

In 12 months the renewables market has moved but governments have not

Tripling global renewables is the single biggest action the world can take for the climate this decade. An analysis of 2030 renewables targets shows that, while renewables markets are surging, governments have not updated renewables ambition in the lead-up to COP29.

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Lead author: Dr Katye Altieri

Other authors: Oya Zaimoglu, Dave Jones

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About

This report analyses national 2030 renewable capacity targets for 96 countries and the EU as a bloc. These countries collectively account for 96% of the world's renewable capacity, 95% of global electricity sector demand and 94% of global power sector emissions. National targets are sourced from national strategy or plans, executive orders, official projections, or credible third-party studies and can be found in Ember's [2030 Global Renewable Target Tracker](#). National targets are up to date as of 24 October 2024. To calculate an estimated global target, we have adjusted the target to account for the missing 4% of global renewable capacity.

Highlights

7,238 GW

4 GW

3,758 GW

Sum of 2030 global renewable capacity national targets at COP28.

Increase in the sum of the world's 2030 targets in the last 12 months.

Gap between the current sum of national ambition for 2030 and what is needed for a global tripling.

Executive Summary

National renewables targets fall short of market forecasts and a global tripling

One year since the COP28 agreement to triple global renewable capacity, national targets still only aim for a collective doubling of capacity by 2030. This is despite booming market forecasts that should give confidence for higher ambition.

Tripling renewables is the single largest action to cut emissions this decade and keep the 1.5C goal within reach. At the UN's COP28 climate change conference in December 2023, world leaders reached a historic agreement to triple global renewables capacity by 2030. The International Energy Agency (IEA) and International Renewable Energy Agency (IRENA) both show that a global tripling of renewables to at least 11,000 GW by 2030 is the optimal pathway to keep 1.5C within reach. In the IEA Net Zero Scenario, over 90% of the renewable capacity growth by 2030 is expected to be from solar and wind, with the former quintupling and the latter tripling as compared to 2022. The NZE Scenario also has storage capacity increasing sixfold to provide the flexibility needed to support a tripling of renewables. This report analyses how national targets for renewables have changed since COP28 and includes a new assessment of national storage targets. These targets are assessed in the context of rapidly changing renewables markets.

01 National targets still only aim for a doubling of renewable capacity

A year after the global goal to triple renewables was reached at COP28, the collective sum of national targets has only increased by 4 GW. The current sum of 2030 national targets from 96 countries and one region is 7,242 GW, up from 7,238 GW at the end of 2023. This is a doubling of 2022 capacity, which was 3,379 GW, leaving a gap of 3,758 GW to achieve a global tripling. A regional analysis shows that all regions are falling short of the required ambition needed for a global tripling, considering each region's starting point and the fact that some need to contribute more than others based on 1.5C aligned IPCC scenarios.

02 Solar targets fall far short of solar forecasts

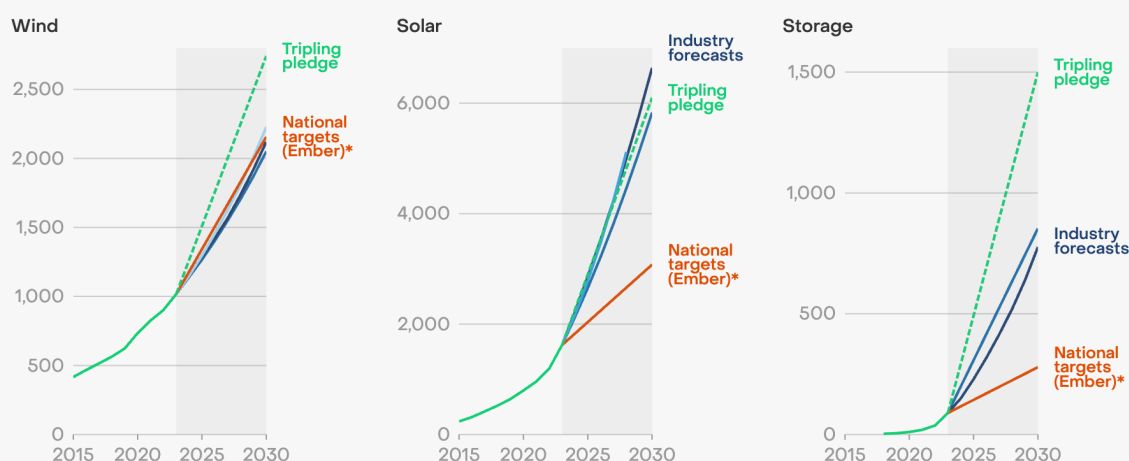
Solar deployment continues to exceed predictions with 593 GW expected to be installed in 2024. This is 29% higher than last year, while 2023 saw an 87% increase compared to 2022. BNEF projects that by 2030, solar capacity will reach 6,640 GW, more than the 6,101 GW required to align with a global tripling. The current sum of 2030 national targets is only 3,011 GW, well below what the market predicts as possible. In 31 of 55 countries analysed, recent and forecast solar additions indicate that there is more than enough solar capacity expected by 2030 to meet targets. Therefore, targets can be revised upwards to reflect the rapid growth in solar markets.

03 Battery additions are growing but storage targets are yet to follow

Battery storage additions increased 136% from 2022 to 2023, in part due to declining costs and increased efficiency. BNEF and IEA agree that battery storage will increase almost 10x from 2023 to 2030, from 85 GW to just under 800 GW. Currently, only 30 countries have national storage targets, totalling 283 GW, falling significantly short of the 1,500 GW needed to align with a global tripling.

Solar is the only technology where industry forecasts align with a global tripling. Government targets fall short of a tripling for wind, solar, and storage.

Global capacity in GW, by technology



Source: *A sum of national targets from the Ember's 2030 Global Renewable Target Tracker, BNEF 3Q 2024 Global PV Market Outlook, Wood Mackenzie Global solar PV market outlook update Q1 2024, BNEF Global Wind Market Outlook 1H 2024, GWEC Global Wind Report 2024, BNEF Global energy storage outlook 1H 2024

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Renewable energy markets are moving fast, especially solar and storage, with record deployment in 2024 and forecasts for even bigger additions to come. However, governments are moving much slower with only eight countries updating national renewable targets, totalling just 4 GW increase in national targets globally. There has been little increase in stated national ambition from COP28 to COP29. Next year's COP30 marks the halfway point of this decade, and an opportunity to set more ambitious targets in the 2025 Nationally Determined Contributions (NDCs).

Year after year, renewables growth continues to exceed expectations. Prices are falling, markets are surging and technological efficiency is improving. What's missing are high ambitions and confidence from countries - national targets are outdated and should be updated to reflect that a tripling is now within reach. COP29 presents an excellent opportunity for leaders to support a storage goal to support the global tripling of renewables.

Dr. Katye Altieri

Global Electricity Analyst, Ember



"This Ember report highlights that the renewables industry can deliver the scale required to address the climate challenge, if the right policies are in place. However, ambitious national targets, combined with long term energy plans and enabling frameworks, are essential to unlocking the full potential of this transition. Now is the time for governments to capitalise on the current market momentum with policies and actions that further accelerate progress towards meeting the tripling goals. The future energy winners will be those that seize this present opportunity."

Bruce Douglas

CEO, Global Renewables Alliance



Chapter 1 Current global renewable target outlook

National renewable targets have not been updated since COP28

Over 130 governments pledged to triple global renewables capacity to 11,000 GW at COP28 in December 2023. Since then, only 4 GW has been added to the sum of national targets.

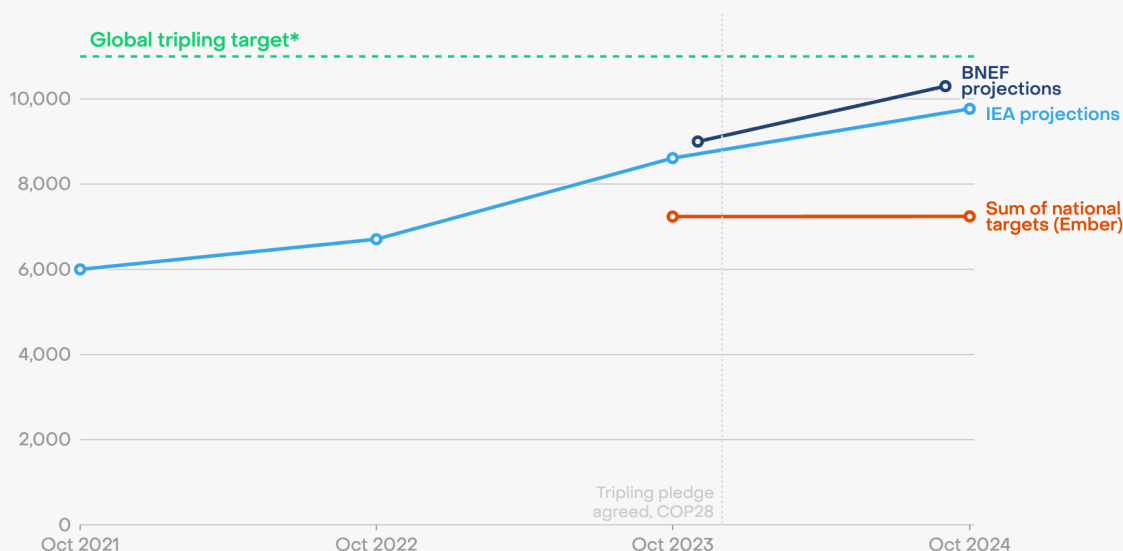
The International Renewable Energy Agency (IRENA), the International Energy Agency (IEA), and the global agreement by [133 countries at COP28](#) are all aligned that [tripling renewables capacity to at least 11,000 GW by 2030 is required for a 1.5C pathway](#). They show that over 90% of the renewable capacity growth would be from solar and wind, with wind capacity rising threefold and solar capacity fivefold, from 2022 to 2030.

The [sum of 2030 national renewable targets in December 2023](#), during the time of COP28 was a doubling of renewable capacity, from 3,379 GW in 2022 to 7,238 GW in 2030. Ember analysis at the time highlighted that if countries took stock of their policy landscapes, rate of renewable deployment and the renewable capacity in the pipeline, more ambitious yet achievable targets for 2030 could be developed. However, only eight countries have updated their targets in the last 12 months. The sum of renewables targets assessed here is consistent with the recent [IEA COP28 Tripling Renewable Capacity Pledge](#) stocktaking report, which assessed targets and plans in 150 countries, and found that by 2030, global renewables capacity will be 2.2 times 2022 levels.

Since COP28, renewable markets, particularly solar and batteries have continued to surge. Indeed, if all current policies and market developments are considered, as outlined in the [IEA main case forecast](#), renewable capacity is expected to increase 2.7 times by 2030 compared to 2022, with the accelerated forecast projecting a 2.9-fold increase by 2030.

In the last 12 months, national renewables targets have not changed. The market has.

Global renewables power capacity in 2030, by date of forecast or country target analysis (GW)



Source: Ember's 2030 Global Renewable Target Tracker, BNEF Tripling Global Renewables by 2030: Hard, Fast and Achievable, BNEF Unlocking Investment to Triple Renewables by 2030 · International Energy Agency World Energy Outlook Stated Policies Scenario

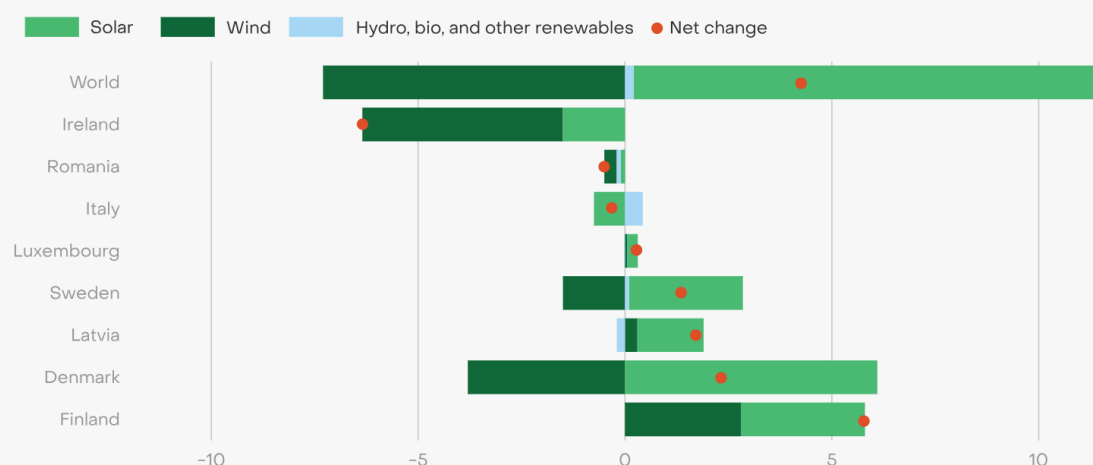
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Only eight countries have updated their 2030 targets in the last 12 months

This report finds that 2030 national targets, one year after COP28, have increased by a net total of 4 GW, bringing the updated total to 7,242 GW. The eight countries that updated targets are all in the EU and did so through the National Energy and Climate Plans (NECPs) process, although 14 have submitted final NECPs. These updates were minor as the prior targets were part of draft NECPs and the new targets are adjustments made in the final NECPs.

Net increase of 4 GW comes from a decline in wind targets and an increase in solar targets

Change in 2030 renewable target capacity since COP28 (GW)



Source: Ember Global Renewable Target Tracker

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The targets analysed here come from the [Ember 2030 Global Renewable Target Tracker](#), which currently tracks data from 96 countries and one region (the EU) representing 96% of global renewable capacity and 95% of electricity demand. The EU region and 67 countries have explicit targets, identified clearly in national strategy or plans, executive orders, legal texts and policy proposals nearing approval. There are 14 countries with implicit targets sourced from official projections or credible third-party studies based on current renewable support policies and net-zero targets. Although implicit targets are not legislative or legal targets, they act as a proxy for current ambition for renewables in the absence of an explicit target. There are two countries with derived targets that are estimates for 2030 based on explicit targets for other years. There are a further 13 countries with no identifiable target. [Ember's 2030 Renewable Target Tracker](#) provides detailed information on targets, sources and confidence levels by country, enabling comparisons across regions and economic groups.

The combined 2030 targets of the countries analysed currently do not meet the benchmark of a global tripling. Of the 96 countries tracked, 83 have renewable capacity targets for 2030. These countries account for 89% of global electricity demand. The 13 countries with no identifiable targets are Austria, Azerbaijan, Brunei Darussalam, Democratic Republic of Congo (DRC), Iran, Iraq, Kazakhstan, Kuwait, Mongolia, Russia, Syria, Togo and Uganda.

accounting for 5.4% of electricity demand. The remaining 120 countries, which account for 5.5% of electricity demand, have not been investigated for this target tracker.

The lack of updates for renewable targets is likely tied to structural factors, including the election timings and governance cycles. Many countries, like China with its five-year cycle, align policy updates with these timelines. Major elections in the UK, US, and India in 2024 may have influenced the pace of updating stated ambitions.

However, the upcoming Nationally Determined Contributions (NDCs) in 2025 present a critical opportunity to solidify the global goal of tripling renewable capacity. These NDCs, operating outside of national political cycles, offer a unified mechanism for setting ambitious targets across countries within the same timeline, providing an important signal that progress toward tripling is on track. As we are halfway through this decade, it is crucial for countries to make strong commitments. While national targets reflect individual ambitions and energy policies, a planned and coordinated expansion of renewables and the associated clean energy flexibility is essential. This approach can help prevent inefficiencies and potential curtailment that could arise from chaotic or unplanned growth.

2030 targets fall short in all regions

A global tripling does not mean that every country is required to achieve a tripling of capacity. If a country's renewable capacity is close to zero and they triple their renewables capacity, the increase in renewables is not significant. Whereas some countries are beyond the point that tripling renewable capacity is realistic or needed. A recent [Climate Analytics report on Tripling renewables by 2030: interpreting the global goal at the regional level](#) assessed how much renewables need to be built across different regions using the latest 1.5C aligned IPCC scenarios. These regional allocations (what is needed for a tripling), are compared to the regional sum of national targets (the sum of government ambitions), and to recent IEA renewables forecasts for 2030 (a market and policy-based indication of what is expected to happen in each region).

MENA, Sub-Saharan Africa and Eurasia have the biggest relative shortfall

The sum of 2030 national targets in the Middle East and North Africa (MENA), Sub-Saharan Africa, and Eurasian regions have the biggest relative shortfalls compared to what [Climate Analytics suggests is required to align with a global tripling](#). These regions have the smallest

expectations in total, in part because many countries within these regions have yet to begin building solar or wind at scale.

The sum of national targets in the MENA region is 116 GW, which is 77% short of the 500 GW needed by 2030 to align with a global tripling. In total, 10 countries in the MENA region were analysed, representing 88% of the region's electricity demand. Out of them, six have targets and four - Iran, Iraq, Kuwait, and Syria - do not. The [IEA Renewables 2024](#) report's main case 2030 forecast of 149 GW for the MENA region exceeds the sum of national targets. In 2022, several countries, including Algeria, Iran, Iraq, Libya, Kuwait, Qatar and Oman, [sourced](#) less than 1% of their electricity from solar and wind. According to the [IEA World Energy Outlook 2024](#), solar PV will account for over 85% of the region's renewable expansion this decade.

The sum of national targets in Sub-Saharan Africa is 90 GW, which is 70% short of the 300 GW needed by 2030 to align with a global tripling. 11 countries were analysed in this region, representing 70% of the region's electricity demand. Five of these, including the Democratic Republic of Congo (DRC), Togo, Uganda, the United Republic of Tanzania, and Rwanda have no renewables target yet. The [IEA Renewables 2024](#) report's main case forecast projects 146 GW capacity for this region by 2030. The report also highlights that renewable capacity growth could be 34% higher in Sub-Saharan Africa in the accelerated case scenario (176 GW) due to growing electricity demand and significant untapped renewable potential. Many countries [sourced](#) less than 1% of their electricity from solar and wind in 2022; these include Angola, Cameroon, the DRC, Republic of Congo, Gabon, Mozambique, Nigeria, Sudan, Zambia and Zimbabwe.

Many countries around the world face financial and logistical challenges, making it essential to facilitate development in high-potential countries through suitable financing and de-risking mechanisms. Africa alone accounts for one-fifth of the global population and has huge solar potential and yet the region currently attracts just 3% of global energy investment. The [Nairobi Declaration](#) calls upon the international community to provide support required to raise the share of renewable energy financing to 20% by 2030 and contribute to increasing Africa's renewable generation capacity to at least 300 GW by the same year.

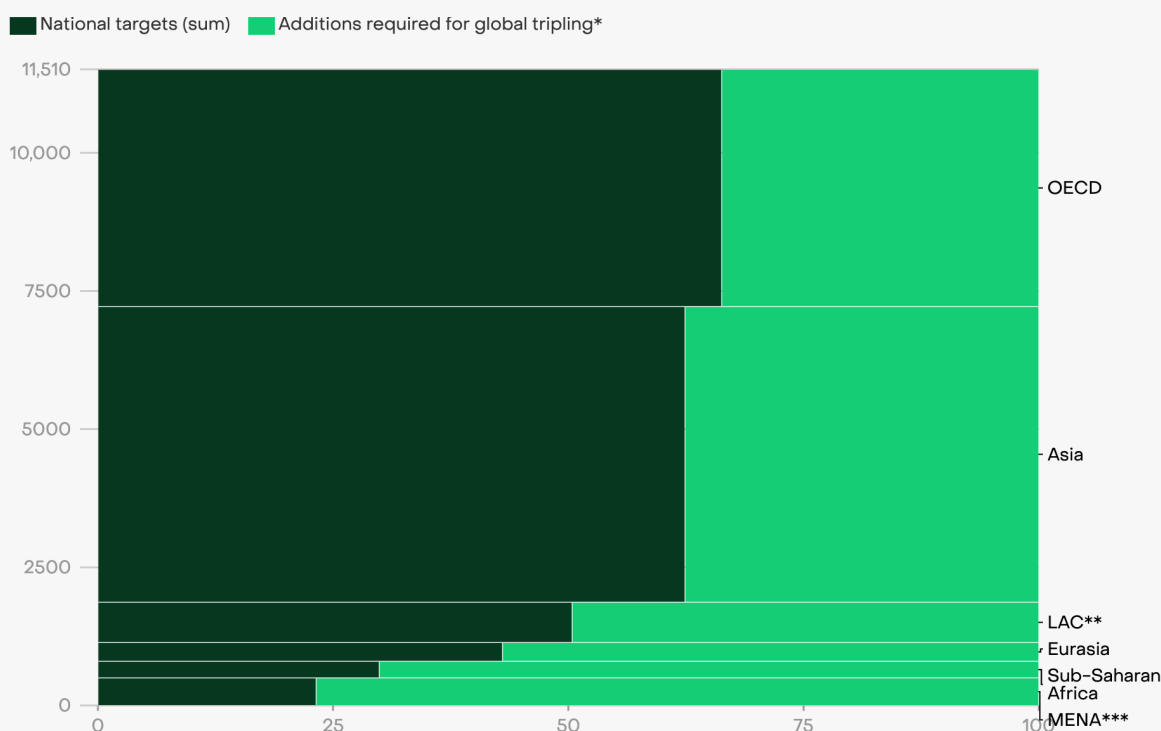
The sum of national targets in the Eurasia region amounts to 146 GW, falling short by 57% of the 340 GW required by 2030 to meet the goal of global tripling. A total of 14 countries in the region were analysed representing 98% of the region's electricity demand; of those Russia is the only country with no renewables target identified. The [IEA Renewables 2024](#) report's main case forecast estimates 127 GW of renewable power for this region by 2030, which is lower than the total of current national targets. However, the accelerated scenario predicts 143 GW, which is close to the sum of current national targets. According to the [report](#),

Eurasia could install 52% more renewables in the IEA accelerated case scenario by overcoming challenges such as slow grid infrastructure expansion and high financing costs. Many countries in the region [sourced](#) less than 1% of their electricity from solar and wind in 2022; these include Azerbaijan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan and Uzbekistan.

The sum of national targets in the Latin America and the Caribbean region is 368 GW, which is 50% short of the 730 GW needed by 2030 to align with a global tripling. A total of seven countries were analysed representing 81% of the region's electricity demand and all have targets. The [IEA Renewables 2024](#) report's main case forecast projects 545 GW capacity for this region by 2030.

All region's targets are falling short of what's needed for a global tripling of renewables

National commitments to renewables power capacity in 2030 vs what's needed to triple global capacity (GW)



Source: Ember's 2030 Global Renewable Target Tracker, *Based on regional allocations from Climate Analytics -
 **Latin America and the Caribbean
 ***Middle East and North Africa

Asia and the OECD have the biggest absolute shortfall

From an absolute GW perspective, [Climate Analytics](#) shows that Asia and the OECD countries are responsible for 80% of the required capacity additions this decade. Asia needs

to slightly more than triple 2022 renewables capacity, with a 3.6x increase according to [Climate Analytics](#), and the OECD needs to triple (3.1x). Tripling renewables globally requires reaching at least 11,000 GW by 2030, and the [Climate Analytics](#) report assumed that renewables need to reach 11,500 GW by 2030. As such, the absolute gaps for the OECD and Asia region are slightly higher than they would be if 11,000 GW was used as the benchmark.

The sum of current national targets in the OECD region is 2,905 GW, which is 1,385 GW short of the 4,290 GW required by 2030. A total of 33 OECD countries were analysed representing 99.9% of the region's electricity demand. Austria is the only country with no renewables target yet.

The sum of national targets in Asia is 3,359 GW, leaving them 1,991 GW short of the 5,350 GW needed by 2030. The [IEA Renewables 2024](#) report's main case forecast for Asia combined with the forecast for China is 6,135 GW by 2030, well above the sum of targets and the regional allocation of a global tripling. A total of 19 countries were analysed representing 97% of the region's electricity demand. Among them, Azerbaijan, Brunei Darussalam, Kazakhstan, and Mongolia have no identifiable targets.

The combined national targets are currently insufficient in every region to achieve the global goal of tripling. However, the market-based IEA main forecasts for renewables exceed the combined national targets in all regions except Eurasia, where only the accelerated forecast reaches the sum of targets. Interestingly, as per IEA projections, Asia is the only region where the tripling goal can be met or even surpassed. This highlights that not only is there an ambition gap in setting national targets, but also an implementation gap (at least outside of Asia) such that renewable deployment must increase across most regions.

Chapter 2 Solar and wind target outlook

Solar and wind targets fall short of tripling and market forecasts

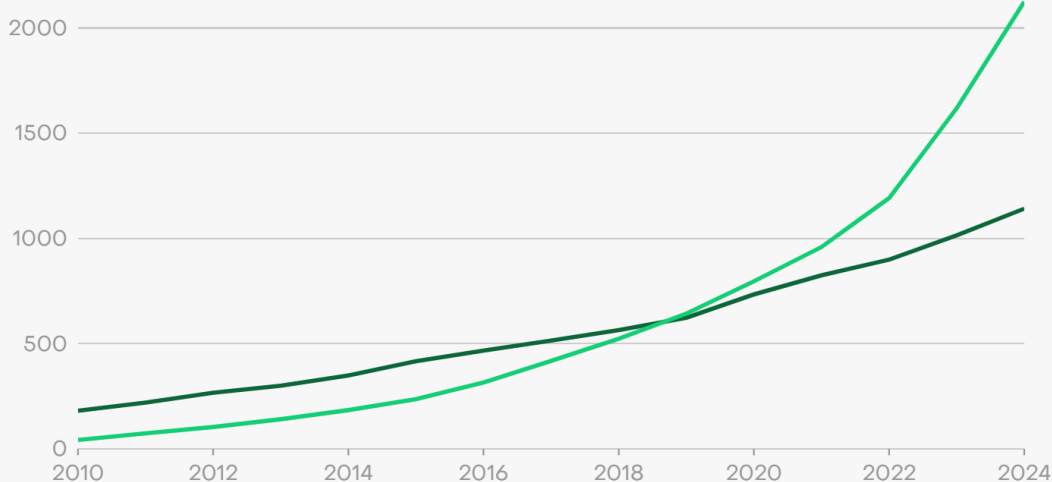
Over 90% of the renewable capacity growth in this decade is expected to be from solar and wind. A tripling of global renewables capacity by 2030 means a tripling of wind capacity and a fivefold increase in solar capacity.

Solar is growing exponentially while wind is growing linearly. Wind and solar capacity were rising in concert until 2019, when solar overtook wind. 2023 saw record additions for both solar capacity and generation. Solar's recent rapid capacity growth has surpassed all expectations, positioning it at the forefront of the clean energy revolution. A shortfall in wind capacity is concerning as wind has higher generation potential; the same amount of wind capacity can produce twice the electricity generation of solar. Below, national 2030 targets for solar and wind are analysed in the context of what is happening in each of the markets, highlighting the disconnect between the rapid pace of market changes and the slow response of governments in updating their targets.

Solar capacity outpaced wind in 2019 and continues to grow exponentially while wind grows linearly

Global capacity in GW

Wind Solar



Source: IEA Renewables 2024

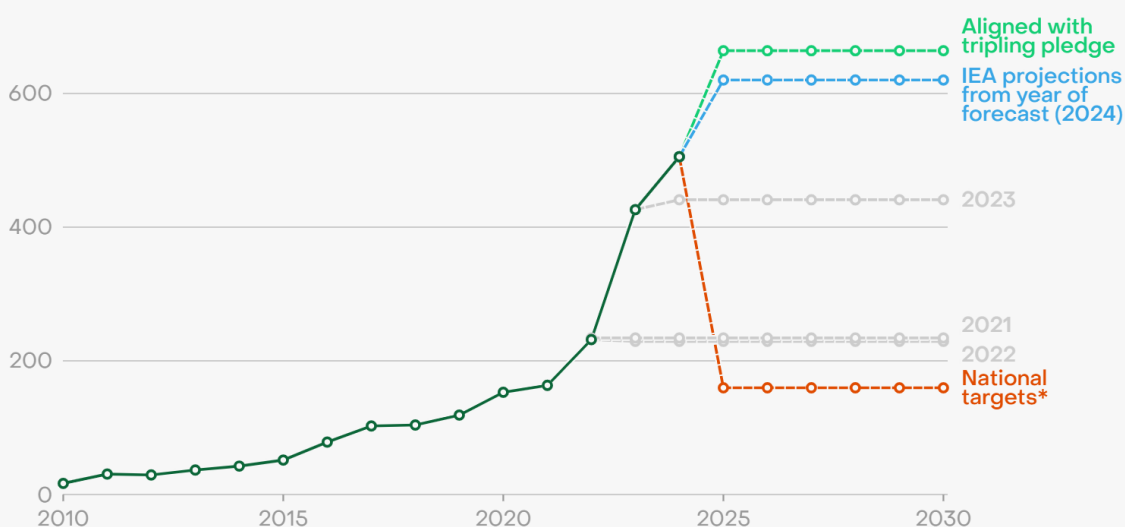
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Solar market has moved, but governments have not

The global solar market is experiencing unprecedented growth, [defying even the most optimistic expectations](#). The [IEA World Energy Outlook \(WEO\) 2024](#) forecast for 2030 solar capacity is 24% higher than 12 months ago in the [WEO 2023](#), which was 56% higher than the [WEO 2022](#). Expectations now are that by 2030 capacity will almost align with what is needed for a global tripling. According to the IEA's market update in June 2023, global solar PV manufacturing capacity is projected to reach [1,100 GW by the end of 2024](#), which is more than sufficient to meet the needs of the IEA's NZE Scenario. Solar panel prices have dropped significantly, [even more than expected based on the learning curve](#), making solar energy the cheapest form of new electricity capacity in many regions.

Governments's solar targets are well below the market's expectations – and capabilities

Annual capacity additions of renewable power, actual and projected from date of forecast/target analysis* (GW)



Source: IEA World Energy Outlook, *Ember's 2030 Global Renewable Target Tracker
Note: the 2024 solar addition estimate is based on Ember analysis 'Solar power continues to surge in 2024'

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Solar deployment continues to exceed predictions, with [Ember estimating that 593 GW of solar will be installed globally this year](#), 29% more than last year, following an impressive 87% surge in 2023. This rapid rise means that annual solar additions need to grow at a modest 2% per year from 2025 to 2030 to meet the capacity needed to align with the [IEA NZE Scenario](#) for a global tripling.

Solar forecasts for 2030 are now aligned with a tripling, but national targets fall far short

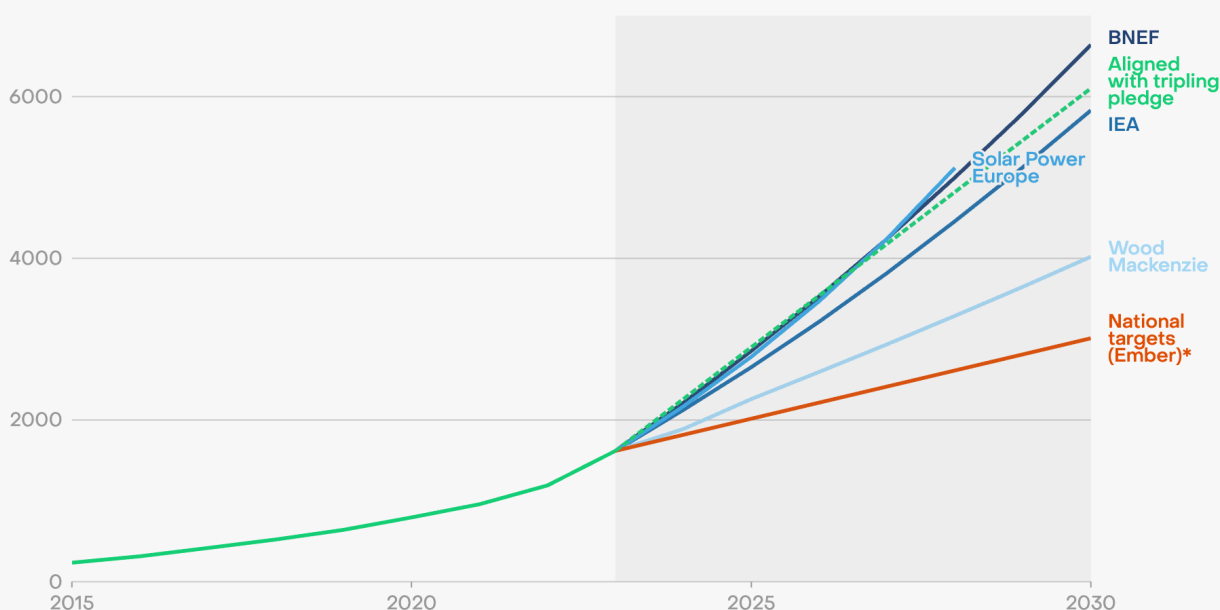
Solar forecasts for 2030 are now aligned with the global tripling goal. Projections indicate that solar capacity will not only meet but slightly exceed the more than fivefold increase needed in the [IEA NZE scenario](#). [Forecasts](#) suggest that by 2030, global solar capacity will be almost six times that of 2022.

However, the combined 2030 national solar targets set by countries currently amount to 3,011 GW, only 2.5 times the [2022 capacity](#). This represents half of the increase needed to

align with the global goal of tripling renewables to 6,101 GW and falls short of the forecasts, which indicate a potential rise of up to 6,640 GW between now and 2030.

Forecasts of solar power growth suggest capacity can meet the 2030 global tripling goal but national targets are well below industry projections

Global solar power capacity in GW



Source: IEA Renewables 2024, Solar Power Europe Global Market Outlook for Solar Power 2024–2028, BNEF 3Q 2024 Global PV Market Outlook, Wood Mackenzie Global solar PV market outlook update Q1 2024 · *A sum of national targets from the Ember 2030 Global Renewable Target Tracker, capacity in GW(dc)

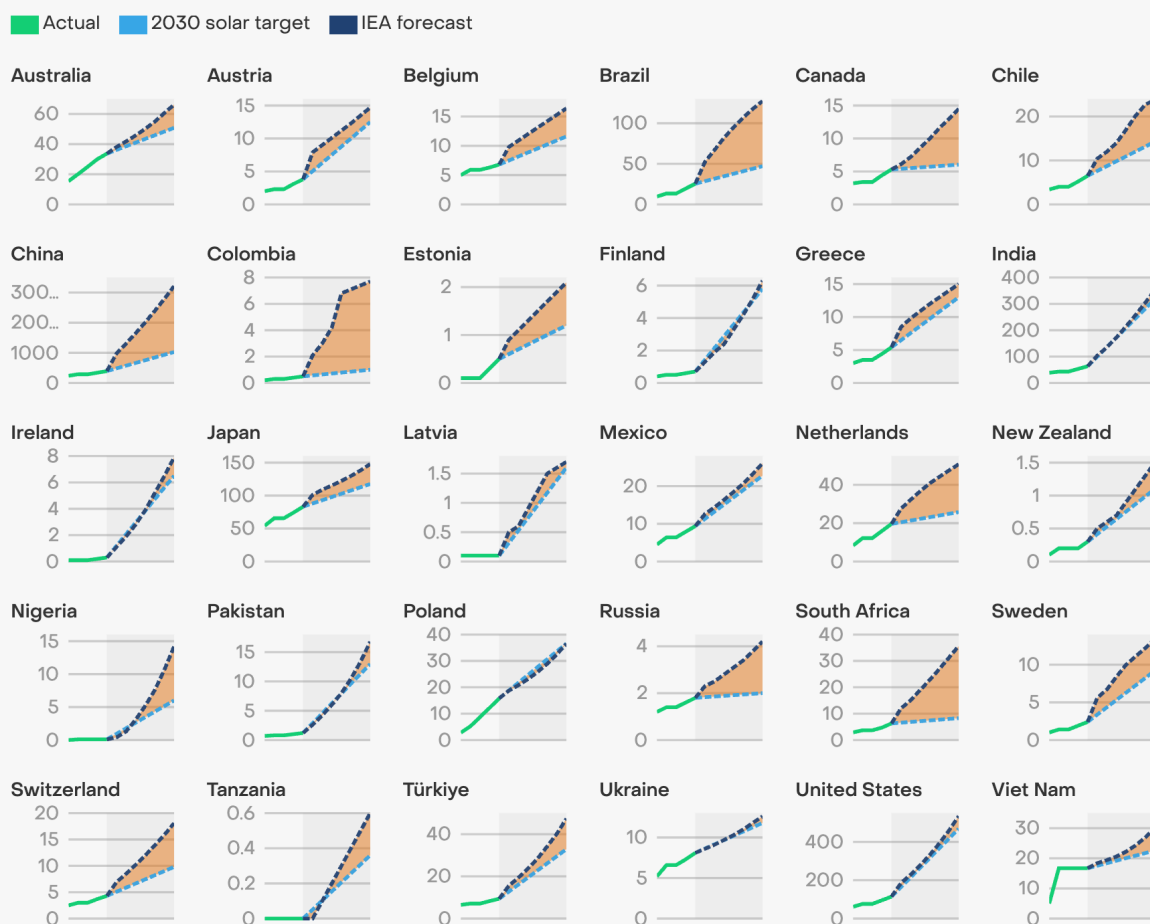
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Solar targets for 31 countries are set below what is projected to be built

In many countries, recent solar deployment and forecasts have already exceeded what is required to meet existing targets, suggesting that solar ambitions could be substantially revised in the upcoming 2025 NDCs, to better align with the solar market growth. Out of the 55 countries monitored in the [IEA Renewable Energy Progress Tracker](#) and the [Ember 2030 Global Renewable Target Tracker](#), 31 are projected to have solar capacity in 2030 that exceeds their current 2030 targets.

Solar targets could be revised upwards to reflect recent and forecast deployment

Solar capacity from 2019 to 2030; projections from 2023 (GW)



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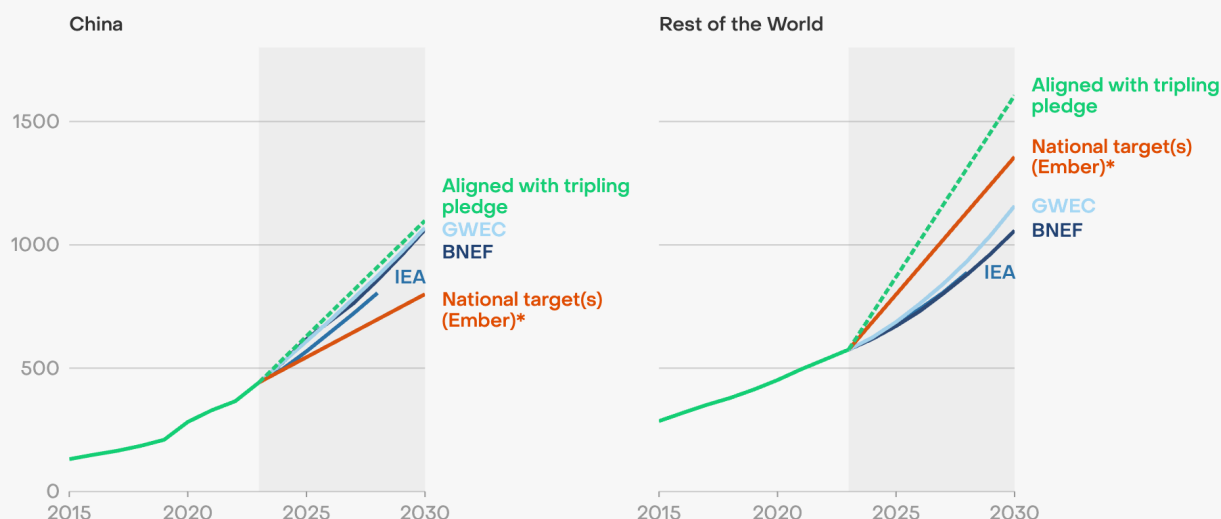
Wind targets align with market forecasts, but both fall short of tripling

A tripling of global renewables capacity by 2030 means a tripling of wind capacity. In the [IEA Net Zero Scenario](#), wind triples from 901 GW in 2022 to 2,742 GW in 2030. [Ember analysed wind targets](#) from 70 countries and the EU as a bloc, which together account for 99% of

current global wind capacity. National wind targets set the world on track for 2,157 GW of wind capacity by 2030, which is more than double the capacity (2.4x) compared to 2022. However, there remains a gap of 585 GW between the total of current national targets and the global goal of tripling wind to 2,742 GW. Forecasts from the IEA, BNEF, and GWEC all agree that global wind capacity in 2030 will reach around 2,100 GW, a value similar to the sum of national targets. However, this is primarily achievable due to the large wind additions forecast in China. Although it only accounts for 37% of global wind targets, China is expected to install over 50% of global wind additions between 2024 and 2030. China is overachieving on its target and is projected to almost triple wind capacity from 2022 to 2030. This means that wind in the rest of the world in aggregate is projected to less than double (1.9x) to 1,058 GW by 2030 according to BNEF. These forecasts are significantly below Ember's assessment of national targets, which sum to 1,357 GW. Essentially, there is not only a wind ambition gap but also an implementation gap.

China is projected to exceed its national wind power targets by 2030 and meet the global tripling pledge. The rest of the world, combined, falls short of both.

Wind power capacity (GW)



Source: IRENA, IEA, BNEF, GWEC · *Ember 2030 Global Renewable Target Tracker
Base year for tripling = 2022

Wind must play its part in a global tripling

Wind has an important role to play in meeting electricity generation needs associated with the global tripling of capacity. Solar contributes more than half of the 11,000 GW of

renewables capacity in the global tripling, while wind only contributes a quarter. But wind has a higher capacity for electricity generation than solar, meaning 1 GW of wind provides twice as much electricity as 1 GW of solar. As a result, although their capacity contributions are different, wind and solar contribute similar amounts to the 2030 renewables generation (31% and 36%, respectively). Practically, this means that for every 1 GW that wind falls short of the global tripling, then 2 GW of solar must be added to generate the same amount of electricity. It is also important to note that wind and solar work well together to provide electricity throughout the day, with wind peaking in the morning and evening and solar at midday, as well as seasonally with wind peaking in winter and solar in summer.

Due to the lengthy lead times for wind and the necessity of obtaining permits, policy and regulatory frameworks are even more crucial for wind than for solar, with national targets serving as a significant signal to the market. Investments in grid and transmission infrastructure, and actions to streamline permitting could signal confidence for increasing ambition on wind. The rapid growth in key markets, especially China, and the upward revisions of forecasts in key regions, indicate that with the right combination of policy, regulatory and financial support, rapid and large-scale wind growth can be enabled.

Chapter 3 Storage target outlook

Battery additions are growing rapidly, but no country yet has a realistically ambitious storage target

As the share of wind and solar grows, storage must grow too. Storage is key for harnessing the power of wind and solar providing short-term flexibility to electricity systems. Wind and solar generation can surpass demand in certain hours in some places. Being able to shift that power to where and when it can be used through clean flexibility solutions such as battery storage presents an enormous opportunity.

The UN COP29 climate conference in November 2024 may be a pivotal moment for energy storage. The latest [COP presidency letter](#) published on 17th September expresses the desire to agree on a global goal to increase energy storage capacity six times above 2022 levels, reaching 1,500 GW by 2030.

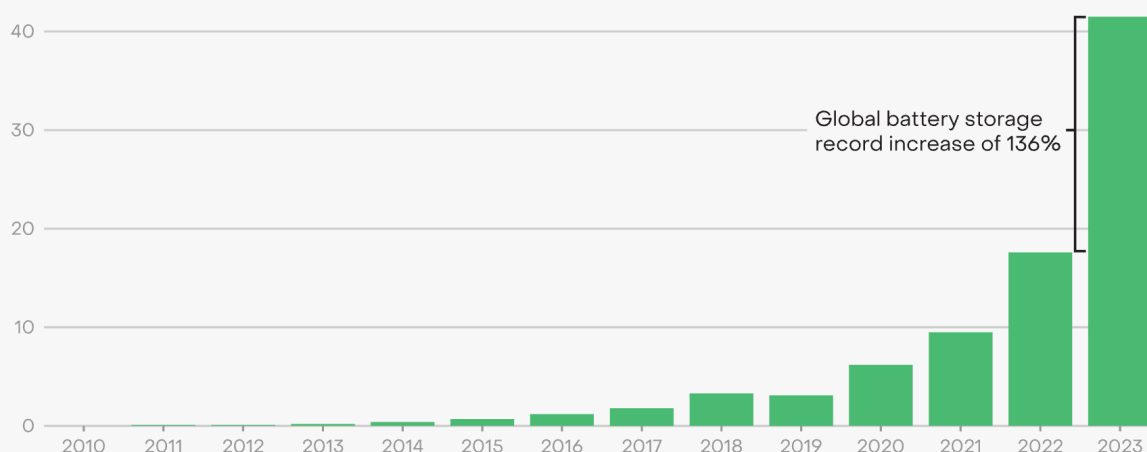
The [IEA NZE Scenario update published in 2023](#) has 1,200 GW of installed stationary battery storage, which is an upgrade from the original [NZE Scenario in 2021](#) that had 590 GW, driven in part by the sharp decrease in battery storage costs and the increase in technological efficiency. The total storage capacity in the IEA NZE Scenario is 1,500 GW, with the additional 300 GW coming from pumped hydro. This is consistent with the recent [G7 global storage target](#) of 1,500 GW.

Battery storage is the fastest-growing clean energy technology on the market

According to [BNEF](#), battery storage additions were a record-setting 45 GW in 2023, up from an until-then record-setting 18 GW in 2022. China, the EU, and the US collectively accounted for nearly 90% of the capacity added in 2023.

Global battery storage additions were up a record 136% in 2023 compared to 2022

Global battery storage additions in GW



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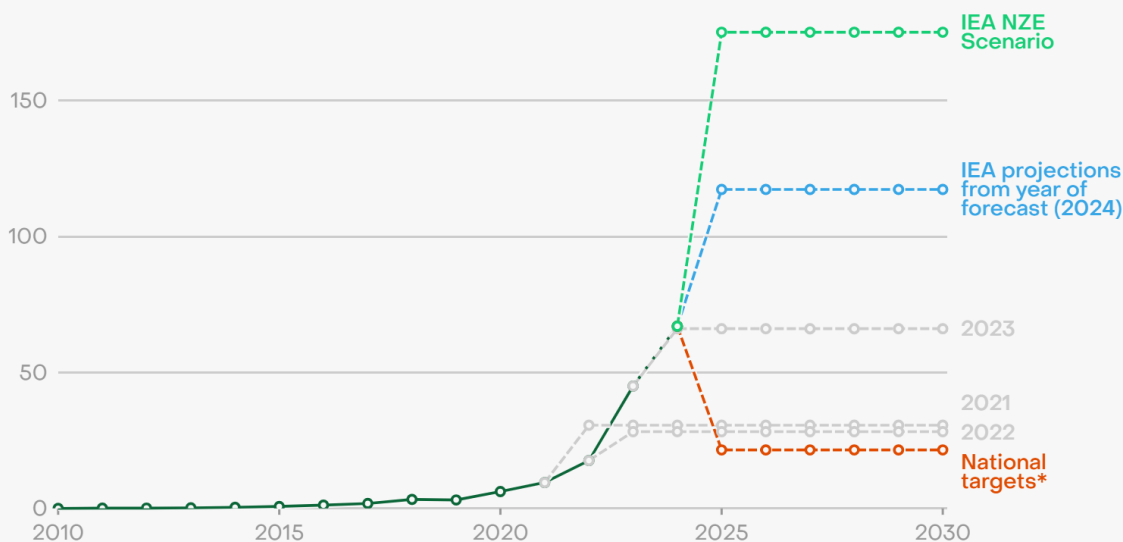
Batteries have seen dramatic [cost reductions](#) in recent years. Lithium-ion battery prices have declined [from USD 1,400 per kilowatt-hour in 2010 to less than USD 140 per kilowatt-hour in 2023](#), one of the fastest cost declines of any energy technology ever.

Battery forecasts project capacity will increase almost 10x from 2023 to 2030

Pumped hydro is currently the largest source of energy storage, with [142 GW in 2023](#) compared to [85 GW of battery storage](#). But utility-scale and behind-the-metre battery storage are expected to account for 90% of the overall storage growth out to 2030. The recent [IEA World Energy Outlook 2024 STEPS](#) scenario projects battery storage to increase 10x from 85 GW in 2023 to 853 GW in 2030. This is consistent with a recent [BNEF forecast of 776 GW](#) of battery storage in 2030. The battery market is growing rapidly, the [World Energy Outlook 2024](#) forecast is 55% greater than the [World Energy Outlook 2023](#), which projected only 552 GW of battery storage in 2030. Although forecasts are more optimistic each year, they still fall short of the 1,200 GW of battery storage capacity installed by 2030 in the [IEA Net Zero Scenario](#).

Battery storage forecasts continue to rise but remain below what is needed to support a global tripling of renewables

Annual capacity additions of battery storage, actual and projected from date of forecast or target analysis (GW)



Source: IEA World Energy Outlook, Ember · *National storage targets only exist in 22 countries, 5 of these targets are generic storage targets which include non-battery technologies
IEA NZE Scenario has a total of 1,200 GW of battery storage by 2030

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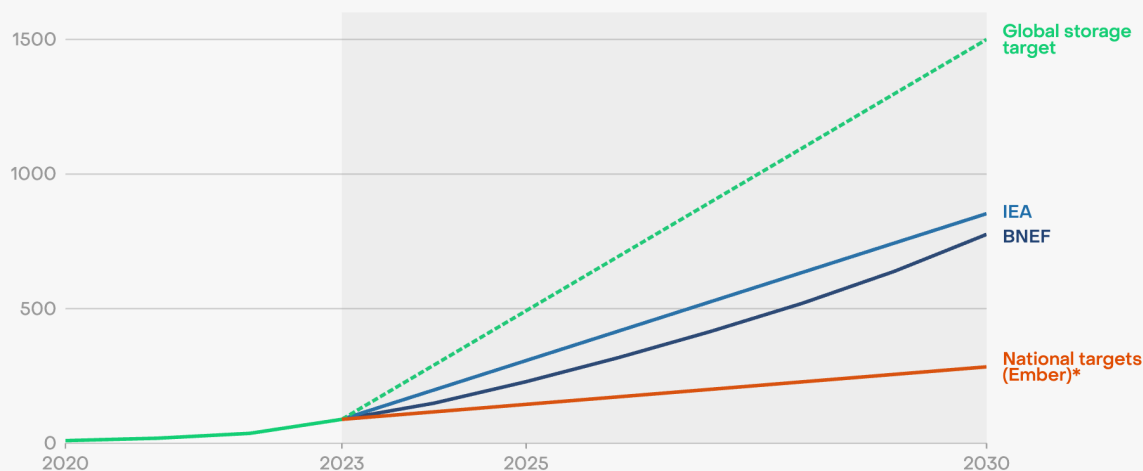
Only 30 countries have storage targets and they fall far short of a tripling aligned goal

Of the 96 countries assessed in this analysis, 30 have some form of national storage target. The 2030 storage targets total 284 GW, falling short by 1,216 GW of the 1,500 GW global

storage target called for by the [G7](#) and the [COP presidency](#), and 492 GW short of the BNEF market forecast for 2030.

Storage targets fall short of forecasts and the global storage target needed to support a global tripling of renewables

Global storage capacity in GW



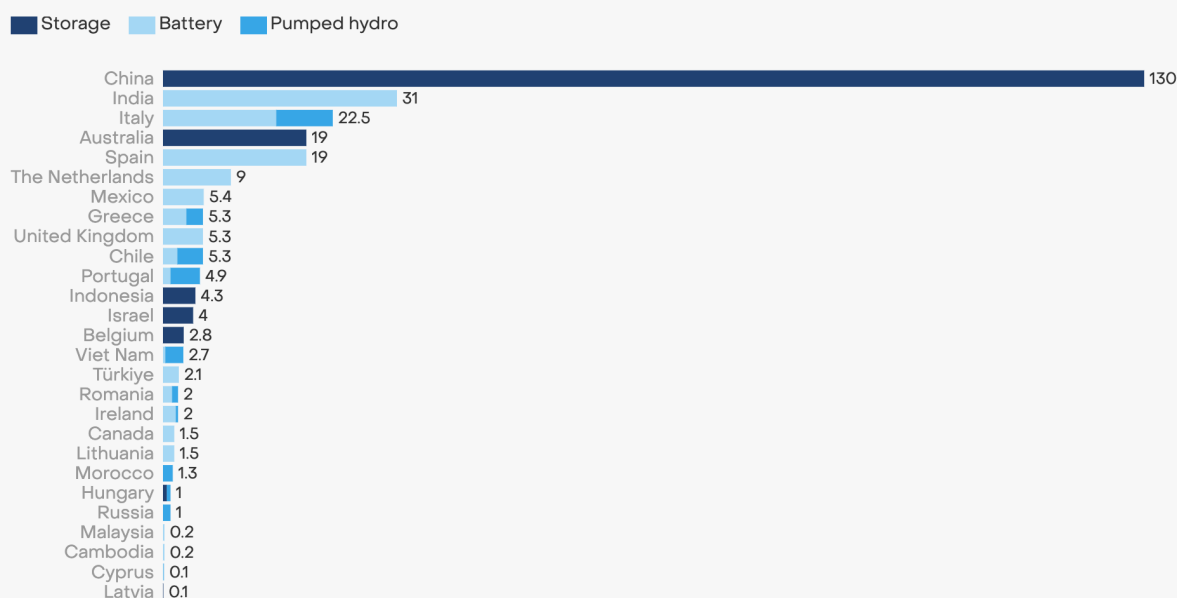
Source: IEA World Energy Outlook 2024, BNEF, *Sum of targets from Ember's 2030 Global Renewable Target Tracker

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Storage targets include different technologies and some countries have more than one technology specified. In total there are 19 battery storage targets, followed by 12 pumped hydro storage targets, two hydrogen storage targets, and one ammonia storage target. Seven countries have a generic storage target that does not specify technology.

Only 30 countries have power storage targets

Storage capacity targets for 2030 (GW)



Source: Ember's Global Renewable Target Tracker ·
Storage for Australia and the United Kingdom combines pumped hydro and battery
Costa Rica's target of 0.03 GW has been excluded

Recent battery storage additions are already more than enough to meet the global sum of storage targets. Battery additions were up 136% in 2023 as compared to 2022, and at 45 GW are already greater than the 21 GW per year needed to meet 2030 targets. To meet the 2030 [IEA NZE Scenario](#), storage additions need to continue to rise by 32% per year, from 45 GW in 2023 to 314 GW in 2030.

Conclusion

Solar and storage markets are leading the way, an increase in national target ambition must follow

National targets are not being updated to keep pace with market dynamics or the urgency needed to achieve a global tripling by 2030.

Assessments of national targets indicate that governments are targeting just over a doubling of renewable capacity by 2030. The ambition gap between targets and a global tripling has remained almost unchanged in the past 12 months.

The IEA's [2024 World Energy Outlook](#) shows increased optimism for reaching a global tripling as compared to the [2023 World Energy Outlook](#), with the estimated global renewable capacity up 13% from last year. The [Stated Policies Scenario](#) projects 9,768 GW capacity in 2030, taking into account existing policies. The [Announced Pledges Scenario](#), which includes all energy and climate targets, is more optimistic and estimates 10,918 GW, in line with the [BNEF](#) forecast of 10,300 GW by 2030. Forecasts that take into account all existing policies and market dynamics agree, and are more optimistic in suggesting that a tripling is almost within reach. This highlights that countries are not considering the market trends, their own energy-related policies, standards, programs, and projects or announced pledges when setting their targets.

Increasing national targets in line with market developments is important for signalling policy support. However, targets alone cannot achieve the necessary progress to triple renewables, they must be supported by robust policy mechanisms. IRENA, the Global Renewables Alliance and the COP29 presidency released a report on [Delivering on the UAE](#)

[Consensus: Tracking progress toward tripling renewable energy capacity and doubling energy efficiency by 2030](#), which outlines key recommendations for enabling the transition including strengthening international cooperation, scaling up finance, and modernising and expanding infrastructure such as grids. [Batteries](#) are another key supporting feature in the transition, along with other clean flexibility solutions.

A tripling of renewables capacity as outlined in the [IEA NZE Scenario](#) relies on a tripling of wind and a quadrupling of solar capacity to provide 15,247 TWh of generation in 2030. A higher solar to wind ratio in reaching the tripling means less generation, as a GW of solar produces roughly half the generation of wind. If developments in wind capacity installations continue to stagnate, installed renewable capacity might need to surpass a tripling to provide the generation needed. This is exacerbated if electricity demand grows faster than expected, an issue raised in the [2024 World Energy Outlook](#), as higher than expected demand means even more renewables are needed to generate electricity.

The [IEA Renewable Energy Progress Tracker accelerated case](#) forecast is the most optimistic with 10,779 GW expected by 2030. The accelerated case has frequently been closer to reality than other forecasts, and for solar the accelerated case still may not be optimistic enough given the rapid growth in recent years. Each year that renewables growth exceeds expectations, the annual additions required to triple capacity becomes more achievable.

The analysis in this report highlights that if countries take stock of their policy landscape and what is currently happening in renewable markets, a more ambitious and yet achievable set of targets for 2030 could be developed. Some countries are starting to increase ambition in the run-up to COP29. For example, on 21 October 2024, the Turkish Ministry of Energy and Natural Resources revealed a 2035 roadmap for renewable energy. Although 2030 targets are not mentioned in the roadmap, it is indicated that renewable installed capacity will grow four-fold from the current capacity. The 2025 NDC process presents an ideal opportunity to solidify this ambition and close the gap between where national targets are, and what is needed to meet or exceed a global tripling goal.

Supporting Materials

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Authors

Katy Altieri, Oya Zaimoglu, Dave Jones

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Cover image

Aerial view of Solar panel in Vietnam

Credit: [Quang Ngoc Nguyen](#) / Alamy Stock Photo

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