

【欧州】【海事】

Maritime Issues - Renewable energy including offshore wind power generation: European Commission presents strategy to utilise the potential of offshore renewable energy for a climate neutral future

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【概要 : Summary】

Renewable energy will play an important role in reaching the higher CO2 emission reduction target of 55% by 2030 compared to 1990 levels, and the net zero GHG emission target in 2050. In order to achieve these targets, the European Commission proposed a Strategy to harness the potential of offshore renewable energy for a climate neutral future “ (COM/2020/741 final). The aim is to make offshore renewable energy a core component of Europe’s energy system by 2050. The new EU Strategy sets targets for the growth of the offshore renewable energy sector in all maritime areas of the EU, including the North Sea, Baltic Sea, Mediterranean Sea, Black Sea, Atlantic Ocean, and the outermost regions and overseas territories. The Strategy includes the further promotion and upscaling of bottom-fixed and floating offshore wind power generation installations as well as other ocean energy technologies such as wave and tidal, floating photovoltaic installations and the use of algae to produce biofuels.

The renewable energies’ capacity should increase from its current level of 12 GW to 60 GW by 2030 and to 300 GW by 2050. The Strategy

will create new opportunities for industry, generate green jobs across the continent, and strengthen the EU’s global leadership in offshore energy technologies. The Strategy also promotes cross-border cooperation between the EU Member States regarding the electricity grids. In order to develop the offshore renewable technologies, it is estimated that it needs almost € 800 billion between now and 2050.

The EU institutions together with the Member States will have to enhance maritime spatial planning, to strengthen the supply chains and upgrade of port infrastructure and to establish a predictable legal framework to promote projects for deployment of offshore renewable energy.



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【記事 : Article】

1. Background of promoting offshore renewable energy

The EU is continuing its efforts to transform its energy system and to replace fossil fuels with renewable energy sources to deliver on its European Green Deal (COM (2019) 640 final) targets of 11 December 2019. According to the European Green Deal (EGD), the utilisation of wind power is considered being one of the key elements to achieve the net zero GHG emissions target of 2050. The EGD underlines that “...increasing offshore wind production will be essential, building on regional cooperation between Member States”. Therefore, the EU is committed to further explore the potential of offshore wind power generation, besides other ocean energy technologies for producing green electricity in the maritime environment, such as wave and tidal, floating photovoltaic installations and the use of algae to produce biofuels. In this context, the European Commission presented a new strategy on offshore renewable energy.

2. The European Commission's Offshore Renewable Energy Strategy

The offshore renewable energy sector is seen as a potential cornerstone of the clean energy transition in the EU. On 19 November 2020, the European Commission presented a Communication regarding “An EU Strategy to harness the potential of offshore renewable energy for a climate neutral future” (COM/2020/741 final). According to the Commission's Strategy COM/2020/741 final, offshore renewable energy can come from a variety of natural and clean sources. Considering the Commission Strategy's main areas of interest, they include offshore wind, bottom fixed and floating, direct current technologies for grid, wave energy, tidal energy, solar energy (floating) and algae for producing biofuels. These offshore renewable energy technologies

encompass a number of clean energy technologies that are at different stages of maturity. Offshore wind turbines have a greater output than onshore. Floating wind turbines, although still at an earlier development stage, they show greater flexibility than bottom-fixed turbines to adapt to the direction of the wind and the different EU sea basins. Direct Current technologies for grid, such as High Voltage Direct Current converters and systems, can efficiently convey huge amounts of offshore renewable energy to land. Wave energy technology harnesses the power created by waves, based on the motion of floats which ride the waves. Tidal energy transforms the movement of tides into electricity, using tidal currents to drive underwater turbines. The development of ocean energy technologies, mainly wave and tidal, could make a significant contribution to Europe's energy system and industry as from 2030 when they are expected to reach commercial size. Other technologies are still at the early stages of development including algal biofuels like biodiesel, biogas, and bioethanol, ocean thermal energy conversion (OTEC) and floating photovoltaic installations.

Regarding offshore wind generation, the strategy intends to increase the capacity from its current level of 12 GW to at least 60 GW by 2030. By 2050, the EU's offshore wind power generation capacity is expected to reach 300 GW by 2050 and other forms of ocean energy and other emerging technologies such as tidal, floating wind and solar are expected to reach 40 gigawatts of capacity by 2050, according to Commission's Executive Vice-President for the European Green Deal Frans Timmermans.

Therefore, the construction of offshore wind farms and other marine energy generation technologies will have to be decisively accelerated in order to replace fossil fuel-based energy sources. Getting to 300 GW of offshore wind and to 40 GW of ocean energy installed

capacity by 2050 means a significant increase of scale for the sector in less than 30 years. It means multiplying the capacity for offshore renewable energy by nearly 30 times by 2050. Therefore, the European Commission 's Offshore Renewable Energy Strategy intends to support the creation of enough space to install so much energy capacity in EU waters and to improve the EU Member States cooperation in order to benefit from the projects in shared waters and shared grids.

The strategy is expected to deliver a win-win for the environment and the economy, as energy supply will become environmentally friendly and at the same time it will support European industry and create jobs, protect biodiversity, reduce pollution, and ensure a healthy basis for thriving fishing communities.

In order to achieve the further expansion of renewable energy projects in the EU' s maritime areas, the EU institutions together with the Member States have to enhance maritime spatial planning. The EU Member States are currently working on their maritime spatial plans until 2030, in which they set out which offshore projects they want to build. The EU Member States will have to submit their national maritime spatial plans by March 2021, including their offshore renewable energy development objectives. Establishing an offshore bidding-zone would be best suited to a large scale-up of offshore renewables, as it ensures that renewable energy-based electricity can flow to where it is needed and improve regional security of supply. Offshore bidding-zones for hybrid projects could be established in a way that is compatible with the electricity market rules. A further step in the development of the European energy infrastructure will be an offshore meshed grid, similar to the onshore interlinked transmission grid system. It would allow for a fully integrated, cost effective deployment of offshore renewable energy.

3. Locations for the offshore renewable energy sector

The locations for offshore wind farms and other marine energy generation technologies will have to be chosen with the aim to tap the highest potential. While the North Sea is well established as location for offshore wind generation facilities, there exist many other options for bottom fixed and floating installations in the EU' s maritime areas.

The Baltic Sea' s neighbouring countries have started to cooperate more closely within the Baltic Energy Market Interconnection Plan (BEMIP) and the EU strategy for the Baltic Sea Region, among others. The EU' s Atlantic Ocean also has a high potential for offshore wind energy generation by both bottom-fixed and floating offshore installations as well as a potential for wave and tidal energy. The EU' s Atlantic strategy and the 2020 revised Atlantic action plan focus on the huge potential of the Atlantic Ocean for marine renewable energy.

Regarding the Mediterranean Sea, there is a high potential to install mostly floating offshore wind energy facilities. Furthermore, there exists good potential for wave energy and localised potential for tidal energy. The Black Sea offers a good potential for both, bottom-fixed and floating offshore wind generation, and localised potential for wave energy.



Map 1: Examples of projects and production sites (European Commission)

Source: https://ec.europa.eu/commission/presscorner/detail/en/fs_20_2098

Finally, the EU islands have large potential in marine energies and can play important role in the EU's offshore energy development. The Clean Energy for EU Islands Initiative provides a long-term cooperation framework to promote and accelerate clean energy transition on all EU islands. In addition, many European outermost regions and overseas countries and territories have a good potential for offshore renewable energy and are pioneers in decarbonising islands, which are included in the Clean Energy for EU Islands Initiative.

4. The financing of the Strategy's wind facilities and other emerging technologies

The Commission estimates that investment of nearly € 800 billion will be needed between now and 2050 to meet its proposed objectives. Around two thirds would be necessary to fund the associated grid infrastructure and one third for offshore power generation.

In the next decade to 2030, annual investment in onshore and offshore grids in Europe will have to increase to above EUR 60 billion and then increase further thereafter. Mostly, it will have to come from private investment. This Strategy aims to provide investor certainty and to ease the perceived risk by targeted deployment of public funding. Measures including the future revision of the State aid guidelines and the Renewable Energy Directive will provide a fully updated framework to cost-effectively deploy clean energy. The European Commission, the European Investment Bank and other financial institutions will work together to support strategic investment in offshore renewable energy. In addition to the Recovery and Resilience Facility, the EU funding instruments including the InvestEU programme, the Connecting Europe Facility, the Renewable Energy Financing Mechanism, Horizon Europe, Innovation

Fund under the EU Emission Trading System (EU ETS) and the Modernisation Fund can play a strategic role in the realisation of grid infrastructure development but also offshore renewable technologies energy projects.

However, the current regulatory framework was not designed with cross-border offshore renewable projects and their specific challenges. Therefore, in order to help generating and enabling the necessary investment, the Commission will provide a clear and supportive legal framework. In addition, by the end of 2021, the Commission will revise the Guidelines on State aid for energy and environmental protection and ensure that they support the goals of this Strategy. The Commission encourages the EU Member States to use the Recovery and Resilience Facility (RRF) and work together with the European Investment Bank and other financial institutions to support investments in offshore energy through InvestEU. Funding under the Recovery and Resilience Facility (RRF) will need to be committed by end of 2023. Therefore, it is crucial for the Member States to be able to present several mature projects by that time.

5. The Strategy's approach to offshore renewable energy and grid infrastructure

Since the first offshore wind power generation turbine was installed in the Vindeby Offshore Wind Farm in Denmark in 1991, the offshore wind industry has gained momentum based on the benefits from the utilisation of the stronger and steadier winds at sea. Regarding the current development of offshore wind farms, it can be expected that Europe will further increase its grid-connected offshore wind capacity.

The new Strategy underlines the opportunities across all of the EU's sea basins - the North Sea, the Baltic Sea, the Black Sea, the Mediterranean and the Atlantic and for certain coastal and island communities.

The planned expansion of offshore wind farm

activities in European seas will lead to increased spatial demands and growing competition between sea users. Furthermore, the electricity grid infrastructure in Europe has also to anticipate the major growth in both offshore and onshore wind energy, which will require the expansion of offshore grids and the reinforcements of onshore grids. European governments must be more determined and decisive to enabling higher levels of deployment of offshore wind power generation. The Commission will encourage cross-border cooperation between EU Member States on long term planning and deployment. This will require integrating offshore renewable energy development objectives in the National Maritime Spatial Plans (MSP), in line with national energy and climate plans - NECPs in March 2021. The Commission will report on the implementation of the MSP Directive, reflecting the long-term development of offshore renewables in 2022. The Commission will develop with EU Member States and regional organisations a common approach and pilot projects on MSP looking at risks at sea, the compatibility with nature protection and restoration (2021-2025).

The Strategy includes a new approach to offshore renewable energy and grid infrastructure, as the offshore renewable energy is closely linked with offshore and onshore grid development. In order to step up offshore renewable energy deployment in a cost efficient and sustainable way, a more rational grid planning and the development of a meshed grid will be important. In this context, the concept of so-called hybrid projects could offer a solution. Hybrid projects combine offshore generation and transmission assets, which conventionally operate as separate entities. Such hybrid projects have advantages as they are cheaper, use less space and pave the way towards a future integrated energy system in the North Seas region. Ultimately, they can contribute to the realisation of the energy transition and decarbonisation. The bidding zone for a hybrid

project can be done in a way that is compatible with the electricity market rules. It could be a well-suited option for a large scale-up of offshore renewables, as it ensures that renewable energy can be fully integrated into the market by simultaneously integrating renewable energy and using cross-border interconnections for trade. Hydrogen production via electrolysis also offers opportunities for synergy with some renewable energy power generation technologies, like wind power generation. Hydrogen fuel and electric power generation could be integrated at a wind farm, allowing flexibility to shift production to best match resource availability with system operational needs and market factors. In times of excess electricity production from wind farms, it would be possible to use this excess electricity to produce hydrogen through electrolysis. The electrolyser production is still in its early stages, but the production capacity is expanding rapidly. The Commission needs to clarify the regulatory framework, in particular on offshore bidding zones for hybrid projects and will present proposals for amending relevant legislation accordingly.

6. Conclusion

Offshore renewable energy is most promising for meeting Europe's decarbonisation objectives and to cover the rise in electricity demand in the next 30 years. The European oceans and sea basins hold a vast potential for the sustainable production of renewable energy. The Strategy sets out the scaling up of offshore renewable energy and its use as a priority in the EU's energy policy. Since offshore renewable energy is a rapidly growing global market, Europe could become a powerhouse for the global development of renewable energies. The EU has to harness all the potential of offshore wind and other technologies such as wave, tidal and floating solar. Regarding offshore wind generation, fixed-bottom and floating installations, the location in the North

Sea needs to be further optimised and extended to other sea basins, starting from the Baltic Sea. Regarding other marine technologies, the challenge will be to mobilise sufficient funding for research and demonstration, to bring down costs and to bring these technologies to market in time. Therefore, the Commission's Strategy sets a clear direction and establishes a stable framework, which are crucial for public authorities, investors and developers in this sector. The EU's domestic renewable energy production needs a boost in all five sea basins including the North Sea, the Baltic Sea, the Mediterranean, the Black Sea and the Atlantic in order to achieve the EU's 2050 climate targets.

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