Ready, Set, Go: Europe's Race for Wind and Solar

European countries must increase the pace of wind and solar deployment to help ditch Russian fossil fuels and put the region on track for its climate commitments.

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About

In this report, Ember analyses the deployment pace of wind and solar energy across the European Union and compares this to a 1.5C compatible pathway from our recent modelling. This study delves deeper into key countries' renewable capacity expansion plans, comparing on-the-ground deployment rates with 1.5C aligned capacities to 2030 taken from modelling results. This is used to identify whether countries are currently on track, alongside a discussion of the top reasons for underperformance.

Highlights

2x

By mid-decade, annual wind and solar capacity additions must double forecast to align with 1.5C

4

Only 4 out of 27 EU countries are on track to install the required wind capacity by 2030

120

Obtaining permits for a wind project can take up to 120 months, five times longer than the EU's binding limit

Executive Summary

EU countries must go faster on wind and solar to deliver 1.5C aligned 2030 capacities

While the European Union keeps advancing renewables targets, on-the-ground deployment needs to accelerate to meet them.

With the gas crisis and Russia's war in Ukraine, energy security has shot to the top of the EU's agenda. Seeing the urgency of reducing dependence on imported fossil fuels, the European Commission and EU member states have increased ambition on renewable energy. The REPowerEU proposal aims for the EU to reach 1236 GW of renewable capacity by 2030, compared to a target of 1067 GW under previous plans, and up from 513 GW of installed capacity in 2021. Analysis from Ember and CREA reveals that many national governments have also committed to expanding renewables as a way to address spiking fossil gas prices and energy security concerns.

Europe is in search of a cheaper and more stable power system. Modelling from Ember shows how this can be achieved through possible pathways to a 1.5C aligned clean electricity system in Europe. The modelling provides insights into the required 2030 capacity for wind and solar. Comparing these capacities with the pace of actual deployment shows that EU countries need to accelerate the rate of wind and solar capacity additions to reach the volumes required in 2030.

The EU is charging forward on renewables ambition. While increased targets are an important step towards adding renewables to Europe's electricity system, this needs to be coupled with actual delivery through national legislation, the removal of administrative barriers, effective support schemes and increased investment.

01 EU must double expected mid-decade wind and solar deployment

Wind and solar deployments have a steep climb ahead to reach 1.5C aligned capacity. In 2021, the EU deployed 34 GW of wind and solar capacity combined. To reach 1.5C, yearly additions will need to increase, reaching 76 GW in 2026. Forecasts show that by this date, the EU will only be adding 38 GW, half of required annual capacity increases.

02 Most EU countries are not set to hit wind installation rates needed for 1.5C

At predicted rates of deployment, only four out of 27 EU countries (Finland, Croatia, Lithuania and Sweden) will achieve sufficiently high annual wind capacity increases to align with 1.5C. The EU as a whole is also not on track for required solar deployment rates.

03 Deadlines for granting wind and solar permits are being exceeded by up to 5 times

According to EU legislation, permit granting for renewable projects should not exceed two years. Among the 18 countries analysed for onshore wind projects, the average permitting time exceeded the two year mark in all cases, in some by up to five times. For solar, the two year limit was exceeded in nine of 12 analysed countries, with delays up to four years.

“Europe no longer lacks renewables ambition, but it is now facing an implementation gap. Higher targets have not yet translated into accelerated deployment on the ground. Europe needs to urgently buckle down on removing permitting barriers to unleash the full potential of renewables.“

Harriet Fox
Energy & Climate Data Analyst, Ember

Pace of wind and solar

The EU must accelerate wind and solar deployment

Europe increased its renewable energy ambitions. Now the focus must move towards deployment at speed or risk missing key benchmarks.

EU behind on wind and solar deployment pace

Europe is hungry for more renewables. The EU aim of a green post-Covid recovery and pressure from the continuing gas crisis and Russia's invasion of Ukraine are pushing countries towards cleaner, cheaper and more secure sources of power. This shift is already underway: installed capacity of wind and solar in Europe has been increasing for the last decade. However, rates of deployment will have to significantly step up to keep pace with more ambitious 2030 targets.

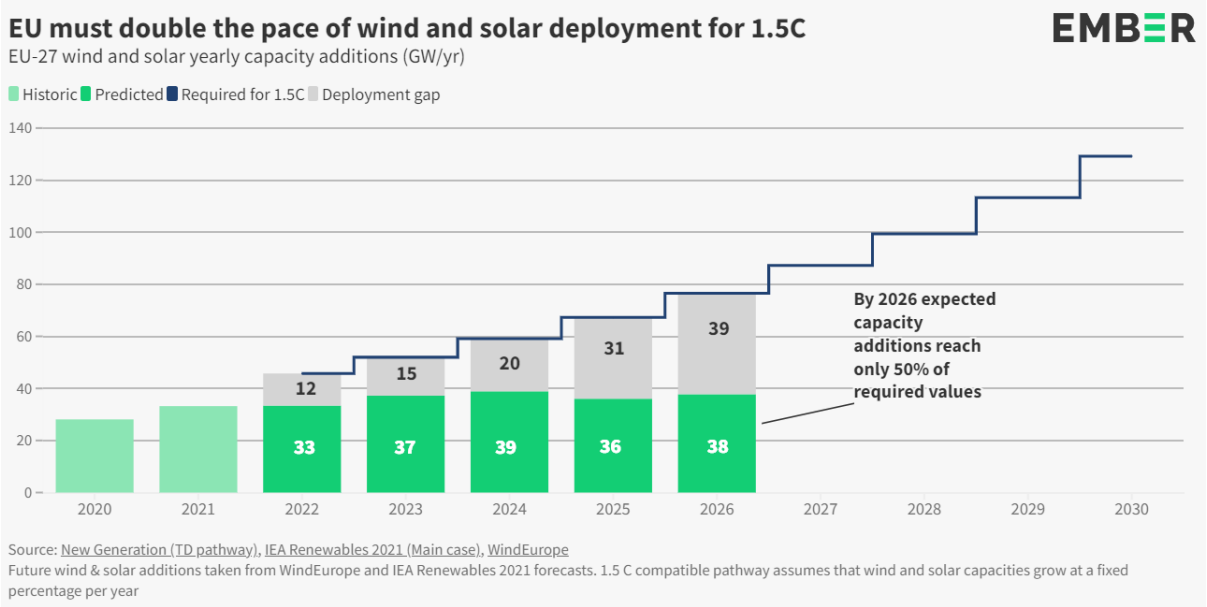
Recent increases in solar deployment are a positive sign. However, future deployment predictions are below pathways compatible with 1.5C. In the case of wind power, both current and future deployment rates are not aligned with 1.5C compatible benchmarks or REPowerEU targets. This is especially worrying because wind's higher capacity factor (compared to solar) means that delays in wind deployment will have a larger impact on the electricity generation mix.

The 2030 benchmark

Ember's recent modelling work outlines different 1.5C-aligned pathways to reach a clean European electricity system by 2035. Capacity figures from the 'technology driven' (TD) pathway are used in this analysis to indicate 1.5C compatible benchmarks for country and EU-level targets. At an EU level, the overall targets from the TD pathway for 2030 are 476 GW wind (onshore & offshore) and 600 GW solar. This pathway was chosen as the most aligned with the recently announced REPowerEU 2030 targets of 510 GW wind and 592 GW solar and throughout this report is referred to as 'required capacity'.

Since REPowerEU does not provide country-level targets, results from Ember's study are used to break down the required capacity according to each country. The resulting country-level numbers should be viewed as indicative of what is required for the EU27 as a whole to reach sufficient installed capacity of wind and solar.

There are different ways wind and solar could grow to meet capacity requirements aligned with 1.5C (full detail in the methodology). Based on discussion with developers and analysis of current growth rates, our research shows that annual additions face the need for a steep continual increase in coming years, rising to four times the 2021 levels by 2030. WindEurope and IEA forecasts provide expected additions for wind and solar respectively from 2022 - 2026. These figures show wind and solar capacity additions are close to the required values in 2022 and 2023, but from 2024 onwards begin falling behind, reaching **only half** (38 GW) of the required trajectory (76 GW) by 2026.



At an EU level, solar capacity has seen rapid expansion in the last three years, from 104 GW to 162 GW, an exponential trend adding 15% every year. In order for solar capacity to match necessary ambition by 2030 — as well as REPowerEU targets — this rate must continue. However, the IEA predicts growth below this pace, with annual additions in 2026 only 46% of the required value.

While reaching sufficiently high levels of wind and solar will be a challenge across both technologies, deployment projections for wind expose a particular risk. This is because wind's higher capacity factor means that each gigawatt of wind capacity translates to comparably more electricity generation than in the case of solar. Wind capacity has grown more slowly than solar, adding an average of 10 GW/year since 2018. To meet 1.5C aligned objectives this needs to increase. However, according to forecasts, in 2026 only 54% of additions required will be added.

Ember's clean electricity system modelling provides another pathway, described as 'system change' (SC) which is also 1.5C aligned and aims for a European net zero energy system by 2040 (compared to 2050 in TD pathway). Under this scenario, wind and solar capacities in 2030 are higher, putting expected deployment rates even further behind. In 2026, combined wind and solar will hit just one third of additions required under the SC pathway.

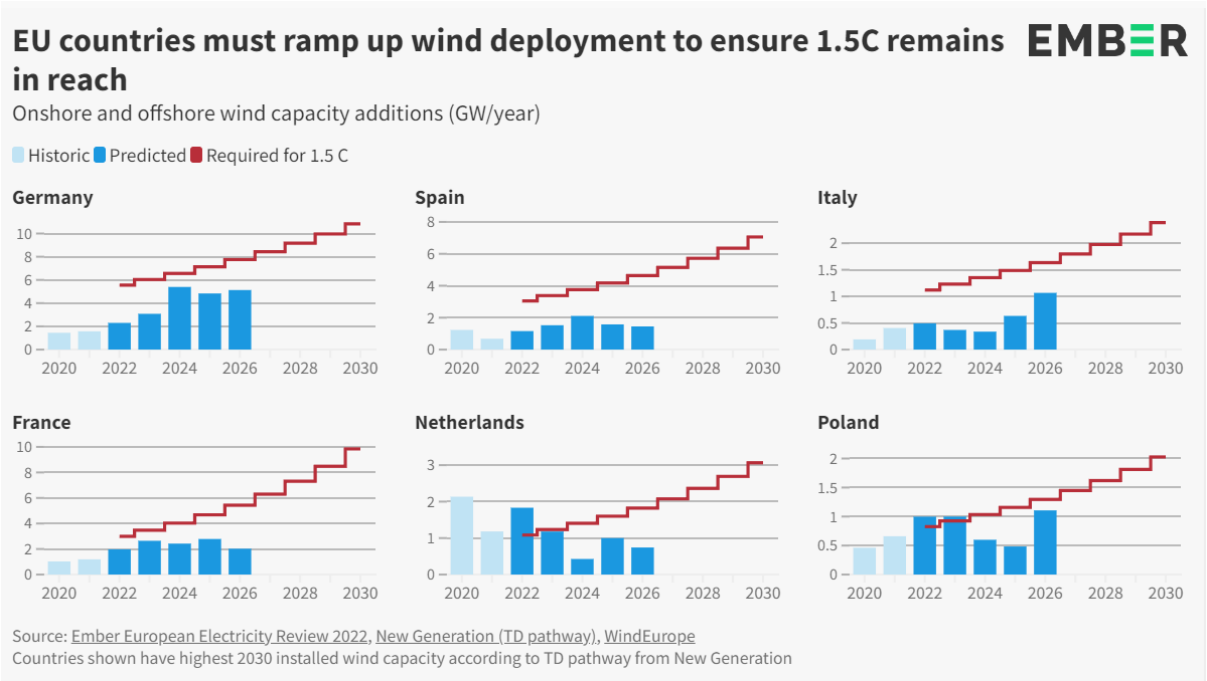
**AC capacity values are used throughout the report.*

Key countries are not hitting wind installation rates needed on the ground

Many EU countries have set ambitious targets for renewable energy. These goals must now be matched with accelerated deployment. The upcoming years will be crucial in setting the pace necessary to reach a clean EU electricity system by 2035.

Countries behind on wind power progress

Across EU-27 countries, progress towards 1.5C aligned 2030 wind capacity is slow. At predicted rates of deployment (cross-checked with renewables auction results), only four out of 27 countries (Finland, Croatia, Lithuania and Sweden) are set to install sufficient yearly capacity.

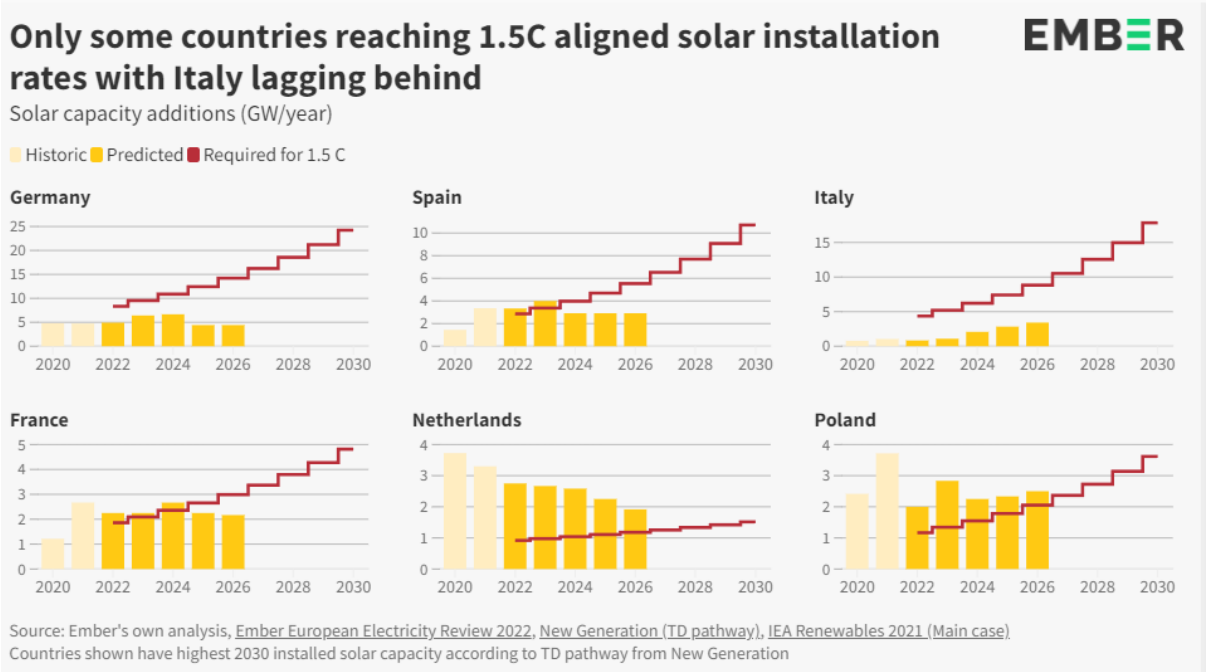


Six countries with the potential to play a key role in wind installations look set to install only half of the capacity needed in 2026. Predictions for France, Spain and the Netherlands show flatline or decreasing installation rates to 2026. The later these countries pick up their deployment pace, the faster they will have to accelerate in the lead up to 2030. This deployment 'deficit' exposes countries to financial losses: least-cost pathways clearly indicate the need for rapid wind deployment, which would also reduce reliance on fossil fuel imports and lower electricity prices in a time of economic struggle.

There have, however, been positive recent announcements signalling that European governments are taking deployment challenges seriously. The German Easter Package lays out an ambitious deployment schedule which plans to add 10 GW/year onshore wind capacity from 2025 onwards and 19 GW of offshore wind between 2026 and 2030. This would put German deployment rates far above current predictions and on track to reach a total of 145 GW wind capacity by 2030 and aligned with 1.5C benchmarks. In Poland, the government reached preliminary agreement to update a problematic wind law which has blocked investment in onshore wind since 2016, and the first offshore wind farm is expected to start operating in 2026.

Future solar deployment rates not 1.5C aligned

At the EU level, solar deployment rates from the previous three years seem promising. However, predictions for the next four years paint a different picture. Analysis of six key countries reveals the pace varies widely, with many falling short.



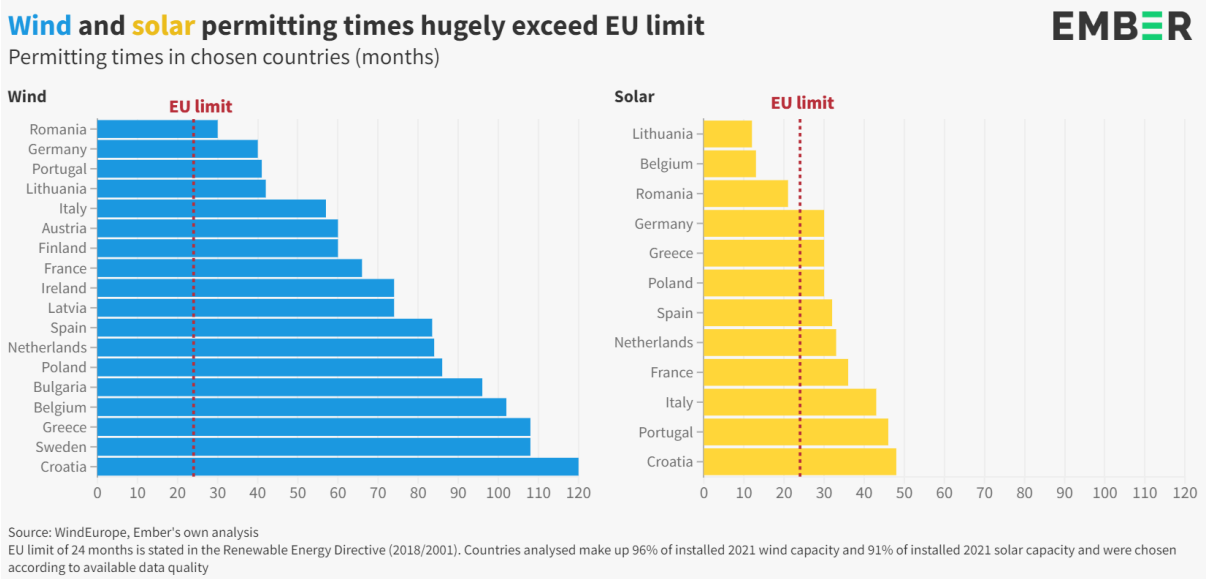
According to annual forecasts, Poland and the Netherlands are set to keep up with 1.5C aligned solar capacity additions through 2026. However, it is important to note the worrying downward trend in expected solar capacity additions, due to issues such as the lack of available grid connection. Still, an immediate priority should be on unblocking the pace of deployment in laggard countries. Italy, for instance, is predicted to install only a third of the yearly required capacity between 2022 and 2026.

“Europe needs full focus and attention on accelerating renewables. A real challenge the solar sector is facing is a critical skills shortage - we risk not having the number of installers and project developers that we need. The EU must address the skills bottleneck and take necessary measures to ensure the skilled workforce needed to accelerate solar projects”

Dries Acke
Policy Director, SolarPower Europe

Permitting deadlines for wind and solar exceeded by up to 5 times

A long permitting process is a key reason why the EU and several countries are deploying wind and solar too slowly — it is usually the most time-consuming phase of a renewable energy project. Permitting includes all the administrative processes required to move from an idea phase to the construction of a wind or solar power plant: i.e. securing construction permits, performing environmental impact assessments, and navigating local spatial planning processes. Ember's analysis also includes the grid connection process in permitting times.



The renewables industry has been flagging the time delays from administrative barriers for years. This was recently acknowledged by the European Commission in its recommendation on speeding up the permitting process. EU legislation — specifically the 2018 Renewable Energy Directive (RED) — already states that permit granting should take no more than two years, but adherence to this is rare.

According to information collected from developers and industry bodies, solar permitting times range from 12 months in Lithuania to 48 months in Croatia. Of the 12 countries with available information, only three (Belgium, Lithuania, Romania) had permitting times less

than the EU limit of 24 months. Combined, these 12 countries account for 91% of current installed solar capacity.

Onshore wind permits take even longer, ranging from 30 months in Romania to 120 months in Croatia. None of the 18 countries analysed were below the 24 month limit stated in the RED. Together, those countries make up 96% of current installed wind capacity.

Common issues with permitting include lack of digitalisation in the overall process, lack of resources within local authorities, delays caused by legal appeals and overlap of responsibility amongst different authorities.

The upcoming amendment of the Renewable Energy Directive should support ideas suggested in REPowerEU, such as 'go-to' zones for renewable projects where permitting shall not exceed one year, and designating renewable projects as "overriding public interest" to allow simpler administrative procedures. Any final agreement should, however, adequately address environmental impact and social and biodiversity concern. It is also equally important to enforce the legislation that is already in place, namely the two year limit that was set in the Renewable Energy Directive already in 2018.

Multiple gigawatts of European renewable capacity are being delayed due to administrative barriers. In Poland, for example, up to 20 GW of solar capacity is waiting for grid connection permits. With quicker permitting times and the necessary grid upgrades, these projects could be unlocked, helping in the reduction of Russian gas consumption, lowering electricity prices and improving Europe's energy security.

> ***"Europe is only building half the wind capacity it needs to deliver on its energy security and climate targets. National governments can fix this by simplifying and accelerating permitting. With tough winters ahead, speeding up the deployment of home-grown energy is not optional. It's indispensable"***
>
> **Pierre Tardieu**
> WindEurope Chief Policy Officer

Conclusion

Focus must shift to deployment

To keep up with REPowerEU and 1.5C-aligned ambition, attention must now turn to removing barriers to installation.

At an EU level, expected wind and solar deployment rates are below those required for 1.5C, reaching only 50% of necessary additions in 2026. Of the EU member states, only a handful are reaching required wind deployment rates, and key countries for solar deployment are also lagging behind. A crucial barrier to wind and solar deployment is the permitting process time, which in most countries exceeds the EU legislative limit of two years.

To begin tackling barriers to deployment, the existing two year permitting limit, stated in the Renewable Energy Directive (RED), needs to be enforced by the European Commission. To align with REPowerEU and 1.5C, it is equally important that the amendment to the RED is passed this autumn, raising the EU's 2030 renewable energy target to 45%.

Further, the 1.5C-aligned capacity expansion pathways should also be transposed into the updated National Energy and Climate Plans (NECPs) during the formal review process in 2023. At a national level, auction volumes should be significantly increased to capacities in-line with 2030 targets. Renewable energy 'go-to' areas, taking into account environmental and social concerns, should be designated as suggested in REPowerEU where permit-granting should not exceed one year. Finally, permitting processes should be streamlined through investments in personnel and digitalisation to ensure they are compliant with the two year limit.

Slow wind and solar deployment will only exacerbate the current cost and security crisis the EU's energy sector is facing. Rapid expansion of these technologies will help the EU to replace expensive and uncertain fossil fuel imports with clean and secure sources of energy, whilst also reducing electricity prices.

Annex

Country-level wind and solar auction results

In this report, upcoming and complete country wind and solar auction results, and discussions with developers, were used to verify wind and solar capacity predictions from industry bodies. Predictions for solar deployment numbers were taken from IEA's Renewables 2021 data explorer using the main case scenario as these aligned most closely with auction results and data was available at country level. Predictions for wind deployment were taken from WindEurope's 2021 Statistics and the outlook for 2022-2026 report, using net additions from the realistic expectations scenario.

Onshore wind and solar auction results from six key countries were collated to cross-check the predictions used in the main report and get a more robust idea of deployment numbers on the ground and in the coming two to three years. Solar auction results were supplemented with forecasts from the IEA for small-scale and commercial solar installations that are not covered by the auction schedules to estimate total yearly solar additions.

Upcoming auctions which are scheduled or have not yet released results were assumed to have awarded the total capacity available. It was also assumed all successfully auctioned capacity will be built, secure grid connections and obtain finance, making it a best-case scenario estimate. Generally, differences between industry predictions and auction results were less than 15%.

Country	Technology	Auction results/schedule (GW)	Deployment Deadline*
France	Onshore wind[1]	2019: 1.09 2020: 0.778 2021: 0.404 2022: 2 2023: 2 2024: 2	36 months
	Offshore wind[12]	2019: 0.6	84 months

		2021: 0.27 2022: 1 2023: 1.8	
	Solar[1]	2020: 1.4 2021: 0.676 2022: 2.9 2023: 2.9 2024: 2.9	24 months
Germany	Onshore Wind[1]	2020: 2.6 2021: 3.3 2022: 5.2 Easter Package lays out yearly additions: 2023: 5 2024: 8 2025: 10 2026: 10	24 months
	Offshore Wind[1]	2017: 1.49 2018: 1.61 2021: 0.958 2022: 0.98 2023: 1.8 2023***: 7.0 2024: 5.5 2024***: 1.0 2025: 2.5 2024-2026: 3	60 months
	Solar[1]	2020: 1.3 2021: 2.0 2022: 5.1 Easter Package lays out yearly additions: 2023: 9 2024: 13 2025: 18 2026: 22	24 months
Italy	Onshore wind[1]	2020: 1.2 2021: 0.8 2022: 0.4	31 months
	Solar[1]	2020: 0.1 2021: 0.3 2022: 0.9	24 months
Netherlands	Onshore wind[12]**	2019: 0.7 2020: 0.2 2021: 0	36 months

	Offshore wind[1]	2017: 0.7 2019: 0.7 2020: 0.7 2022: 1.4 2022 (postponed): 0.7 2023: 2 2025: 2	60 months
	Solar[12]**	2020: 7.0 2021: 2.2	24 months
Poland	Onshore wind[123]	2019: 2.2 2020: 0.9 2021: 0.8	33 months
	Solar[123]	2020: 1.6 2021: 3.0 2022: 1.5 2023: 1.5 2024: 1.5 2025: 1.5 2026: 1.5 2027: 1.5	24 months
Spain	Onshore wind[12]	2021: 3.3 2022: 1.5 2023: 1.5 2024: 1.5 2025: 1.5	36 months
	Solar[12]	2021: 2.9 2022: 1.8 2023: 1.8 2024: 1.8 2025: 1.8	24 months

* Deployment deadline is the time after the auction by which the renewable project must be commissioned - it is assumed that this will be the date the auctioned capacity comes online. Where unavailable, this is estimated as two years for solar, three years for onshore wind and five years for offshore wind.

** The Netherlands does not use renewable auctions for onshore wind and solar. Instead it has a subsidy scheme with a set budget rather than capacity.

*** Deployment deadline of 84 months

Supporting Materials

Methodology

Estimating wind & solar growth scenarios

Throughout this report at the EU level, a fixed percentage growth in total installed capacity using 2021 as the baseline has been used to estimate the pathway to 1.5C 2030 capacity. This growth scenario is intended to act as a realistic benchmark for deployment rates from 2022 - 2030 and was decided upon after discussion with developers, analysis of current growth rates, and a comparison of other options. These options included fixed GW annual additions and increasing annual GW additions followed by constant capacity increase (similar to the schedule outlined in the German Easter Package). At EU-level, total installed solar capacity currently shows a fixed percentage growth pattern - with more and more gigawatts being added every year. For wind, capacity is currently increasing by roughly 10 GW/year. However, to reach 2030 targets at constant GW additions, this would have to jump to more than 30 GW/year from 2022. A fixed percentage growth in total installed capacity scenario requires adding around 20 GW/year from 2022 (a more realistic number based on WindEurope's projected net additions of 15 GW in 2022) , rising to 45 GW/year by 2030.

At the country level, a fixed percentage growth rate in total installed capacity is also used. In this case, forecast data is used to calculate the average yearly percentage increase from data between 2021 and 2026. This is then extended to estimate 2030 capacity which is used to determine whether countries are on track for required capacities.

Solar forecast data

Solar forecast data is taken from the IEA Renewables 2021 report, released in December 2021. This data set was chosen after comparison with solar auction results from key countries (Germany, Italy, Spain, Netherlands, Poland) to cross-check the figures, and due to the public availability of country-level data alongside EU numbers. The Renewables 2021 report included an accelerated scenario which assumes certain market and policy advancements can occur in the next 1 - 2 years. For this report, the IEA's main case has been used to display what would happen in a 'business as usual' scenario. Industry believes higher solar growth is possible. In their report 'EU Market Outlook for Solar Power 2021-2025' from December 2021, SolarPower Europe outlined a medium case scenario

which sees the EU-27 adding 41 GW (ac) solar capacity in 2025. This is significantly higher than the IEA forecast of 21 GW (ac) in 2025, however, combined with forecast wind deployment, it would still leave the EU 20% behind 1.5C compatible additions. There are also supply chain and skills shortage issues in the solar industry which must be addressed to accelerate solar at pace.

Wind forecast data

Wind forecast data is taken from WindEurope's report, '2021 Statistics and the outlook for 2022-2026' which was released in February 2022. Net additions were used from the realistic expectations scenario.

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Photo credit: Joan Sullivan / Climate Visuals Countdown