BLOWING IN THE WIND:

STATE OF PLAY AND PROJECTIONS FOR OFFSHORE AND ONSHORE WIND ENERGY IN THE EU

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SUMMARY

To tackle the climate emergency and to reduce our dependence on fossil fuels, we need to massively expand renewable energy. In this context, wind energy has a central role to play, by providing cheap, low carbon, and locally produced power. This need for expansion is emphasised in the recent announcement from Commission President Ursula von der Leyen on the publication of a Wind Package during her State of the European Union (EU), which put the spotlight on the wind energy sector. Today, the EU has over 200 GigaWatt (GW) of onshore and offshore wind installed capacity, supplying 16% of EU electricity demand. This needs to more than double by 2030 to meet the new renewable energy target of 42.5%, which will create thousands of new jobs and can be done while minimising impacts on nature.

This paper provides an overview of the current wind energy situation and projections for 2030, comparing EU Member State ambitions with EU targets, and with energy scenarios more consistent with the 1.5°C goal. It reviews key challenges for the sector, and makes recommendations on how to ensure accelerated wind energy deployment is a success for the climate, nature and people.

Key findings/conclusions

1. In 2022, the EU-27 had 204 GW of installed wind capacity, 16 GW offshore and 188 GW onshore.
2. On paper, taking account of the technological capabilities of new wind turbines and recent energy system modelling, EU Member States' current ambitions for onshore and offshore wind are (collectively) broadly aligned with the level of wind power implied by the updated renewable energy target of 42.5% for 2030.
3. However, for a pathway more consistent with the 1.5°C goal and a fair EU contribution to meeting it, significantly more is likely needed. The Paris Agreement Compatible (PAC) energy scenario(add footnote), which reaches 50% renewable energy by 2030, models one such pathway.[1]
4. Austria, Belgium, Germany, Ireland, Italy, Lithuania, the Netherlands, Portugal, and Sweden's ambitions for wind energy deployment by 2030 are roughly in line with the PAC scenario projections. Other countries foresee much less, with most Central and Eastern European (CEE) countries ambitions falling far behind the PAC projections. It should also be noted that the PAC scenario assumes dramatic reductions in energy demand, and hence lower absolute levels of renewable energy deployment than would otherwise be required.
5. Yearly deployment at present is far too low, with only 16 GW of wind installed in 2022, and therefore needs to more than double by 2030 to deliver the 42.5% target. Current rates also compare poorly to performance elsewhere, for example China has installed more than 150 GW since 2017, and is due to add another 371 GW by 2025.
6. Ecosystem-based planning as well as enhanced cooperation between citizens, stakeholders and Member States can lead to a faster and cheaper deployment of wind power, by minimising conflicts over space between sectors and between human activities and nature.
7. There are good examples, including in Just Transition regions, of where the deployment of wind energy has led to positive socio-economic outcomes, for example through creating new jobs and reskilling workers from fossil fuel industries.

1 More information on the PAC scenario in box page 9.

WWF recommendations to ensure wind energy delivers for climate, nature and people

1. 42.5% renewable energy by 2030, as foreseen by the updated renewable energy target, is not enough. Given the climate emergency and our dependence on fossil fuels, the EU should aim to achieve at least 50% by 2030, and 100% by 2040.
2. Member States should set specific targets for onshore and offshore wind in their National Energy and Climate Plans (NECPs).
3. Member States must use robust ecosystem-based spatial planning at sea and on land to minimise the environmental impacts of wind energy expansion. Greater investment by Member States in administrative capacity, including increased staffing and training in competent authorities, is crucial to this end, and to speeding up decision-making.
4. New EU-level permitting rules exempting most projects in Renewables Acceleration Areas from having to carry out an Environmental Impact Assessments (EIA) and Appropriate Assessment (AA), and presuming that all renewable energy projects are of overriding public interest are regrettable. The new rules must be carefully implemented by Member States and closely monitored by the Commission to ensure impacts on nature are minimised and that effective public participation is assured. Renewable Acceleration Areas (RAAs) must also identify the potential co-location between different activities and sectors to reduce the space needed and reduce environmental impacts.
5. Member States must seek to maximise the potential of wind energy to contribute to a just and fair transition, in particular by focusing investment in disadvantaged regions, helping workers in fossil fuel and other declining industries find jobs in the wind industry, and ensuring that economic benefits for local communities are realised.
6. Non-price criteria in wind projects tenders must become mandatory, and harmonised to the extent possible at EU level, taking regional specificities into consideration.

Written by the WWF European Policy Office.

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TABLE OF CONTENTS

1. MAKING THE MOST OF THE WIND

Since the beginning of the year, the Intergovernmental Panel on Climate Change (IPCC) has outlined in its latest report that wind and solar sources of energy represent the biggest potential for decreasing CO_2 emissions by 2030.[2] In the vast majority of scenarios put forward by the European Scientific Advisory Board on Climate Change (ESABCC), wind and solar are also depicted as the dominant source of energy for the future.

At the EU level, the REPowerEU plan and the revision of the Renewable Energy Directive (RED) have led to a new target for renewables of 42.5% by 2030.[3] Other scenarios such as the Paris Agreement Compatible (PAC) energy scenario and Ember New Generation modelling (see boxes page 9) propose higher targets, in line with WWF recommendations that the EU reach 50% by 2030, and 100% by 2040.

To achieve any of these goals, EU Member States need to overcome significant challenges, from the need to win local public support to expanding grid infrastructure, and speeding up permitting processes. These are particularly relevant to the wind sector, given its predominant role in the energy transition. Equally, while the deployment of wind energy needs to be massively accelerated, the transition towards 100% renewable energy should not come at the expense of nature or exploit any weakening of environmental legislation. And it must be well planned, involving EU citizens fully and effectively and ensuring that they benefit from the rapid transition in our energy system that is required.

Finally, while this paper focuses on the deployment of wind energy, it is essential to recall that the best way to reduce greenhouse gas (GHG) emissions from energy and minimise any impacts of energy infrastructure on nature or people is to cut our energy consumption. Expanding renewables and decreasing energy demand should go hand in hand - dramatic reductions in energy demand are critical to decarbonising at the speed and scale required to keep the 1.5°C temperature goal within reach.

Key facts

- In 2022, wind supplied 16% of EU electricity demand, with 14% covered by onshore, and 2% by offshore installations.[4]
- EU Member States currently have 16 GW of installed offshore capacity. They have pledged to have at least 116 GW by 2030, which at today's consumption levels would be enough to supply 122 million European homes (62% of the EU total) with electricity.[5]
- Onshore, there are 188 GW currently installed, and projections from the wind sector suggest this will reach 311 GW by 2030.[6]
- These pledges and projections for 2030 would mean an increase of 625% compared to 2022 capacities for offshore wind, and for onshore an increase of 65%.

2 IPCC, 2023, AR6 Synthesis Report: Climate Change 2023, https://www.ipcc.ch/report/ar6/wg3/figures/summary-for-policymakers/IPCC_AR6_WGIII_FigureSPM7.png

3 In 1997, the first indicative target was 12% of renewables by 2010. In 2009, the new binding target was 20% of renewables by 2020, and in 2018 the target was 32% by 2030.

4 WindEurope, 2023, Wind energy in Europe: 2022 Statistics and the outlook for 2023-2027, https://windeurope.org/intelligence-platform/product/wind-energy-in-europe-2022-statistics-and-the-outlook-for-2023-2027/

5 Based on current average household electricity consumption (3,500 MWh/year). It should be noted that household consumption is likely to increase significantly given the electrification of heating, charging of EVs, etc.

6 Data provided by WindEurope, and retrieved from EU-27 sources.

2. WHERE THE WIND'S BLOWING: THE STATE OF PLAY AND FUTURE PROJECTIONS

This section presents the current onshore and offshore wind capacity, Member States ambitions for 2030, and the targets for 2030 according to different scenarios. WWF has collected data from several sources, including the WindEurope report *Wind energy in Europe: 2022 Statistics and the outlook for 2023-2027*[7], EU countries' (non-binding) agreements by sea basin[8], the latest official regional Declarations for offshore wind (in Ostend[9] and Berlin[10]), as well as data from the PAC scenario and Ember New Generation models.

The Paris Agreement Compatible (PAC) scenario for energy infrastructure is an EU energy scenario aligned with the Paris Agreement's objective of limiting global warming to 1.5°C. The PAC scenario consortium consists of Climate Action Network (CAN) Europe, European Environmental Bureau (EEB), Renewable Grid Initiative (RGI), and REN21; and the PAC project has been developed by CAN and EEB, with the most recent modelling being done by Climact. It is based on three key objectives:

1. 100% renewable energy supply by 2040;
2. At least 65% greenhouse gas emissions (GHGs) reductions by 2030;
3. Net-zero emissions by 2040.[11]

It is a demand reduction-led scenario, looking at the demand side (e.g. in the transport, industry and buildings sectors - including lifestyle changes) and matching the energy needed from the supply side. Given this approach, which assumes a dramatic decrease in energy demand, the figures in terms of renewable energy deployment needed are significantly lower for the same percentage level of overall renewable energy compared to other scenarios. For example the PAC scenario reaches 50.11% renewable energy in final energy demand in 2030 with absolute levels of wind power deployment not that dissimilar from other scenarios that only reach 40 or 45% renewable energy.[12]

Ember is an independent energy think tank. In a recent study, they concluded that the EU was already on track to achieve 45% renewable energy share by 2030, and could reach 50% with more support.[13]

Ember has also developed an energy scenario, the 'New Generation' model. One of their key findings is that to reach net-zero emission by 2050, the EU needs to plan for a clean power system based on 70 to 80% wind and solar by 2035. The data from the New Generation modelling for onshore and offshore wind are used in the second section of this review paper.[14]

The table below outlines, for each Member State, their current onshore, offshore, and total installed wind capacity, their 2030 ambitions, and the PAC scenario data, using the latter's country-by-country analysis. Member States' ambitions for total wind deployment by 2030 are compared to the PAC scenario data and are classified as follows:

- GREEN = Member States that are aiming to deploy wind at roughly the scale of the PAC scenario (90% or more compared to PAC scenario);
- AMBER = Member States that are aiming to deploy less wind compared to the PAC scenario (70-90% compared to PAC scenario);
- RED = Member States that are aiming to deploy much less wind compared to the PAC scenario (less than 70% compared to PAC scenario).

Importantly, this rating relates purely to Member States stated ambitions for deployment of offshore and onshore wind. It does not assess how Member States will deliver on them, or whether they are on track to do so.

7 WindEurope, 2023, Wind energy in Europe: 2022 Statistics and the outlook for 2023-2027, https://windeurope.org/intelligence-platform/product/wind-energy-in-europe-2022-statistics-and-the-outlook-for-2023-2027/

8 Northern Seas offshore grids (NSOG), Baltic Energy Market Interconnection Plan offshore grids (BEMIP offshore), South and West offshore grids (SW offshore), Atlantic offshore grids, South and East offshore grid (SE offshore): https://energy.ec.europa.eu/news/member-states-agree-new-ambition-expanding-offshore-renewable-energy-2023-01-19_en

9 North Sea Energy Ministers, 2023, Ostend Declaration, https://www.bmwk.de/Redaktion/DE/Downloads/Energie/ostend-declaration-energy-ministers-north-seas-europes-green-power-plant.pdf?__blob=publicationFile&v=4

10 CBSS Foreign Ministers, 2023, Berlin Declaration on Baltic Offshore Wind, https://cbss.org/wp-content/uploads/2023/05/230509_berlin-declaration-on-baltic-offshore-wind-by-cbss-foreign-ministers_final_consented.pdf

11 The calculations do not consider emissions and removals from land use, land use change and forestry (LULUCF)

12 PAC scenarios, 2023, https://www.pac-scenarios.eu/

13 Ember, 2023, Fit for the future, not Fit-for-55, https://ember-climate.org/insights/research/fit-for-the-future-not-fit-for-55/

14 Ember, 2023, New Generation: Building a clean European electricity system by 2035, https://ember-climate.org/insights/research/new-generation/

Table 1: Overview of EU Member State offshore and onshore wind capacity in 2022 and their plans for 2030 (in GW)

	Offshore wind			Onshore wind			Total wind		
	2022 installed capacity	2030 ambitions[15]	2030 PAC scenario	2022 installed capacity	2030 ambitions[16]	2030 PAC scenario	2022 installed capacity	2030 ambitions	2030 PAC scenario
Austria	N/A*	N/A	N/A	3.59	6.32	6.78	3.59	6.32	6.78
Belgium	2.26	6	3.85	3.04	4.24	4.36	5.3	10.24	8.21
Bulgaria	0	0	1.56	0.71	0.95	5.95	0.71	0.95	7.51
Croatia	0	0.51	2.17	1.1	1.36	2.27	1.1	1.87	4.44
Cyprus	0	0.1	0.28	0.16	0.2	0.28	0.16	0.3	0.56
Czech Republic	N/A	N/A	N/A	0.34	0.97	5.1	0.34	0.97	5.1
Denmark	2.3	13.2	20.55	4.97	9.5	4.36	7.27	22.7	24.91
Estonia	0	1	2.6	0.32	0.7	0.79	0.32	1.7	3.39
Finland	0.07	1	4.22	5.61	6.85	7.37	5.68	7.85	11.59
France	0.48	4.4	29.75	20.65	37	27.54	21.13	41.4	57.29
Germany	8.055	30.5	25.06	58.27	115	86.43	66.325	145.5	111.49
Greece	0	2.7	0.98	4.68	7.05	11.34	4.68	9.75	12.32
Hungary	N/A	N/A	N/A	0.33	0.33	2.67	0.33	0.33	2.67
Ireland	0.025	5-5.5	2.11	4.61	8.2	7.73	4.635	13.2-13.7	9.84
Italy	0.03	8.5	2.33	11.82	18.4	26.26	11.85	26.9	28.59
Latvia	0	0.4	4.88	0.14	0.6	1.93	0.14	1	6.81
Lithuania	0	1.4	1.84	0.74	3.6	3.69	0.74	5	5.53
Luxembourg	N/A	N/A	N/A	0.17	0.25	0.28	0.17	0.25	0.28
Malta	0	0.05	4.67	0	0	0	0	0.05	4.67
Netherlands	2.46	21	22.74	6.22	6.1	6.42	8.68	27.1	29.16
Poland	0	5.9	14.49	7.86	9.6	15.65	7.86	15.5	30.14
Portugal	0.025	10	0.43	5.67	9	8.33	5.695	19	8.76
Romania	0	1	6.16	3.03	5.25	7.58	3.03	6.25	13.74
Slovakia	N/A	N/A	N/A	0	0.5	1.67	0	0.5	1.67
Slovenia	N/A	N/A	N/A	0	0.15	0.95	0	0.15	0.95
Spain	0.005	1-3	4.24	29.79	47.26	53	29.795	48.26-50.26	57.24
Sweden	0.19	0.7	0.79	14.4	12	10.42	14.59	12.7	11.22
Sum of EU	16	116	155.68	188	311	309.15	204	427	464.83

** N/A = Not Applicable (landlocked countries)*

15 Data from sea-basins agreements, updated with the latest regional declarations.

16 Data provided by WindEurope, and retrieved from EU-27 sources (NECPs, press releases, new plans, etc.).

KEY TAKEAWAYS:

At the moment, the total wind capacity in EU-27 is around 204 GW (16 offshore, 188 onshore), and should reach 427 GW (116 offshore, 311 onshore) in 2030 if Member States achieve their currently planned levels of ambition.

- According to the PAC scenario modelling on a country-by-country basis, the total installed capacity of wind power needed in 2030 must reach 464.83 GW.[17] Therefore, the current level of ambition of Member States would collectively deliver 91.86% of the wind deployment required in the PAC scenario (however note the point in the box above about the levels of demand reduction involved in the PAC scenario and comparisons with other scenarios below).
- Austria, Belgium, Denmark, Germany, Ireland, Italy, Lithuania, the Netherlands, Portugal, and Sweden aim to have roughly the scale of wind energy in 2030 foreseen in the PAC scenario.
- France, Greece, Luxembourg, and Spain aim to have wind at a scale of 70% to 90% of the level foreseen in the PAC scenario.
- Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Finland, Hungary, Latvia, Malta, Poland, Romania, Slovakia, and Slovenia aim to have less than 70% of the wind energy foreseen in the PAC scenario.

On the offshore side, commitments from Member States (and hence overall EU projected deployment) have skyrocketed in the last few years, notably following the increased cooperation between countries, emphasised by the five sea basin non-binding agreements of early 2023. The expectations went from the 60 GW announced by the Commission in its 2020 EU strategy on offshore renewable energy[18], to the 116 GW pledged by EU countries in 2023.

On the onshore side, despite wind being the cheapest energy source in many countries, similar cooperation between Member States has not happened yet.[19] The historical regional sea conventions, the lack of physical borders compared to on land, and the fact that seas are not privately owned may all be factors that can explain this difference in terms of cooperation.

Moving on from the Member State-level analysis, it is of interest to compare 2030 projections with the overall EU target for renewables, and also with more ambitious modelling scenarios, such as the PAC scenario and Ember New Generation modelling. Knowing the capacity factors used for both onshore and offshore in the different energy scenarios is essential to compare the figures.

The table below shows the Commission and WindEurope's expectations for the wind sector to meet the 40% renewable energy target proposed in July 2021 by the Commission in the Fit-for-55 Package, and the 45% renewable target proposed by the Commission in May 2022 as part of the REPowerEU plan.[20] It also shows WindEurope's estimate of what would be required for a 42.5-43% renewable objective (aligned with the final 42.5% target agreed under the revision of the RED in 2023), and finally the levels of deployment in the PAC and Ember scenarios.

Capacity factor (CF): The capacity factor of a wind turbine is its average power output divided by its maximum power capability, and reflects the fact that wind speed varies, so a wind turbine does not consistently produce its theoretical maximum output. Offshore wind turbines almost always have a higher CF than onshore wind turbines because they are larger and offshore winds have a higher speed and greater constancy.

However, as some studies have shown, the more turbines are installed in a region, the less efficient offshore wind production becomes, due to a lack of wind recovery. Indeed, when wind energy is used at larger scales, atmospheric effects lead to lower capacity factors, and to fewer full-load hours.[21]

17 The PAC scenario country-by-country analysis models the different sources of energy needed (including onshore and offshore wind) to meet the energy demand of a country, using Member State specificities such as different capacity factors. The total sum of GW varies for the aggregated EU-27 scenario, because some Member States specificities cannot be modelled on a 1-on-1 basis (e.g., the average EU wind capacity factor compared to the sum of all the national ones). Hence the difference in table 2.

18 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, An EU Strategy to harness the potential of offshore renewable energy for a climate neutral future,COM/2020/741 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2020:741:FIN&qid=1605792629666

19 Ember, 2023, Wind and solar deployment in the EU, https://ember-climate.org/insights/commentary/eu-wind-and-solar-deployment/

20 WindEurope, 2023, Wind energy in Europe: 2022 Statistics and the outlook for 2023-2027, https://windeurope.org/intelligence-platform/product/wind-energy-in-europe-2022-statistics-and-the-outlook-for-2023-2027/

21 Agora Energiewende, Agora Verkehrswende, Technical University of Denmark and Max-Planck-Institute for Biogeochemistry, 2020, Making the Most of Offshore Wind: Re-Evaluating the Potential of Offshore Wind in the German North Sea, https://static.agora-energiewende.de/fileadmin/Projekte/2019/Offshore_Potentials/176_A-EW_A-VW_Offshore-Potentials_Publication_WEB.pdf

Table 2: EU onshore and offshore wind projections for 2030 depending on the scenarios (in GW)

	Offshore	Onshore	Total wind
2022 installed capacities	16	188	204
Current 2030 ambitions	116	311	427
Fit-for-55 Impact Assessment 40% target	79 CF = 32%	374 CF = 27%	453
REPowerEU Impact Assessment 45% target	102 CF = 32%	408 CF = 27%	510
WindEurope 40% target	59 CF = 45%	325 CF = 35%	384
WindEurope 42.5-43% estimated target	Not specified	Not specified	423
WindEurope 45% target	111 CF = 45%	329 CF = 35%	440
PAC scenario country-by-country 50.11%	155.68 CFs vary from country to country	309.15 CFs vary from country to country	464.83
PAC scenario EU-27 50.11%	127.5 CF not specified	395 CF not specified	522.5
Ember New Generation modelling 70-80% of electricity from wind and solar by 2035	93-97 CF = 42.5%	383-405 CF = 32.5%	475-500

KEY TAKEAWAYS:

General:

- Along with assumptions on energy demand reduction, assumptions on capacity factors have a big impact on the overall level of installed capacity required to meet any particular level of power production and hence renewable energy target. Higher CFs provided by new-generation turbines mean fewer GW of installed capacity are needed in such scenarios or projections in total to produce the same amount of energy. However, and especially for offshore turbines, depending on the scale of wind farms, lower CFs are observed due to atmospheric effects (see box page 11).

European Commission compared to WindEurope assessments:

- Based on the European Commission's Impact Assessment drafted ahead of the launch of the Fit-for-55 Package, to achieve 40% renewable energy by 2030 it was estimated that the EU would need 453 GW of wind energy capacity (374 GW onshore and 79 GW offshore wind). According to the Commission's assessments made after the publication of the REPowerEU plan, increasing the renewable energy target to 45% by 2030 would mean a revised ambition of 510 GW of total wind energy (an additional 57 GW).
- The Commission's targets were calculated using CFs of 27% and 32% for onshore and offshore wind respectively, which, according to other sources, does not reflect current technology.[22] In WindEurope's assessment, CFs are now on average 35% for onshore and 45% for offshore turbines.
- Using these updated CFs, and their early 2022 assumption that the new RED target would be around 42.5 to 43%, WindEurope concluded that wind energy would need to contribute at the level of 423 GW, which is broadly consistent with the current 2030 EU Member State ambitions of 427 GW.[23]

PAC scenario:

- PAC scenario figures vary between the country-by-country and the EU level analyses. This can notably be explained by the difference in CF used (see footnote 16).
- Looking at the PAC scenario modelling based on country-by-country CFs, current offshore wind projections (116 GW) are closer to the level identified to reach 50.11% renewables by 2030 (127.5 GW), compared to onshore wind projections (311 GW from Member States, and 395 from PAC scenario).
- However, the total amount of wind identified by the PAC scenario aggregate modelling at EU level is 522.5 GW, much higher than current Member State 2030 ambitions.

Ember modelling:

- Ember New Generation modelling makes the distinction between existing and new CF, with the latest operating at 32.5% and 42.5%. Their projection leads to a level of wind capacity of between 475 and 500 GW.

OTHER CONSIDERATIONS:

Deployment rates:

- The current annual rate of deployment is still very low compared to the level that would be required to achieve these projections or pledges. In 2022, the EU installed 16 GW of new wind turbines and only invested €17bn in the construction of new wind farms, the lowest figure since 2009.[24] In comparison, China has been investing massively in wind energy development: its onshore and offshore capacity now exceeds 310 GW, double its 2017 level, and it is reportedly on track to add another 371 GW before 2025.[25]
- According to WindEurope, by the end of the decade, the wind sector will need to install more than 44 GW annually to achieve the new RED target. Even higher rates would be required to reach the levels of deployment in the PAC scenario.
- Ecosystem-based planning, faster permitting processes and the administrative capacity in competent authorities to deliver them, better public engagement, higher levels of investment and improved supply chains are among the key drivers to accelerate the pace of deployment. These issues are discussed further below.

WWF recommendations:

- 42.5% of renewable energy for 2030 is not enough. Given the climate emergency and our dependence on expensive fossil fuels, the EU should aim to achieve at least 50% by 2030, and 100% by 2040.
- Member States should set specific targets for onshore and offshore wind in their National Energy and Climate Plans (NECPs).

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22 In its 2019 report on offshore wind, the International Energy Agency (IEA) already mentioned that the capacity factors of new offshore wind turbines were between 40 to 50%. International Energy Agency, 2019, Offshore Wind Outlook 2019, https://iea.blob.core.windows.net/assets/495ab264-4ddf-4b68-b9c0-514295ff40a7/Offshore_Wind_Outlook_2019.pdf

23 WindEurope, 2023, Wind energy in Europe: 2022 Statistics and the outlook for 2023-2027, https://windeurope.org/intelligence-platform/product/wind-energy-in-europe-2022-statistics-and-the-outlook-for-2023-2027/

24 WindEurope, 2023, Europe invested €17bn in new wind in 2022, the lowest since 2009, https://windeurope.org/newsroom/press-releases/europe-invested-e17bn-in-new-wind-in-2022-the-lowest-since-2009/#:~:text=Europe%20invested%20just%20%E2%82%AC17bn,and%20ensure%20affordable%20electricity%20prices

25 Global Monitor Energy, 2023, A Race to the Top China 2023: China's quest for energy security drives wind and solar development, https://globalenergymonitor.org/report/a-race-to-the-top-china-2023-chinas-quest-for-energy-security-drives-wind-and-solar-development/

3. ACCELERATING THE DEPLOYMENT OF WIND POWER: A HOW-TO GUIDE

Building on the analysis in the previous section, it is clear that the EU needs to significantly accelerate the deployment of wind energy (alongside solar power, demand reduction and other emissions reduction measures) to stay on a pathway consistent with the 1.5°C target. This section outlines key prerequisites that can help unlock the potential of wind energy while minimising negative impacts and maximising benefits for both nature and people.

A. ECOSYSTEM-BASED PLANNING

Stopping runaway climate change, which means a very rapid expansion of renewables such as wind and solar, is essential to avoiding the mass extinction of life on earth. Though if we do not plan the expansion of wind energy carefully, we may impact the very nature we seek to protect, at a time when we already face a biodiversity crisis. Nature is our best climate ally; minimising negative impacts of onshore and offshore wind deployment must be a priority to avoid counterproductive repercussions. While all energy infrastructure has environmental impacts, for both onshore and offshore wind, planning and appropriate siting can minimise negative impacts and reduce the need to mitigate them. To deliver coherent spatial plans, regional cooperation is needed between all stakeholders, from the involvement of civil society, to the collaboration between Member States and private sector players.

At sea, to comply with the EU Maritime Spatial Planning Directive (MSPD, 2014/89/EU), Member States have had to designate areas for the different maritime industries, including offshore wind, both spatially and temporally. As a result, most EU countries already have space marked for renewable energy development, which could be used as a basis for designating Renewables Acceleration Areas (RAAs) in the future, as required in the new RED. Where Member States have yet to finalise and submit their national maritime spatial plans, they should ensure that the areas for offshore renewable energy align with at least the 2030 targets for renewable energy and minimise conflicts with other maritime activities, including nature protection. Additionally, to ensure that any negative environmental impacts of offshore wind projects on nature are minimised, they must follow the 'mitigation hierarchy approach' to nature protection: namely to avoid, minimise/reduce, restore and compensate as a last resort only.[26]

Positive example: the Dutch North Sea plan[27]

As part of the North Sea Agreement (NSA), which addresses offshore renewable energy, fisheries, and marine protection, the Netherlands put in place positive practices:

1. Good collaboration between all stakeholders (including the fishing sector);
2. Designated areas and timelines to reduce bottom-contacting fisheries by 15% by 2030;
3. Increased ambitions for nature inclusiveness within sectoral developments, such as identifying and implementing best-available techniques and best environmental practices;
4. Agreement that no wind farms will be placed within either Natura 2000 or Marine Strategy Framework Directive (MSFD) areas, i.e. areas where the negative impacts of human activities already require addressing.

These approaches should be replicated by other Member States, to ensure transboundary harmonisation across sea basins.

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26 WWF, 2021, Nature protection and offshore renewable energy in the European Union, https://wwfeu.awsassets.panda.org/downloads/wwf_epo_position_paper_offshore_renewable_energy_and_nature.pdf

27 WWF, 2022, Assessing the balance between nature and people in the European Seas: Maritime Spatial Planning in the North Sea, https://wwfeu.awsassets.panda.org/downloads/wwf_north_sea_msp_assessment_2022.pdf

On land, there are currently no EU obligations in terms of spatial planning. The upcoming designation of RAAs is an opportunity for Member States to plan efficiently to maximise the deployment of onshore wind and related grid infrastructure in a way that minimises impacts on nature and people.

Overall, the identification of RAAs should be based on wildlife sensitivity mapping and robust ecosystem-based spatial planning. Environmentally sensitive areas should be excluded from this process as agreed in the new RED for Natura 2000 sites and bird and marine mammal migratory corridors. Nature parks and reserves, as well as blue carbon ecosystems should also be excluded.[28]

WWF recommendation:

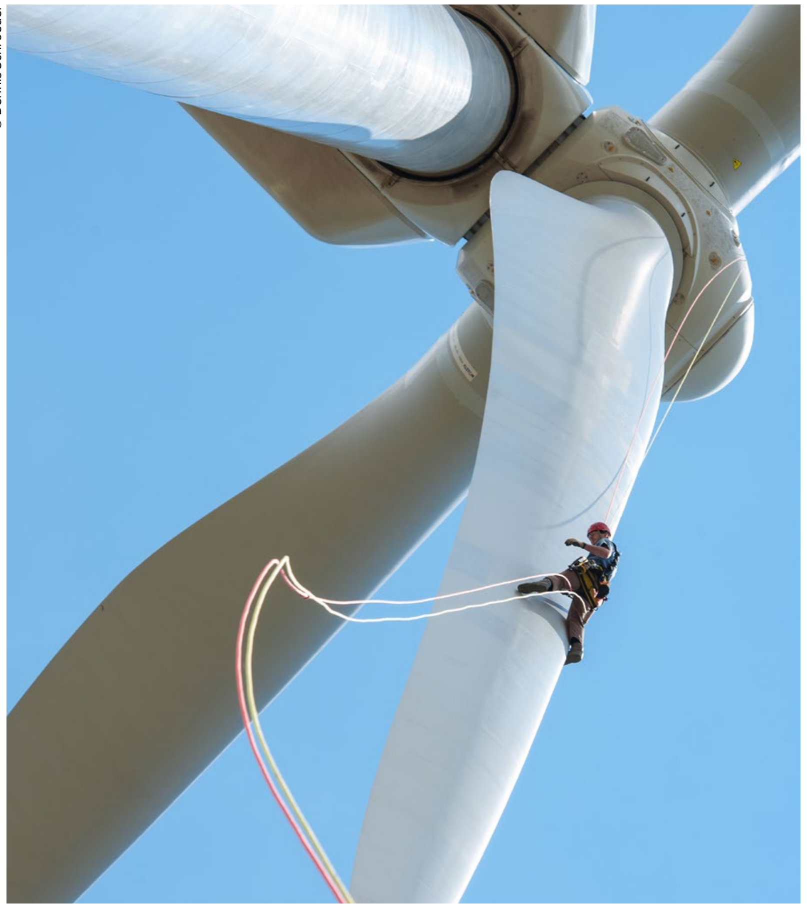
Member States must use robust ecosystem-based spatial planning at sea and on land to minimise the environmental impacts of wind energy expansion. Greater investment by Member States in administrative capacity, including increased staffing and training in competent authorities, is crucial to this end, and to speeding up decision-making.

B. NEW PERMITTING RULES - MOVING FAST WITHOUT HARMING NATURE

It is essential to speed up permitting processes to deploy renewables, but this must be done in a nature-friendly way. While the idea of tighter deadlines for decisions by competent authorities is valid and useful, the form of the new rules raise serious concerns. Indeed, the new permitting rules implemented by the Council Emergency Regulation on the acceleration of permitting[29], and agreed under the revision of the RED, allow Member States to exempt renewable projects in dedicated renewable or grid areas from carrying out an Environmental Impact Assessment (EIA). And in the case of the RED, projects in RAAs are also exempted from Appropriate Assessment (AA) by virtue of article 6 (3) of the Habitats Directive.

Once the RED enters into force (expected towards the end of October 2023), Member States will have 27 months to designate RAAs, where the permitting processes for renewable projects will be accelerated. Exempting these projects from performing EIAs is regrettable. Renewable energy infrastructure, though essential, is still infrastructure, and it needs to be subject to robust assessments and public consultation to clarify the impacts and mitigation measures to be monitored and/or required and to ensure full public participation and support.

Additionally, the Council Emergency Regulation implemented early 2023 to accelerate the deployment of renewable energy, and the new RED text include the presumption that renewable energy projects are of "imperative reason of overriding public interest" (IROPI). WWF has previously stressed, in its position paper on REPowerEU and go-to areas,[30] the risks that such a presumption entails for the weakening of existing environmental laws. And that - as with the exemption from carrying out environmental impact assessments - it also risks undermining the aim of speeding up permitting process if it leads to greater public opposition. Last but not least, applying this principle to all renewable projects appears to have opened the way to similar environmental deregulation in other sectors. Both the Commission proposals on the Critical Raw Materials Act (CRMA) and Net-Zero Industry Act (NZIA) include the presumption of IROPI for the mining and other industry sectors. Streamlining permitting processes should not come at the cost of vital environmental legislation or meaningful community participation. This means that every project should have an environmental and social impact assessment and the new provisions on permitting procedures should be implemented very carefully and closely monitored.



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28 WWF, 2022, 'Go-to-areas' for renewables: making the puzzle fit, https://wwfeu.awsassets.panda.org/downloads/repowereu_position_paper.pdf

29 Council of the EU, 2022, COUNCIL REGULATION (EU) 2022/2577 laying down a framework to accelerate the deployment of renewable energy, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022R2577

30 WWF, 2022, 'Go-to-areas' for renewables: making the puzzle fit, https://wwfeu.awsassets.panda.org/downloads/repowereu_position_paper.pdf

The new rules also give rise to a number of uncertainties. Detailed guidance from the Commission is needed urgently to help Member States implement these new rules consistently with existing environmental legislation, such as the Birds and Habitats Directives, the Water Framework Directive and the Marine Strategy Framework Directive.

Finally, processes can be sped up in many other ways, notably for the wind sector. The Commission and Member States must work on these other challenges, such as the need to increase administrative capacities in competent authorities, better spatial planning, and better public and in particular local community engagement.

WWF recommendation:

New EU-level permitting rules exempting most projects in Renewables Acceleration Areas from having to carry out an EIA and AA, and presuming that all renewable energy projects are of overriding public interest are regrettable. The new rules must be carefully implemented by Member States and closely monitored by the Commission to ensure impacts on nature are minimised and that effective public participation is assured.

RAAs must also identify the potential co-location between different activities and sectors to reduce the space needed and reduce environmental impacts.

C. PLANNING WITH AND FOR PEOPLE

The development of the wind sector must be socially fair and have strong public support if we are to achieve a rapid and successful energy transition. While there is strong public support for renewable energy in general, including wind power and a recognition that cheap wind and solar power produced in the EU helps avoid high and volatile fossil fuel prices and so keep energy bills low, it is essential that citizens be given early and effective opportunities to participate in planning decisions that may affect them. It is therefore regrettable in the revised RED to have exempted renewable energy projects in acceleration areas from the requirement to carry out an EIA, which provides significant opportunity for public consultation.

Member States should do their utmost to ensure extensive public consultation in the definition of acceleration areas and in their plans for renewable energy expansion generally, including through the use of deliberative democracy approaches such as citizens assemblies. They should also maximise the opportunities for local communities to benefit directly from renewable energy projects (see below).

More specifically, Member States should include in their planning how the development of renewables such as wind power can benefit those who will be most affected by the transition to a clean energy system, and how they can maximise the potential of wind power expansion to contribute to a just and fair transition. From the creation of jobs, to the taxes paid by wind operators to local governments, the money generated by the development of wind farms can directly benefit local communities.[31]

This means mapping the existing and needed workforce to deliver new projects, both in terms of administrative and on site work. And identifying areas where there are already or will be declining industries and hence a need for alternative employment, exploring the potential for renewable energy projects in such areas and investing in the skills and retraining that may be required to allow workers to take up new jobs in the renewable energy industry and related services.

Positive example: reskilling program for mining workforce in Romania[32]

The Romanian Wind Energy Association (RWEA) and the Renewable Energy School of Skills (RESS) put in place a reskilling program in the coal region of Valea Jiului for fossil fuel workers to work on onshore wind energy projects. The professional training academy will leverage the RESS programme, which trained over 5 000 wind energy technicians in Romania.

The academy intends to reskill up to 800 coal miners annually, for a total of 8 000 technicians over the 10 years of the project.

Former coal or mining areas, such as those identified under the Just Transition Mechanism for priority support to a decarbonised economy, often have good potential for wind power. Studies, including by the Joint Research Centre (JRC) indicate the potential for coal regions to provide significant wind capacity, create clean energy jobs and

31 WindEurope, 2022, How do communities all over Europe benefit from having a wind farm nearby?, https://windeurope.org/newsroom/news/how-do-communities-all-over-europe-benefit-from-having-a-wind-farm-nearby/

32 IEA, 2022, Skills development and inclusivity for clean energy transitions, https://iea.blob.core.windows.net/assets/953c5393-2c5b-4746-bf8e-016332380221/Skillsdevelopmentandinclusivityforcleanenergytransitions.pdf

provide appropriate wind sites via use of land which is no longer suitable for agriculture or habitation (e.g. due to former mining activity).[33] Similarly, there is potential for workers in the offshore oil and gas industry, as well as in port infrastructure, having transferable skills that will allow them to get jobs in the rapidly expanding offshore wind industry.

According to the International Renewable Energy Agency (IRENA) and the International Labour Organization (ILO), offshore wind farms are more labour-intensive to build than onshore wind farms, because of the complexity of the construction and installation activities (e.g. foundations, undersea cables, installation vessels). A 2020 Danish study found that for each 1 GW of offshore wind in Denmark, 14,600 full-time equivalent (FTEs) jobs are created, 4,900 generated directly within the Danish offshore companies, and the rest indirectly.[34]

Europe is the leader in offshore installations and technology development, but other countries, such as China, are rapidly developing their own capabilities and undertaking improvements in port infrastructure.[35]

Positive example: Oil & Gas Transition Training Fund, Scotland[36]

In 2016, the Scottish government established the Transition Training Fund (TTF) following the closure of oil and gas facilities that led to high unemployment rates in the North Sea region. The fund helped the affected workers re-skill and further train themselves in order to find employment in sectors in need of labour. Over the three-year programme, more than 4,200 oil and gas workers were reskilled, with 89% finding a new job after the training provided. A wind turbine engineering training course was among the programmes proposed and 13% of all those in the programme were subsequently employed in the renewable energy sector.

Positive example: transformation of the Esbjerg port (DK), from offshore oil and gas to offshore wind[37]

The Port of Esbjerg in Denmark has transformed into a global hub for offshore wind over the past two decades. It has enabled local companies to test and transfer their experiences from oil and gas to a new sector; pursue growth in new markets and diversify their business strategy, also well beyond Denmark's borders. Several new industries and specialised local businesses have emerged as spin-offs, both within the municipality and beyond.

A potential new source of income has also emerged for port municipalities, with specialist decommissioning facilities and potentially also new local recycling industries. As the global market for decommissioning is set to grow over the coming years, there will be new opportunities for both domestic and international offshore ports[38] and suppliers, which specialise in the reuse and recycling of large steel structures and components, including offshore platforms, vessels and wind farms.

WWF recommendation:

Member States must seek to maximise the potential of wind energy to contribute to a just and fair transition, in particular by focusing investment in disadvantaged regions, helping workers in fossil fuel and other declining industries find jobs in the wind industry, and ensuring that economic benefits for local communities are realised.

D. NON-PRICE CRITERIA TO ENHANCE SOCIAL AND NATURE CONSIDERATIONS IN WIND PROJECTS

The energy transition will only be achieved together with people, and for people. Involving local communities and civil society upfront is essential to increase public support and minimise the risk of public opposition to specific projects. It is also essential to understand citizens' concerns, listen to their arguments, and communicate the plan, objectives, and impacts of wind projects.

According to polls conducted by Wind Energy Ireland, 80% of Irish people are in favour of wind power, and 58% of them are in favour of the installation of a wind farm in their area. Cheaper electricity was ranked as the top benefit.[39] WindEurope meanwhile has outlined that in Germany, 78% of people are positive about the installation of wind farms close to their homes.[40] Better communication between regions and countries and greater public participation can prevent wind farm projects from being perceived as disrupting people's environment without bringing direct benefits.

To increase both environmental and social benefits, tenders and auctions for new wind energy projects should increasingly factor-in non-price criteria. These criteria cover several aspects such as sustainability, biodiversity, system integration, innovation, EU supply chain development, and benefits to communities. To guarantee a harmonised EU approach to this practice, WWF supports mandatory, and to the extent possible standardised, criteria, taking regional specificities into consideration.

As an active member of the Offshore Coalition for Energy and Nature (OCEaN), WWF has co-published a statement[41] on the important role of ecological criteria in offshore wind farm auctions to tackle both climate and biodiversity issues. It is positive to see this practice getting more and more support, with countries such as the Netherlands, Belgium, France and Germany including non-price criteria in their bidding processes.

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33 WWF, 2022, Repowering EU coal regions, the role of municipality- led renewable energy projects, https://www.wwf.eu/?7629916/coal-regions-municipality-renewable-energy-projects

34 Danish Shipping, Wind Denmark and Danish Energy with support from the Danish Maritime Foundation, 2020, Socio-economic impact study of offshore wind, https://greenpowerdenmark.dk/files/media/winddenmark.dk/document/Technical%20report-Socioeconomic%20impacts%20of%20offshore%20wind-01.07.2020.pdf

35 IRENA in collaboration with ILO, 2022, Renewable energy and Jobs: Annual review 2022, https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Sep/IRENA_Renewable_energy_and_jobs_2022.pdf?rev=7c0be3e04bfa4cddaedb4277861b1b61

36 European Commission, 2021, Case study: Oil & Gas Transition Training Fund, Scotland, https://energy.ec.europa.eu/topics/oil-gas-and-coal/eu-coal-regions/knowledge-products/oil-gas-transition-training-fund-scotland_en

37 Danish Shipping, Wind Denmark and Danish Energy with support from the Danish Maritime Foundation, 2020, Socio-economic impact study of offshore wind, https://greenpowerdenmark.dk/files/media/winddenmark.dk/document/Technical%20report-Socioeconomic%20impacts%20of%20offshore%20wind-01.07.2020.pdf

38 Ports are where operation and maintenance of offshore wind farms are run, where all offshore wind turbines and other equipment get transported, and where floating turbines are assembled.

39 Wind Energy Ireland, 2022, Public Attitude Monitor, https://windenergyireland.com/images/Final_WEI_Annual_Attitudes_Survey_2022.pdf

40 Ibid.

41 OCEaN, 2023, OCEaN Statement on ecological criteria in offshore wind farm auctions, https://offshore-coalition.eu/publications/ocean_pr_windeuropeconference_20230426.pdf

Belgium case: offshore wind tender in the Princess Elisabeth Zone[42]

Belgium launched a tender process for a new offshore wind project in the Elisabeth Zone in the North Sea. 10% of the points attributed to bidders are dedicated to citizen participation, which can take the form of:

1. Financial participation amounting to 3% of the project's CAPEX in addition to the minimum 1% citizen participation as an eligibility criterion;
2. Communication, sensitisation and active engagement included in the action plan;
3. Access for renewable energy communities amounting to 2% of the project's CAPEX as defined in the Renewable Energy Directive.

WWF recommendation:

Non-price criteria in wind projects tenders must become mandatory, and harmonised to the extent possible at EU level, taking regional specificities into consideration.

E. BROADER SYSTEMIC CHALLENGES

Even though they go beyond the scope of this report, there are many other considerations that need to be taken into account when addressing the challenges for the rapid deployment of onshore and offshore wind:

1. **Support for fossil fuels**: at the moment, there is still no level playing field, as the lack of a carbon price under the EU Emission Trading Scheme (ETS) that reflects the real climate impacts of fossil-based energy supplies and the ongoing existence of fossil fuel subsidies still hamper the deployment of wind and other renewables. The polluter pays principle should be applied fully in the energy sector and any public subsidies for fossil fuels or related infrastructure should be redirected to accelerate the energy transition and help the most vulnerable households cut their energy bills.

2. **Changes in the energy system as a whole**: the large quantity of wind (and solar) energy that will dominate the future energy system will need to be accompanied by numerous other changes, to accommodate the fact that such renewable sources are variable. Amongst other things this means a significant growth in demand side response, interconnection and all forms of energy storage, including thermal storage linked to district heating systems.

3. **Supply chains**: building wind turbines requires raw materials and/or manufacturing capabilities that are often not available or fully developed in the EU. For example, the EU provides only 1% of raw materials for wind turbines and expected supply shortages for neodymium and praseodymium could slow down the drive to increase wind power projects.[43] The proposed Critical Raw Materials Act and the Net-Zero Industry Act aim to address these issues, and avoid our transition to low carbon technologies being too dependent on third countries. WWF is closely following negotiations on both these acts and pushing for the important policy decisions therein to take full account of climate, nature and people. Indeed the prerequisites raised in this report for effective expansion of wind power are also valid for these related challenges: ecosystem and socially-based planning is the right approach to any necessary expansion in low carbon technologies that could have other impacts.

4. **Decommissioning:** considering the required, massive expansion of wind energy, sustainable and appropriate decommissioning solutions need to be scaled up significantly. From repowering and the end-of-life treatment of turbine components, to the decommissioning of related infrastructure and the reuse of space, environmental, climate and socio-economic impacts need to be managed carefully and minimised.

42 SPF Economie, Summary of tender principles for the Princess Elisabeth Zone, 2023, https://economie.fgov.be/sites/default/files/Files/Energy/Tender-principles-Princess-Elisabeth-Zone.pdf

43 McKinsey & Company, 2022, Building resilient supply chains for the European energy transition, https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/building-resilient-supply-chains-for-the-european-energy-transition#/

WWF'S MISSION IS TO STOP THE DEGRADATION OF THE PLANET'S NATURAL ENVIRONMENT AND TO BUILD A FUTURE IN WHICH HUMANS LIVE IN HARMONY WITH NATURE

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