

Executive summary

If the global community is to reach the goals set out in the Paris Agreement, major transformation of the world economy is needed. This is particularly true for the manner in which we consume and produce energy. Though these changes represent significant challenges, they also provide opportunities for “green” growth for the countries and businesses who are capable of capitalising on the changing energy markets. As an illustration of the large commercial possibilities, investment today in renewable energy production is more than twice as large as investment in fossil energy (Statkraft, 2019). If the world is to limit the increase in global temperature to below 2 degrees, or ideally below 1.5 degrees, investment in emissions reducing measures must increase substantially in the coming years.

In this report, we examine the potential for value creation in the Norwegian floating offshore wind power industry with a focus on market development and global competitiveness.

The pilot stage of floating offshore wind power development has been completed and a number of pre-commercial projects are today under development. Commercial wind parks will follow the successful completion of the pre-commercial stage. Our analysis shows that the market has considerable potential for growth if economies of scale can be harnessed, production processes industrialised, and if costs rapidly decrease as a consequence. As the energy generation potential of floating offshore wind is considerably larger than that of other wind technologies, we expect significant growth in the market going forward. It is estimated that up to 80 percent of available offshore wind resources are in areas where bottom conditions are too poor, or the water is too deep for bottom-fixed turbines. In line with recent developments in continental Europe, the scarcity of land plots suitable for installation of onshore wind is likely to further contribute to increased investment in offshore wind farms (WindEurope, 2018).

Our base case scenario for floating offshore wind assumes that the global market reaches a capacity of 100 GW in 2050. This is triple the total installed capacity of the Norwegian power system. Our high outcome scenario, which we believe to be far from unrealistic, assumes that almost 140 GW of capacity is reached by 2050. How the market develops is, however, dependent on how quickly costs for floating offshore wind power fall. Increased investment will lead to a reduction in costs, which in turn will lead to the technology becoming more competitive in the global market, thus further increasing the rate of investment. Floating wind power is, however, still more expensive than competing technologies, making national energy- and industrial policies key determinants of the market development. This is a significant point going forward. On the one hand, the lack of predictability about future policies increases the uncertainty around the offshore wind investments. On the other hand, the dependence on political decisions involves the potential for a small country such as Norway, to play a significant role in driving global developments, as has been done by Denmark in the market for bottom-fixed offshore wind.

Norwegian players are behind key technologies in floating offshore wind development. The supplementation of oil and gas sector know-how further increases Norway’s potential to take a significant global market share. Hywind Tampen will be an important step in this process. Yet, experts and industry players we have talked to point out that this project alone is not big enough to establish a competitive value chain in a developed international market. The general consensus among the experts is that floating wind parks must be at least six times Hywind Tampen’s 88 MW for the technology to become commercially viable. If this commercialisation takes place outside Norway, the competitiveness that has been developed is likely to be negatively impacted and the long-term potential for value creation in Norway will fall as a consequence.

Our assessment of the range of possible value creation outcomes for a Norwegian based floating offshore wind industry shows that up to 20 percent of the global market can be captured. Our high outcome scenario furthermore points to value creation of up to NOK 117 billion⁵ and employment effects of 128 400 full time equivalents (FTEs) in Norway over a period of 30 years. Our analysis also shows that a global market share of 3

percent is likely if no active industrial policy is employed. In such a scenario, we expect value creation of NOK 18 billion, and employment effects of 19 300 FTE's for the same period.

Through interviews with industry players, we have identified necessary conditions for successfully realising the value creation potential in the Norwegian offshore wind sector:



An active home market that can facilitate the development of an operational value chain.



An early start to secure a first-mover advantage when the technology becomes commercially viable.



A clear governmental vision contributing to predictability for Norwegian businesses.



Suitable policy measures that facilitate the learning effects associated with offshore wind power at the commercial scale and contribute to the ability of Norwegian businesses to position themselves in a new and unknown market.

We have analysed whether it is economically justifiable to subsidise the development of offshore wind on the Norwegian continental shelf. The analysis is based on a development of two subsidised, floating offshore wind parks, with a capacity of 500 MW each. We calculated the value creation related to the development of offshore wind farms, by analysing the effect on jobs. The increase in economic benefits mainly arises from the fact that these export-orientated jobs are associated with higher value creation per employee than those of mainland Norway's less trade-exposed sectors. For the subsidisation to provide a positive economic return, the global market share of offshore wind captured by Norwegian businesses must reach 11 percent. This is well within the range of the potential outcomes that we have identified for the Norwegian value chain. Other economic effects, which are not calculated in this scenario – such as the transfer of know-how to other industries - indicate that the actual break-even point will be lower.

There is little economic literature to help guide the analysis about the size of the global market shares which will be captured by subsidising wind farms. Yet, the 'success factors' identified above point to the fact that an active home market will act as a crucial scaling, testing and learning arena which will strengthen the Norwegian players' international competitiveness. Norwegian businesses will also gain commercial references from operating in the home market, which will be important when international developers choose sub-contractors. Combined with goal-orientated political measures linked to the internationalisation of the Norwegian industry, this will put Norway's offshore wind industry in a pole position to capture significant part of the global offshore wind market, deemed so important to reach a greener energy composition.