to increase almost 4 600 GW between 2025 and 2030 – double the deployment of the previous five years (2019-2024). Growth in utility-scale and distributed solar PV more than doubles, representing nearly 80% of worldwide renewable electricity capacity expansion. Low module costs, relatively efficient permitting processes and broad social acceptance drive the acceleration in solar PV adoption.

Distributed solar PV applications (residential, commercial, industrial and off-grid projects) account for 42% of the overall PV expansion. Higher retail electricity prices following the energy crisis, along with strong policy support, have encouraged individuals and businesses to install solar PV systems with the aim of reducing their electricity bills. The use of distributed solar PV applications with storage units is also growing in countries that have an unreliable electricity grid. In South Africa and Pakistan, for instance, uptake in commercial and large-scale off-grid solar PV systems is rising rapidly, improving electricity access.

Compared with 2019-2024, our forecast expects cumulative **onshore wind** capacity additions to increase 45% over 2025-2030, reaching 732 GW. Despite recent challenges concerning supply chain bottlenecks, inflation, and long permitting and grid connection wait times, we expect strong onshore wind expansion, as policies in both advanced and developing countries have partly addressed these barriers. Annual additions are expected to rise in Africa, the Middle East, ASEAN countries, Latin America and Eurasia – in addition to Europe and India.

Renewable electricity capacity growth by technology segment, main case, 2013-2030 Open



Offshore wind capacity expansion is expected to reach 140 GW over the forecast period, more than doubling the growth of the previous five-year period. The annual offshore wind market expands from 9.2 GW in 2024 to over 37 GW by 2030, with China accounting for almost 50% of this increase. In Europe, the annual market is expected to approach 14.6 GW by 2030. Policy changes in the United States, macroeconomic pressures and supply chain challenges have raised costs and undermined project bankability in several European markets and Japan, resulting in undersubscribed auctions and project cancellations. As a result, we have revised the global offshore wind capacity forecast 27% downwards from last year.

Hydropower growth from 2025 to 2030 is expected to be slightly higher than during 2019-2024, with more than 154 GW of new capacity coming online. Annual additions of pumped-storage hydropower (PSH) capacity is forecast to double to 16.5 GW by 2030, driven by the growing need for flexibility and long-term storage. China leads with over 60% of all worldwide PSH growth over the forecast period. PSH expansion is also gaining speed in Europe (Spain and Austria), as rapid deployment of variable renewable energy systems is presenting integration challenges. Hydropower development is also gaining momentum in India, the ASEAN region and Africa.

This year's forecast is a downward revision from 2024

Globally, we have lowered our renewable energy growth forecast for 2025-2030 by 5% compared to last year, to reflect policy, regulatory and market changes since October 2024. This revision means we now expect 248 GW less renewable capacity to be commissioned over 2025-2030.

For solar PV, wind and bioenergy for power, deployment has been revised downwards. Solar PV accounts for over 70% of the absolute reduction, mainly from utility-scale projects, while offshore wind demonstrates the largest relative decline in growth over the forecast period, decreasing 27%.

The US forecast is revised down by almost 50% across all technologies except geothermal. This reflects the earlier-than-expected phase-out of investment and production tax credits; new "foreign entities of concern" (FEOC) restrictions; and the executive order suspending offshore wind leasing and restricting the permitting of onshore wind and solar PV projects on federal land. Among all technologies, wind is impacted most, with both offshore and onshore capacity growth revised down by almost 60% (57 GW) over the forecast period. The forecast for solar PV capacity has been revised down by almost 40%.

Renewable capacity expansion changes from Renewables 2024 to Renewables 2025 in selected countries or regions, 2025-2030

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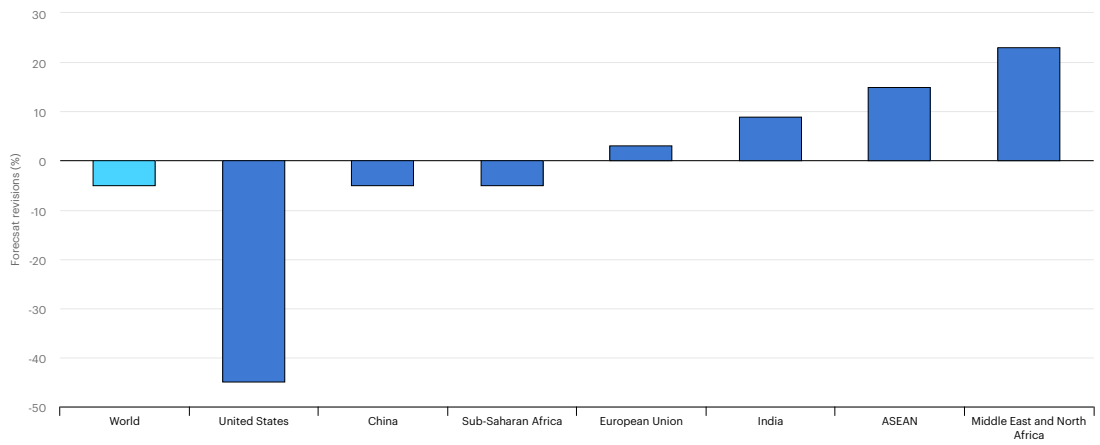


Notes

While China's 5% downward revision seems small in percentage terms, it is the second largest cut in absolute capacity (129 GW) following the United States. Since solar PV and onshore wind are the cheapest technology options to add new power generation in China, facilities were receiving 15- to 20-year contracts at provincial coal benchmark prices and very good returns on investments before June 2025. However, the government then introduced provincial competitive auctions with contracts for difference and requirements to participate in the newly established regional wholesale markets. While this policy is a positive step towards market integration of renewables, it is expected to reduce profitability for investors, prompting us to revise our forecast slightly.

Meanwhile, this year's EU forecast has been revised up slightly, mostly for utility-scale solar PV capacity in Germany, Spain, Italy and Poland. However, in many European markets lower retail electricity prices and reduced incentives following the energy crisis have made residential projects less economically attractive. Furthermore, supply chain challenges and higher costs have left multiple offshore wind auctions without bids, leading to several project cancellations and a 24% downwards forecast revision compared with last year.

We have revised India's forecast up by almost 10%, thanks to record auction capacity in 2024 for onshore wind and utility-scale solar PV; rapid recovery of the onshore wind industry; the introduction of a new rooftop-PV support scheme; and more efficient permitting for pumped-storage hydropower, which is driving faster growth. For the ASEAN region, the faster implementation of large hydropower projects and the introduction of more ambitious renewable energy goals and auction schemes has led to an upward forecast revision. The forecast for the Middle East and North Africa is revised up 23%, driven by faster-than-expected developments in Saudi Arabia this year.

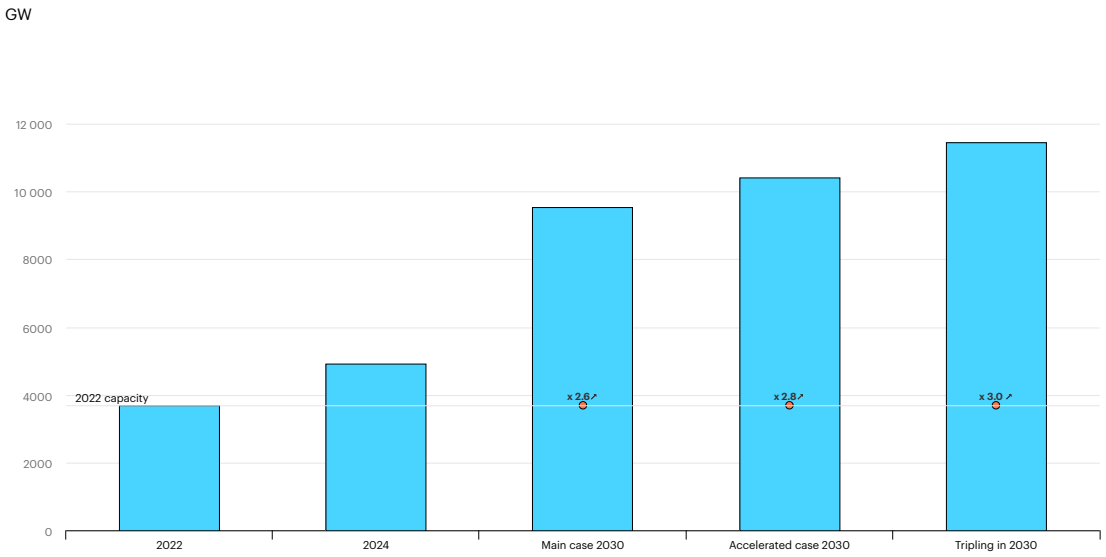
In Latin America, higher retail prices spur distributed solar PV system buildouts. However, growing curtailment risks for wind power in Brazil and for solar systems in Chile (where bilateral contracts drive deployment) have led to utility-scale project cancellations, impacting the forecast negatively. In sub-Saharan Africa, delays in auction implementation for solar PV and extended timelines for geothermal have led to a 5% downwards forecast revision.

Despite robust growth, a gap to global tripling remains

In 2023, nearly 200 countries at COP28 in Dubai pledged to honour the Paris goal of limiting warming to 1.5°C, agreeing for the first time on targets for 2030: tripling the use of renewable energy sources; doubling efficiency gains; cutting methane emissions; and advancing a just transition away from fossil fuels. In our main case, recent cost trends, current policies and market developments raise cumulative renewable capacity to 9 530 GW in 2030 – a 2.6-times increase from 2022. Nevertheless, the main case trajectory is not fully on track to triple global renewable capacity to around 11 500 GW, indicating that an ambition gap and implementation challenges continue to impede faster renewable power expansion.

Conversely, our accelerated case assumes that governments address key policy, grid integration, financing and permitting challenges in the short term to unlock almost 20% more capacity growth compared with the main case. Under this case, cumulative renewable electricity capacity reaches over 10 400 GW, bridging most of the gap to global tripling by 2030.

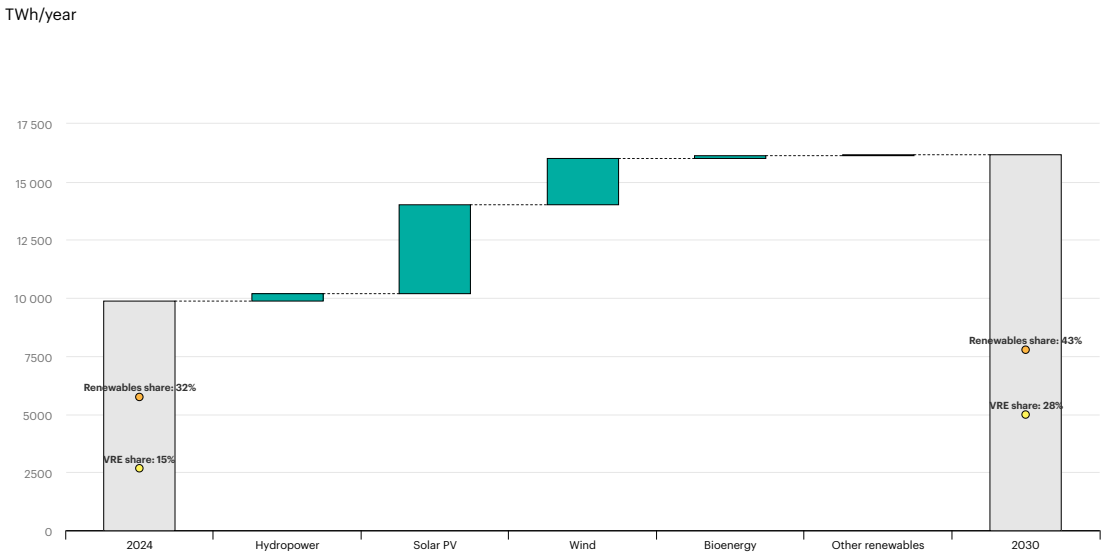
Renewable capacity growth and the gap to global tripling, 2022-2030 Open



Renewables will become the largest global energy source, used for almost 45% of electricity generation by 2030

Electricity generation from renewables is expected to increase 60% – from 9 900 TWh in 2024 to 16 200 TWh in 2030. In fact, renewables are expected to surpass coal at the end of 2025 (or by mid-2026 at the latest, depending on hydropower availability) to become the largest source of electricity generation globally. Solar PV alone accounts for over half of this increase, followed by wind (30%). The share of renewables in global electricity generation is projected to rise from 32% in 2024 to 43% by 2030, while the share of variable renewable energy sources set to almost double to 27%. Over 2025-2030, renewables are expected to meet over 90% of global electricity demand growth.

Global renewable power generation and change by technology, 2024 and 2030 Open



Notes

However, compared with last year's estimates, we expect renewables to generate almost 850 TWh less electricity in 2030. There are two reasons for this lower expectation: first, as already discussed, we revised the capacity forecast 5% downwards, resulting in lower generation. Second, we refined our analysis of wind and solar PV curtailment by transitioning from the established assumptions used previously to a trend-based assessment supported by historical data (see the section below on the role of wind and solar PV in power systems).

Competitive auctions and market-based procurement are increasingly driving global utility-scale renewable electricity expansion

Competitive auctions are now the main procurement mechanism of global utility-scale renewable deployment, accounting for almost 60% of gross capacity additions expected during 2025-2030 – up from less than 25% in the 2024 forecast. This marks a major shift from last year's analysis, when feed-in tariffs and premiums were still the dominant mechanism (but now they represent just 10% of growth). Unlike feed-in tariffs and premiums, where the government sets offtake prices, competitive auctions let developers bid for the level of remuneration they receive, ultimately leading to lower costs This reflects China's 2025 policy reform, which phased out fixed tariffs for solar PV and wind benchmarked to provincial coal prices, replacing them with competitive auctions. With China's transition, the majority of new capacity additions will have, for the first time, offtake prices set competitively rather than administratively by governments.

Global gross renewable utility scale capacity additions by procurement type in Renewables 2024 and Renewables 2025, between 2025 and 2030

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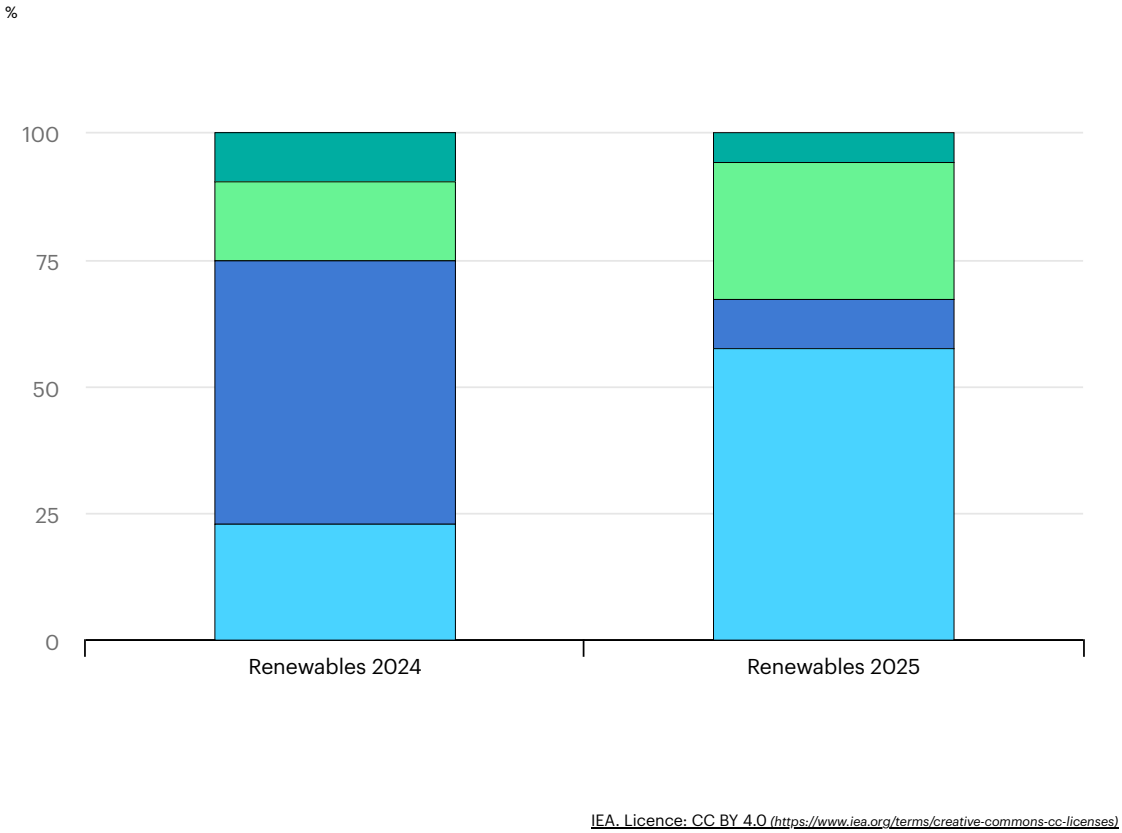

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Gross renewable utility scale capacity additions by procurement type in selected regions, between 2025 and 2030

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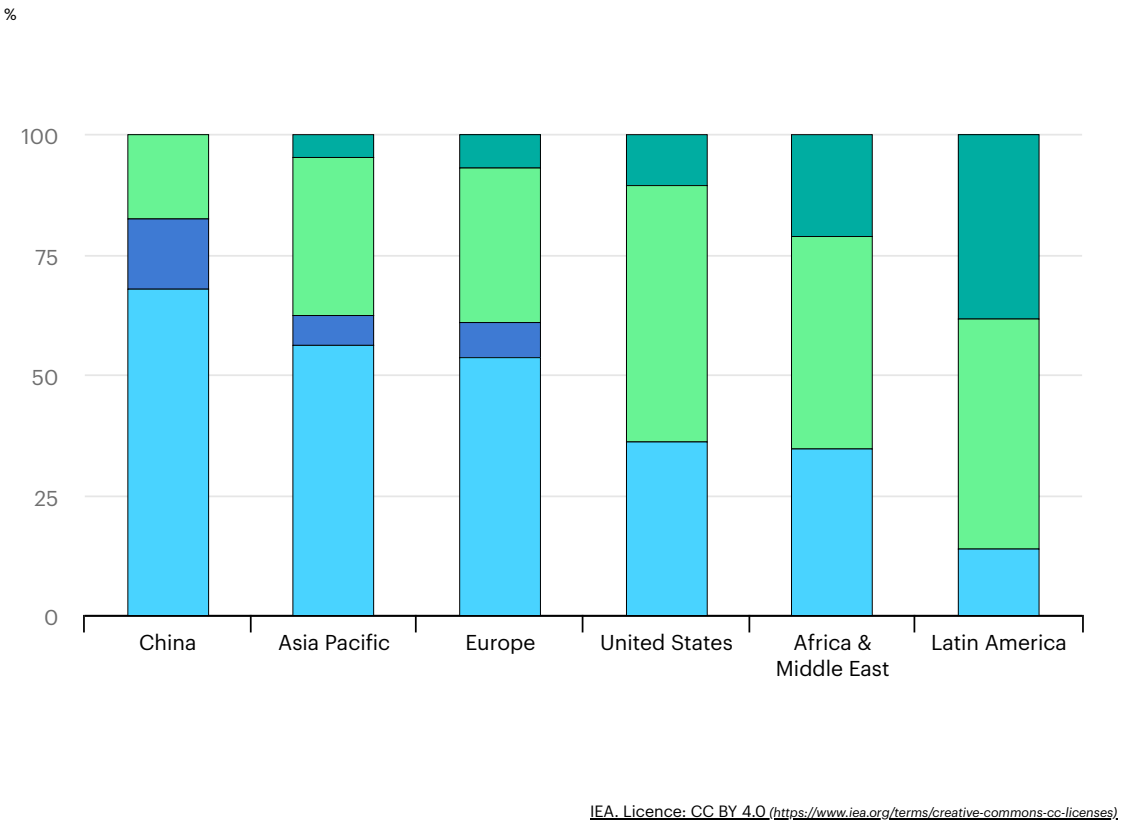


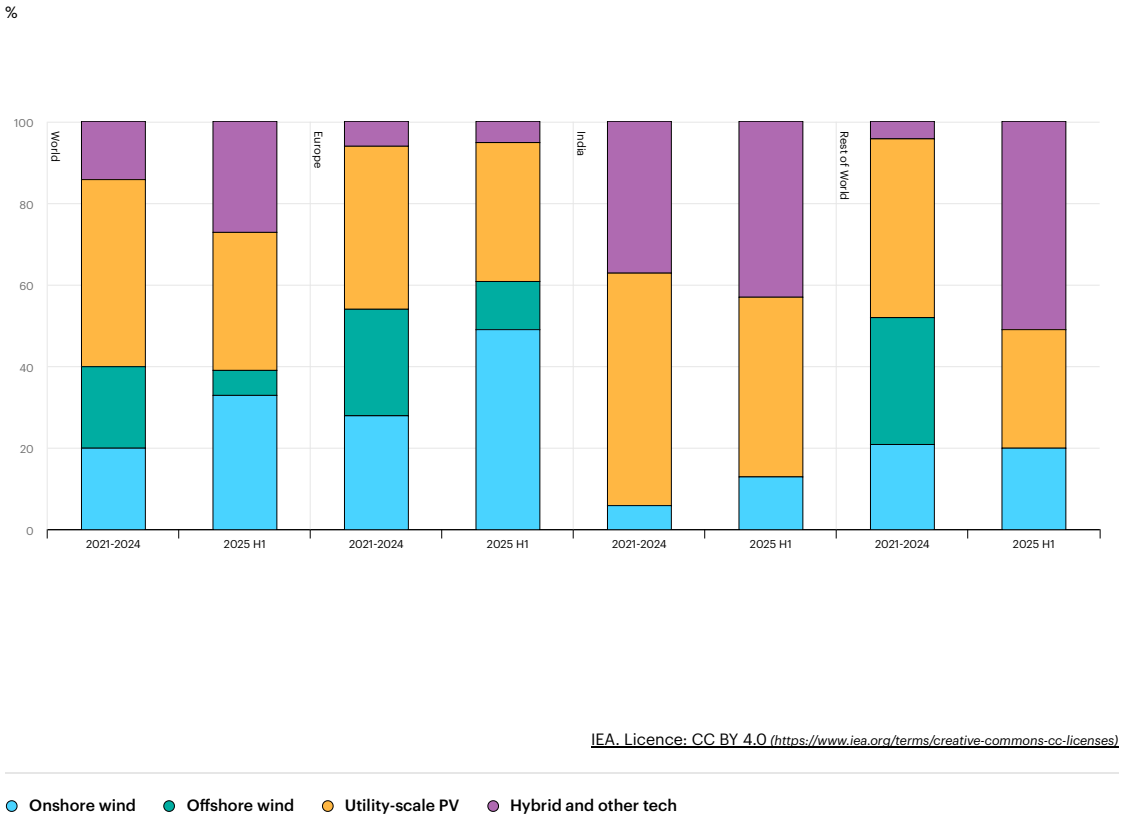
Competitive auctions · Feed-in tariffs and premiums · Merchant and bilateral contracts · Other

Notes

Competitive auctions are now the main procurement type in China, India and Europe, accounting for more than half of renewable capacity growth over 2025-2030. Most schemes take the form of contracts for difference, mandated by both China and the European Union, while in the United States, utilities mainly conduct auctions to meet state RPS obligations. In other regions such as Latin America, Africa and the Middle East, auctions play a smaller role, with other procurement mechanisms more prominent.

Awarded auction volumes in the first half of 2025 showed a significant shift in technology shares. Onshore wind accounted for around 33% of global auction volumes, the highest awarded capacity in any six-month period before 2024, and – for the first time – similar to awarded solar PV capacity. This surge results mainly from permitting condition improvements that addressed years of undersubscribed auctions, especially in Germany. Utility-scale solar PV auction awards totalled over 14 GW, a 63% drop from last year, likely due to more merchant projects. Offshore wind auction volumes also plummeted to 2.5 GW. Finally, hybrid projects and other technologies made up the remaining 27% of awarded capacity in 2025, mostly driven by auctions for hydropower in the Philippines and hybrid projects in India.

Shares of awarded capacity in competitive auctions by technology, 2021-2025 Open



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Market-based procurement mechanisms (i.e. project revenues relying primarily on wholesale spot markets (merchant), corporate purchase power agreements (PPA) or unsolicited bilateral deals with utilities) are also becoming more important. Their role in driving renewable capacity deployment is increasing, accounting for 28% of the growth in the current forecast compared to just 15% in last year's analysis. This stems largely from upwards revisions for China, owing to its power market reforms, and for Europe, where installations from corporate PPAs have been increasing in Spain, Germany, Poland and Italy.

Curtailment is rising with VRE expansion as countries race to deploy measures to increase flexibility and storage

With rapid solar PV and wind expansion, the curtailment of these resources is becoming more common and visible in several markets. Curtailment occurs when the power system cannot absorb all generated power because of transmission capacity limitations, system stability requirements or supply-demand imbalances. While some curtailment is expected and inevitable, persistent or widespread curtailment often highlights gaps in planning, flexibility or infrastructure. Reducing curtailment thus requires a comprehensive strategy involving transmission, flexibility and co-ordinated system planning.

VRE integration is highly dependent on each country's unique situation, including its grid infrastructure and energy policies. Successful integration relies on the adaptation of strategies to local conditions to overcome challenges and optimise renewable energy use.

Annual VRE shares in generation and technical curtailment for selected countries and regions

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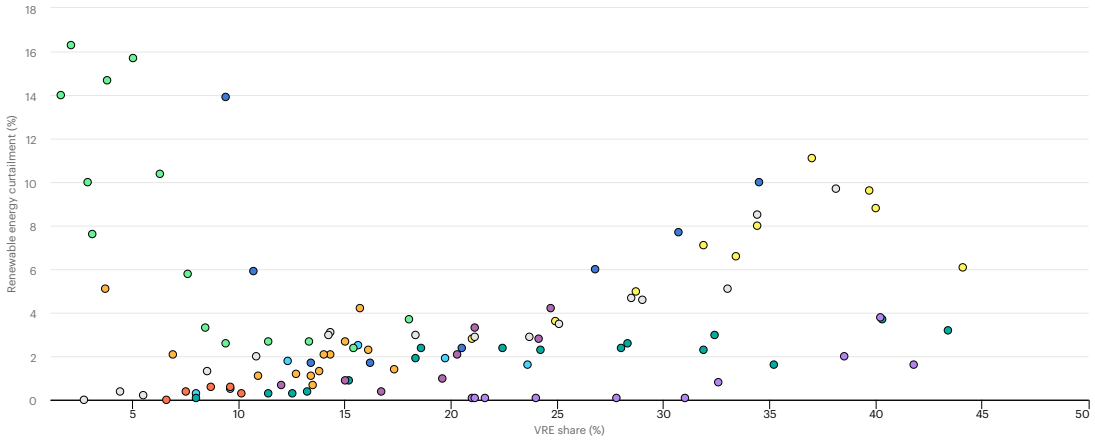


Australia Chile China Germany Ireland Italy Japan Spain United States - California United Kingdom

Notes and sources

Renewable power curtailment has economic impacts that extend beyond just lost energy production. It reduces project developer revenues, potentially discouraging future investments, and can also lead to additional costs for countries if they must compensate developers for the curtailed electricity.

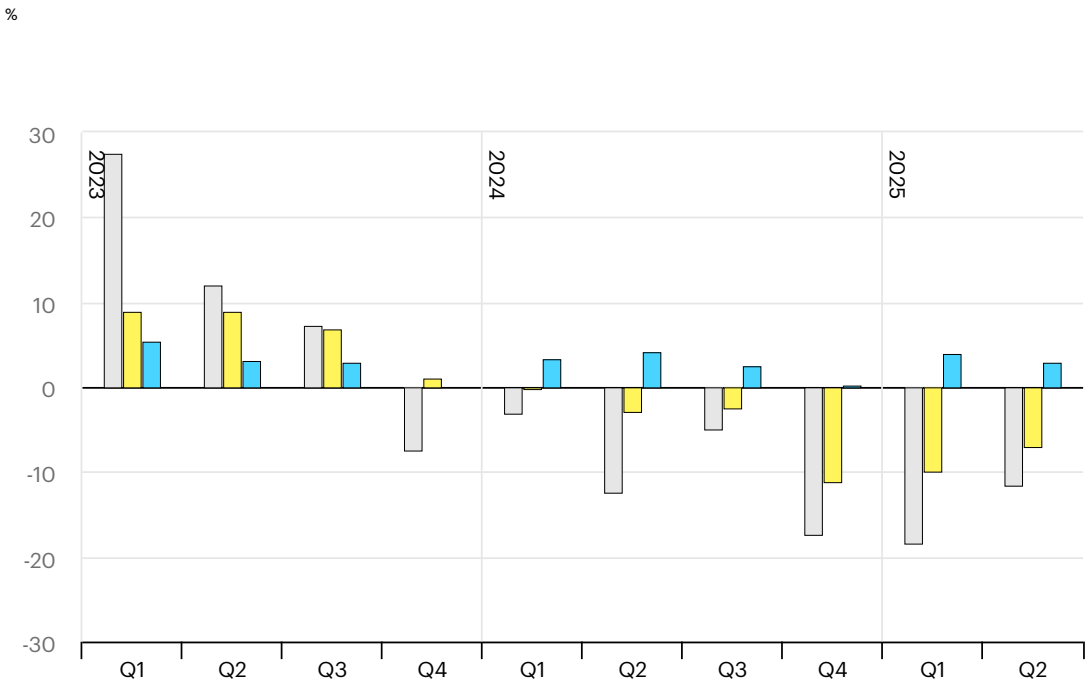
Wind and solar manufacturers struggle financially, but appetite from developers and buyers remains strong

With key regional developments impacting equipment manufacturers, developers and utilities, the financial health of renewable energy companies has evolved since last year. In China, ongoing oversupply-induced price competition that solar PV manufacturers began experiencing in 2023 has pushed the net margins of many into the negative. However, as wind industry production overcapacity is less prevalent, players could achieve stable positive returns.

Outside of China, the wind industry is recovering from previous losses, because the macroeconomic environment has become more stable than in 2022 and 2023, when high inflation and interest rates were causing supply chain disruptions. Wind manufacturers in Europe and the United States have shifted their focus towards stricter financial discipline and supply chain risk management.

Overall investor sentiment concerning new capacity development remains strong. Developers with large and diverse generation portfolios are tending to maintain or further increase their renewable capacity deployment goals. However, considering recent policy changes both in the United States and Europe, some developers (mainly those focused on offshore wind) have revised their commitments to 2030.

Weighted average net margins of renewable energy companies in China, Q1 2023-Q2 2025 **Open**



Polysilicon Solar PV integrated manufacturing Wind integrated manufacturing

Sources

Weighted average net margins of renewable energy companies and large utilities excluding China, Q1 2023-Q2 2025

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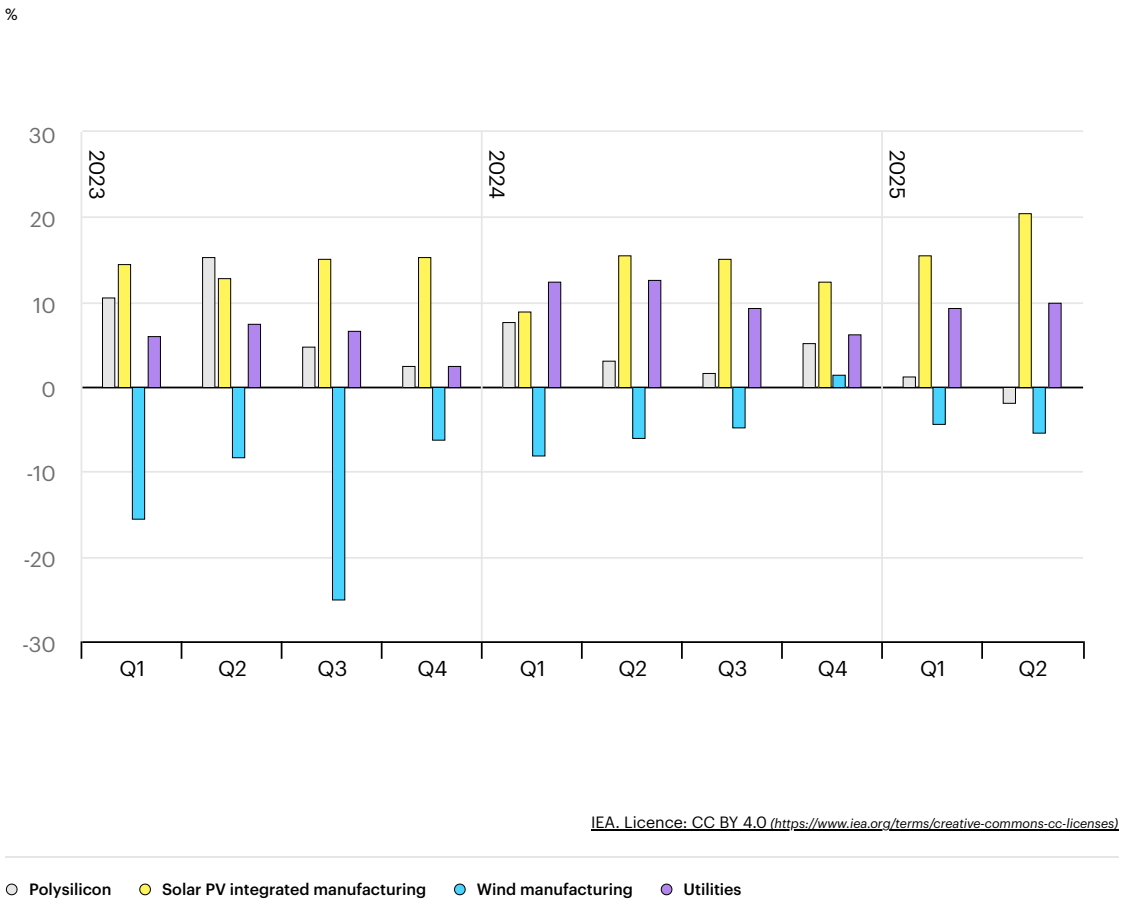


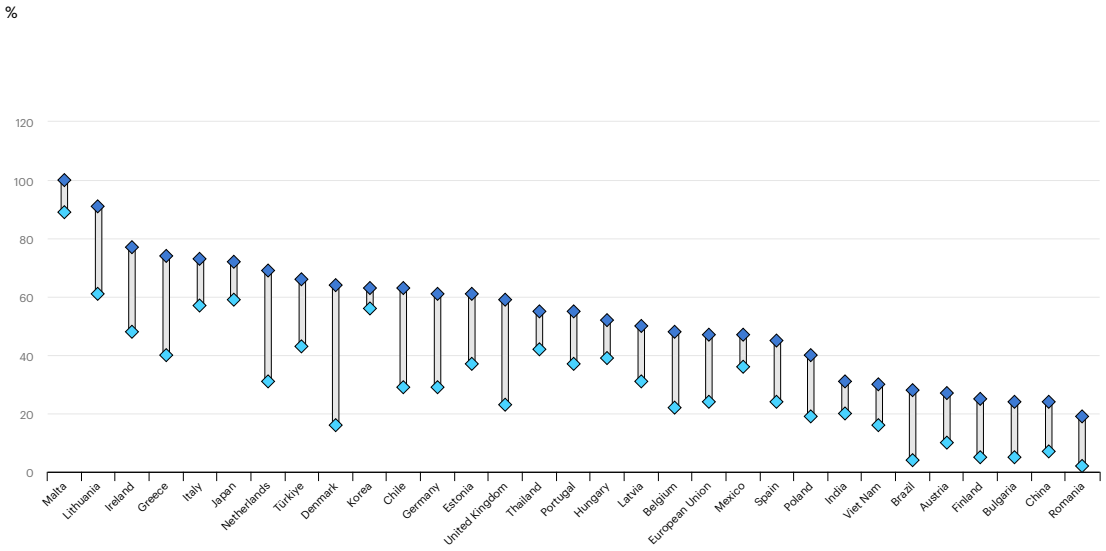
Polysilicon Solar PV integrated manufacturing Wind manufacturing Utilities

Sources

Renewables deployment has already significantly reduced fuel import needs and enhanced electricity supply security

To quantify the energy security benefits of renewable energy deployment in fuel-importing countries (excluding imports of oil and its products), we compared actual trends in capacity additions with electricity generation under a counterfactual scenario in which no new non-hydro renewable energy capacity was added after 2010 – called the Low-RES (renewable energy source) scenario. In the scenario, electricity that was actually generated from wind and solar would instead have been produced using coal and natural gas, with additional fossil fuel demand met through increased imports. The result would be substantial increase in reliance on imported fuels for electricity generation, significantly raising energy security risks in many countries.

Fossil fuel import dependence of electricity supply, actual and in Low-RES scenario, 2023 **Open**



Actual Low-RES Scenario

Notes

In the European Union, in 2023, about one-quarter of the EU electricity supply was met by imported fossil fuels, and without wind, solar PV and bioenergy, this share would have reached nearly 50%. In the Low-RES scenario, the energy security challenges during the 2022 energy crisis would have been significantly more severe. In China, imports accounted for about 10% of the country's total coal supply in 2023 – and nearly 40% of natural gas. Without deployment of renewables over the past decade, China' s fossil fuel-based electricity generation would have been more than 25% higher. This would have potentially required a doubling of fossil fuel imports, raising China's electricity supply import dependence from 7% to nearly 25%. In Brazil, imports of natural gas would have nearly quintupled, pushing electricity import dependence close to 30%, despite the country's large hydropower base.

In the Low-RES scenario, global imports of coal and gas in 2023 would have been around 45% higher – equivalent to 8 000 TWh of additional fuel inputs. This means roughly 700 million tonnes of coal and 400 billion cubic metres of natural gas, together representing about 10% of total global consumption of these fuels in 2023. Assuming historical fossil fuel price trends, fuel-importing countries would have spent approximately USD 1.3 trillion more on coal and natural gas imports between 2010 and 2023. Without the deployment of non-hydro renewables, import expenditures in 2022 alone would have been over USD 500 billion higher – more than the GDP of many mid-sized economies.

Next

Renewable transport *(/reports/renewables-2025/renewable-transport#abstract)*