December 2024

Supporting the Establishment of Effective Infrastructure for the Installation, Operation and Onshore Grid Connection of Offshore Wind in the Black Sea Region

Joint Statement

The 2020 European Offshore Renewable Energy Strategy set ambitious goals to expand offshore wind capacity, targeting 60 GW by 2030 and 300 GW by 2050. The Black Sea has been put forward as one of the top five European sea basins with high renewable energy potential. The World Bank has estimated it at 435 GW (269 GW in fixed foundations and 166 GW in floating foundations).[1][2] Addressing governance challenges and enhancing cross-border cooperation in the Black Sea will be essential to unlock the growth of the offshore wind energy industry.[3]

Infrastructure readiness is pivotal for the large-scale deployment of offshore wind energy in the Black Sea region.[4] This encompasses the development of port infrastructure, grid expansion, and the integration of digital solutions to enhance efficiency and reliability.

The Black Sea Renewable Energy Coalition (BSREC) has defined common challenges, principles and recommendations for effective infrastructure and grid development, as well as country-fact sheets that can be found below.

- The first step in this process should be a comprehensive analysis of existing facilities, investment areas, and grid connection points, particularly in coastal regions. Established businesses, including shipyards, ports, oil & gas companies and steel construction factories can incorporate different aspects of offshore wind into their business strategies and adapt their operations to new opportunities.
- Black Sea countries should secure diverse financing sources for infrastructure projects and maximising the potential of existing port facilities to support offshore wind projects are key steps.

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[1] World Bank. 2019. *Going Global: Expanding Offshore Wind to Emerging Markets. Washington, D.C.: World Bank Group.*

[2] World Bank. 2020a. *Offshore Wind Technical Potential in the Black Sea. Washington, D.C.: World Bank Group.*

[3] Arsani, A., Koeppen, M., Mikulcic, H., Siwinski, P., Vladimirov, M., *At the Frontier: Guidelines for Unlocking the Offshore Wind Energy Potential in Central and Eastern Europe*, Sofia: CSD, 2024.

[4] ENTSOE-E. 2024. European offshore network transmission infrastructure needs.

- National governments should embrace digital solutions to improve grid management efficiency and ensure that infrastructure development keeps pace with the growth of offshore wind energy projects.
- National governments should prioritise the upgrade of the electrical grid, both onshore and offshore. It is necessary to create interconnection points that allow the generated electricity to be transmitted inland, ensuring the stability and reliability of the power network to cope with the weather-based intermittency of supply.
- National governments should accelerate grid investments and strengthen the processing capacity of logistics and manufacturing facilities for wind turbine equipment, which will ensure that projects are completed on time and within the cost schedule.

Bulgaria

Potential:
The technical offshore wind energy potential in the Bulgarian section of the Black Sea is approximately 116 GW. Of this total capacity, around 26 GW (one-fifth) could be achieved using mature bottom-fixed technology, while the remaining capacity would necessitate floating power plants.[5]

Grid capacity:
New offshore wind farm deployments will rely on the expansion of the grid capacity. In northeastern Bulgaria, the substations at Dobrudzha, approximately 50 km from the coast, and Varna, around 70 km inland, serve as potential transmission access points. Additionally, a 440 kV substation is under construction near Shabla, located just 15 km from the shore. In the southern part of the Bulgarian Black Sea coast, the Burgas substation offers another feasible connection point.[6]

Port Infrastructure:
Bulgaria's main ports, Varna and Burgas, play a crucial role in cargo delivery and shipping. They will play a crucial role as development hubs for the country's nascent offshore wind farm projects.[7] The available EU funding facilities can support the expansion and adaptation of the port infrastructure as well as setting up the manufacturing and logistics base for project delivery. A big challenge for the quick deployment of offshore wind projects will be achieving a high percentage share of local content in the build-out of support infrastructure and businesses.

[5] Trifonova, M., Vladimirov, M., Wind Power Generation in Bulgaria: *Assessment of the Black Sea Offshore Potential*. Sofia: Center for the Study of Democracy, 2021.
[6] Trifonova M., Catuti M., Mikulčić, H., Smoleń, M. *Winds of Change: Offshore Renewable Energy for a More Secure and Resilient Central and Eastern Europe*, Sofia: CSD, 2023.
[7] Center for the Study of Democracy, *Offshore Wind in The Black Sea: Towards a Strategic Legal Framework in Bulgaria*, Policy Brief No. 151, November 2024.

Recommendations:

- Accelerate investments in the expansion of the power transmission infrastructure, specifically in the regions of Dobrudzha and Varna, where most of the highest offshore wind energy potential is located.
- Secure EU financing through the Connecting Europe Facility, the REPowerEU and the Operational Programs of the MRRF to upgrade and expand the ports of Varna and Burgas, enhancing their capacity to support offshore wind logistics, transforming them into decarbonisation hubs.
- Set up fiscal and other government incentives to attract investment from foreign offshore wind energy equipment and logistics companies that will open business ventures near the main offshore wind port hubs.
- Assess the cumulative macroeconomic impact of the offshore wind energy deployment in marine areas, including the number of jobs created and new value added to local economies. The analysis could help increase social acceptance among vulnerable communities.
- The port authorities of Varna and Burgas authorities, together with the Marine Cluster in Bulgaria, should support the creation of innovation hubs to facilitate collaboration among start-ups, ports, the shipbuilding industry, and academic institutions.
- The government should support the Bulgarian Maritime University in Varna to train specialists for the construction and maintenance of offshore wind farms and collaborate with vocational schools and other technical universities to create curricula covering engineering, marine logistics, and turbine maintenance.

Romania

Potential:

Romania has a technical offshore wind potential between 76 GW[8] and 94 GW[9] Currently, Romania has no operational offshore wind farms, but the first installations are expected by 2032 (NECP Romania, 2024).

Port infrastructure:

The World Bank has assessed five Romanian ports with the potential to support offshore wind development. Constanta, the largest port in the country, requires minimal to no upgrades to handle the construction of offshore wind farms or to support the manufacturing supply chain. For some of the suitable terminals, there are still doubts about the commercial viability of offshore wind energy-related activities, and load-bearing capacity upgrades may be necessary. The port of Mangalia has also been identified as another possible option for offshore wind energy adaptation.

Grid capacity:

[8] The World Bank. (2024). *Offshore Wind Roadmap for Romania. Washington, D.C.: World Bank Group.*
[9] Energy Policy Group. 2023. *Offshore wind – the enabler of Romania's decarbonisation.*

Available capacity in the power transmission network presents a major challenge for the decarbonisation of Romania's energy sector. Transelectrica estimates that by 2030, an additional 3 GW of wind power could be integrated into the Southeastern region of the country. To effectively transmit substantial amounts of offshore wind energy to the highest demand centres, it is essential to upgrade the section of the 400 kV loop that connects Western Muntenia to Bucharest and to finish the lines that are currently under construction, as well as build new connections such as the Constanta-Arad HVDC cable.

Recommendations:

- More robust and legally binding targets for decarbonisation and offshore wind energy deployment
- Foster the development of the local economy to boost societal acceptance and economic growth through the introduction of non-price criteria in the bidding process that increase the local content in planned offshore wind projects.
- Accelerate the expansion and upgrade of the power transmission grid to alleviate the key bottlenecks in the Southeastern region of Romania.
- Develop a detailed assessment of the necessary port infrastructure upgrades and prioritise EU and national funding streams for the achievement of the necessary servicing port and offshore wind servicing facilities.

Turkey

Potential:

Turkey's ambitious plan to increase wind energy capacity by 29.6 GW by 2035, including 5 GW of offshore capacity, reflects its recognition of wind as a critical energy source. The planned expansion aligns with Turkey's strategy to diversify its energy sources and reduce dependency on imported fuels while also aiming to meet its climate targets.[10] Turkey has 75 GW worth of untapped potential for offshore wind energy deployment. Turkey initiated a bid for building offshore wind parks with an installed capacity of 1.2 GW in 2018, but no projects have come online yet.

In November 2024, The World Bank Group, in collaboration with the Republic of Türkiye's Ministry of Energy and Natural Resources, launched a new roadmap today which outlines the way forward to establish a successful offshore wind industry in Türkiye.[11] The Ministry of Energy and Natural Resources has identified four regions in northwest Turkey as potential locations for energy facilities.[12] Detailed research is currently being conducted in several strategic areas, specifically:

1. **Bozcaada (Tenedos)**: located in the Aegean Sea with a designated research area of 299 square kilometres in the north, south, and west of the island.

[10] World Bank. 2020. *Offshore Wind Technical Potential in Turkey. Washington, D.C.: World Bank Group.*
[11] World Bank. 2024. *Offshore Wind Roadmap for Turkiye. Washington, D.C.: World Bank Group.*
[12] Turkish Ministry of Energy and Natural Resources. 2022. *TÜRKİYE NATIONAL ENERGY PLAN*.

2. **Bandırma**: spanning 1,111 square kilometres, this area lies on the southern coast of the Sea of Marmara.
3. **Gelibolu (Gallipoli)**: Known historically as Gallipoli, this region has an identified area of 75.6 square kilometres.
4. **Karabiga**: Also situated along the Sea of Marmara, covering 410 square kilometres. The port which will probably lead the offshore wind industry in Turkey is Izmir, with another one in Çandarli to support it.

Recommendations:

- Strengthen the political commitment to accelerate the deployment of offshore wind projects.
- Streamline the permitting process for construction in the marine areas with the biggest wind potential.
- Construct and deploy the necessary grid and power transmission capacity in the Marmara region.
- Prioritise the expansion of the Izmir port by building the necessary loading and storage infrastructure that will serve offshore wind projects not only in the Turkish sea waters but across the Black Sea region.

Ukraine

Potential:

A recent analysis conducted by the World Bank in cooperation with the Danish Energy Agency and Danish Technological Institute has estimated the offshore wind potential for Ukraine in the waters of the Black and Azov Seas in a total of 50 GW, including 20 GW for floating wind turbines and 30 GW for bottom-fixed wind turbines. The National Renewable Energy Action Plan till 2030 provides for delivering the first 100 MW offshore wind capacity by the end of 2030. However, the ongoing Russian invasion has greatly impacted the development of the sector. Despite these challenges, Ukraine's Black Sea waters still offer significant opportunities for decarbonising energy, supporting renewable hydrogen production, and boosting local economic growth.[13]

Grid capacity challenges:

Before the Russian invasion, Ukraine's grid capacity was around 55 GW, largely supported by nuclear and thermal power. However, ongoing missile strikes have reduced this capacity to under 20 GW, significantly straining the system. Under these conditions, the pre-war approach to the development of the power networks shifted from the old centralised power system inherited from the USSR to the increasing process of decentralisation that improves the safety and the security of the power supply. Integrating offshore wind with other more conventional renewable energy plants could enhance grid resilience.

[13] The Royal United Services Institute for Defense and Security (2024). *Fighting for the Light: Protecting Ukraine's Energy System.*

Recommendations:

- Post-war reconstruction efforts should prioritise the development of the offshore wind energy sectors.
- Aid should focus on strengthening and modernising the grid, refurbishing ports, and potentially supporting renewable hydrogen production.

Adherence to these recommendations is crucial for navigating the regulatory, spatial, infrastructure, and environmental challenges related to the development of the offshore wind energy industry. By fostering inclusive stakeholder engagement, leveraging international cooperation, and embracing technological innovation, governments in the region can accelerate their transition to renewable energy, align with EU climate objectives, and foster economic growth while safeguarding marine ecosystems.

*The **Black Sea Renewable Energy Coalition (BSREC)** is committed to advancing sustainable offshore wind energy development in the Black Sea region. The coalition seeks to promote comprehensive planning that balances environmental protection with global climate goals, ensuring that marine renewable energy growth contributes to a healthier planet. We prioritise aligning the varied interests of project developers, infrastructure operators, environmental organisations, the tourism sector, and other stakeholders, fostering collaboration to proactively address the challenges and opportunities of renewable energy expansion.*