

EXECUTIVE SUMMARY

FLOATING OFFSHORE WIND

STATE OF THE MARKET AND THE EMERGING NORWEGIAN VALUE CHAIN



Executive summary

A concerted effort to develop floating offshore wind industry has been on the agenda in Norway for several years. Even though Norwegian authorities in recent years have clearly signalled that they want to build a Norwegian-based offshore wind industry, it was not until May 2022 that specific ambitions were presented about realisation of large-scale production on the Norwegian continental shelf. Still, there is uncertainty related to both framework conditions, timeline, and to which scale. To succeed with such an effort, it is important to have up-to-date information about the market and the players that are active in the segment. In this report, we present three sub-analyses related to the development of a Norwegian-based floating offshore wind industry. These are:

- A market analysis of the global market for floating offshore wind
- An assessment of the revenue potential of Norwegian players
- Economic impact analysis for a Norwegian-based industry

The market for floating offshore wind

The market for floating offshore wind is relatively immature, compared to competing technologies. This means that major changes may occur within a short timeframe. This is obvious when looking at the activity that has taken place in the market for offshore wind in the last few years, where floating offshore wind installations now make up a considerable share of the capacity that is being developed. Our analysis of the most important market drivers points to a continued positive trend in the market. Specifically, we point to the following development trends:

- An increasingly ambitious global climate and renewable energy policy agenda that increases the need for, and development of, renewable production capacity across national borders. This also includes countries with limited access to shallow waters suitable for bottom-fixed wind turbines.
- Several countries are increasing their targets for offshore wind development in general, and some have also presented specific and ambitious figures for floating offshore wind. Furthermore, several countries are signalling their intentions to hold auctions with the aim of realising large-scale floating offshore wind farms within a relatively short timeframe.
- The cost level associated with floating offshore wind may fall significantly within the next few years, which increases the market potential in both the short and long term. The more competitive floating offshore wind becomes relative to other renewable technologies, as well as other measures that can reduce global greenhouse gas emissions, the higher the rate of development that is to be expected.

Based on our analysis of market trends, as well as detailed data on projects and areas under development, we expect that the market for floating offshore wind will have an installed capacity of approximately 50 GW in 2035. The growth rate is particularly high after 2030. This is, among other factors, driven by the increased scale of upcoming offshore wind projects and the realization of economies of scale. Our analyses indicate a **global market for floating offshore wind with a capacity of between 210 and 310 GW in 2050**. What mainly separates the extremes in this range is the relative cost development of other emission reduction measures and the level of ambition in global climate policy. The lower interval thus reflects a situation where floating offshore wind plays a relatively minor role in countries with several alternative measures available, and/or that individual countries do not achieve emission reduction in line with the Paris Agreement. Due to the long timeframe, these estimates are associated with considerable uncertainty. Based on the drivers we have assessed in our analysis however, we consider the upside in the market to be significantly larger than the downside.

Based on our analysis of the global market development, as well as predictions for cost development of floating offshore wind, we expect that **yearly global revenues in 2050 for floating offshore wind will be somewhere in the range of NOK 430bn and NOK 689bn.**

Revenue potential of the emerging Norwegian industry within floating offshore wind

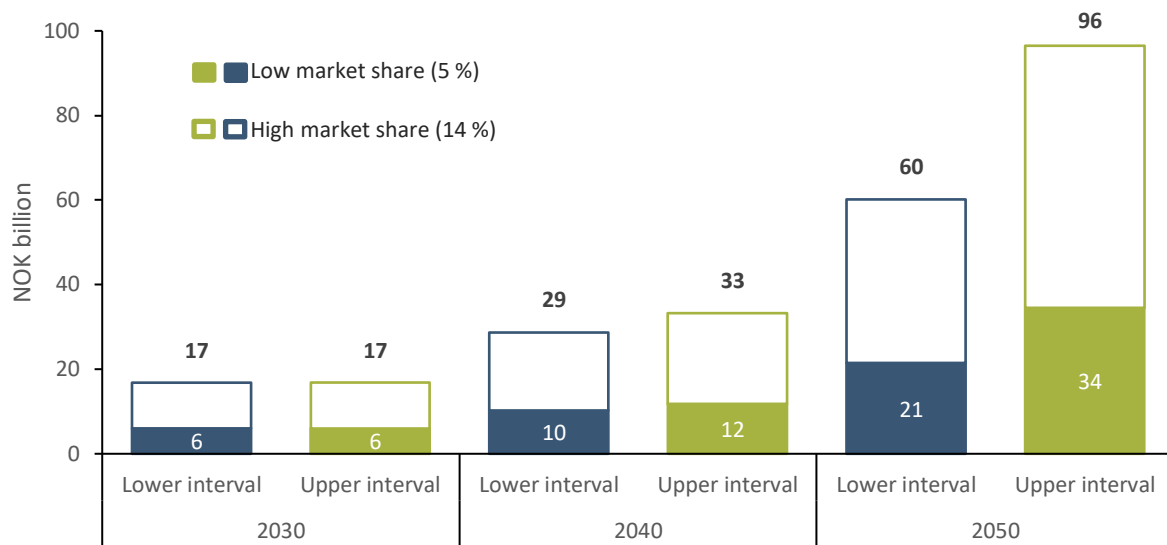
The potential of the global floating offshore wind market is large. However, the future Norwegian market share depends on their relative competitiveness. We consider that Norwegian actors have a competitive advantage in the following areas:

- Advanced offshore expertise, technological insight and quality of products/services
- Suitable topography and short geographical distance to European markets
- Good cooperation between Norwegian actors, which promotes synergies and supplier diversity
- Existing cooperation with international companies which promote innovation and provide market access
- An internationally leading innovation ecosystem, based on formal clusters, test centres and cooperation with academia and R&D institutions

We do however also find significant barriers that limit the growth potential of Norwegian actors. These are linked to both company-specific and market-specific barriers. Company-specific barriers include high wages and costs, limited production capacity and a lack of *access* to relevant skills. When it comes to market challenges, we point to a lack of a domestic market, lack of market access for smaller players and a lack of reference projects that are specific to offshore wind. Furthermore, we point out that processes related to regulation and framework conditions are too slow and create uncertainty for the industry. The government's recently launched ambition of 30 GW of offshore wind by 2040 marks an important change in Norwegian industrial and energy policy. However, it is important that this target is followed up with specific measures, and that it does not become a convenient excuse for a lack of further action. As of today, it has not been clarified which framework conditions will apply to the industry. Moreover, it is not known how much floating offshore is included in the ambition, and when we will see the start of large-scale production on the Norwegian continental shelf. The realisation of projects will be important for building competitiveness in an international market. Norwegian players currently have limited experience that is specific to offshore wind. Furthermore, the value of transferring expertise and resources from the Norwegian offshore industry will fall over time, as players in a number of countries are in the process of positioning themselves in the market for floating offshore wind.

Our analysis shows that the emerging Norwegian industry can capture a market share of 5 to 14 percent of the total global market for floating offshore wind. To reach the upper interval of 14 percent entails that Norwegian players will have to succeed with large-scale industry building and manage to position themselves as a leading value chain in the international market. The lower interval assumes that the development of a value chain is mainly driven by individual actors that compete outside Norway in the commercialisation phase. In other words, here we assume that in such a scenario *no active industrial policy to accelerate* the development of floating offshore wind in Norway will be put into place until the market is more mature. This limits the development of vertical and horizontal links between players in offshore wind in the short and medium term, so that supplier diversity and resulting synergies will be limited. Based on this, we estimate that **annual Norwegian offshore wind revenue in the interval between NOK 21 and NOK 96 billion in 2050.**

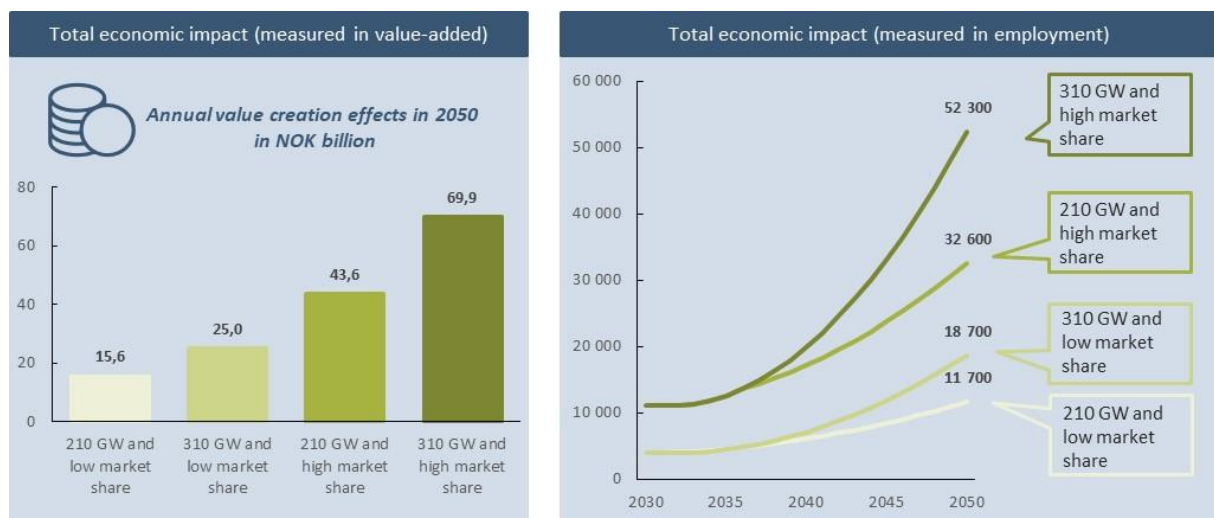
Figure A: Estimated average yearly revenue for Norwegian players in the period up to 2050 in NOK billion, based on the market size in 2050 (in GW) and market share of Norwegian players. Source: Menon Economics



The estimated revenue potential is based on a bottom-up analysis where we have combined different scenarios for the geographical distribution of projects; how Norwegian players will position themselves internationally; as well as national framework conditions for the development of a Norwegian-based industry. **Although Norwegian players' expected revenue will increase if the market becomes larger, it is the domestic development in competitiveness that has the greatest impact on the overall revenue potential.**

The economic impact of a Norwegian-based floating offshore wind industry

In our economic impact analysis, we have estimated the total economic impact of a Norwegian-based floating offshore wind industry. The total impact include both direct and indirect effects. Direct effects are the employment and value added within the offshore wind industry itself. The indirect effects are generated as a result of the demand impulse from the offshore wind industry and are distributed throughout the rest of the Norwegian economy through purchases from different sub-suppliers. Our main findings are illustrated in the figure below.



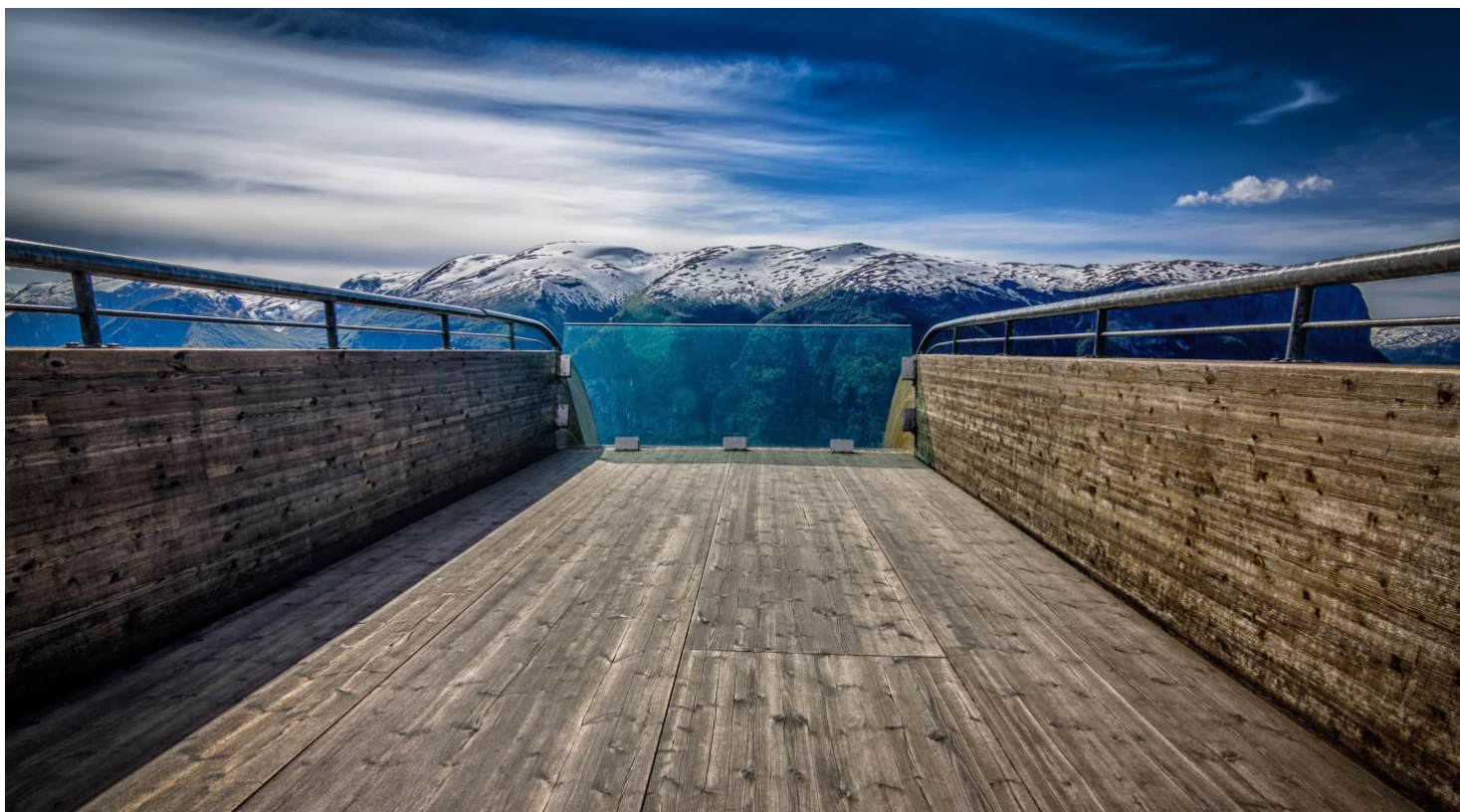
Our analyses show that a Norwegian-based floating offshore wind industry will result in total employment effects of between 11,700 and 52,300 employees in 2050. The upper estimate is equivalent to approximately 25 percent of the total employment effects of the petroleum industry in 2019. In other words, floating offshore wind has the potential to play a crucial role in the further development of today's offshore industry, both in terms of volume and when it comes to knowledge transfer. In addition, increased competitiveness with regard to floating installations can strengthen the position of Norwegian players in the bottom-fixed offshore wind segment. These employment effects come in addition to those we have estimated here. Furthermore, a Norwegian-based industry within floating offshore wind can generate annual total value-added effects of NOK 15.6 – 69.9bn in 2050.

Success criteria

Our analyses have identified a considerable revenue and employment potential for Norwegian actors in the market for floating offshore wind. The question now is how to realise this potential. In this report, we present eight points which we believe are important for the development of a competitive Norwegian-based industry for floating offshore wind:

- Development of an active home market
- An early start when it comes to establishing national supply chains
- Following up the existing targets with specific measures and efficient processes
- Targeted policy instruments that facilitate technological development, scale-up and internationalisation
- An ambitious European effort where Norway takes a leading role
- A willingness to adapt among Norwegian actors, especially from the offshore oil and gas industry
- Pointed development of transferable skills and expertise, especially from offshore oil and gas
- Sufficient willingness to invest in production capacity and standardisation, including development of ports and infrastructure for building and assembly of turbines

If we look at the market for bottom-fixed installations, it is the countries that acted early and strategically built a domestic industry, in their respective home markets, which dominate today. This shows how important it is that Norwegian authorities quickly establish targeted policy instruments and predictable framework conditions. The stated ambitions must be followed up with specific measures and effective processes. This will help Norwegian players to adapt and reduce the risk associated with investing in production facilities, infrastructure and competence development. If both the authorities and the industry are willing to invest, our analyses show that it is possible to build a leading value chain within floating offshore wind in Norway.



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