Question 3: Advantages of Horizontal-Axis Off-Shore Wind Turbines
Literature Review

1.1 Background

Due to the increased concern of global climate change and energy security, the demand in alternative renewable energy has never been greater and wind turbines have seen a boost in manufacture because of this. There is now investment being put into off-shore wind turbines, as they address some controversial concerns that onshore wind turbines produce. For the purpose of this literature review, off shore wind turbines are abbreviated OFWT and onshore wind turbines ONWT.

1.2 Economic, Design and Social Aspects

OFWT's have numerous social, economic and design advantages over other types of electricity generation solutions, such as fossil fuels and other renewable technologies. As stated in Wind Turbine Technology, 'electricity generated by wind turbines is cost-competitive with electricity from conventional energy sources' [1]. Although OFWT's are outnumbered by ONWT's, Renewables UK states that the off shore 'industry can deliver significant amounts of capacity...with 3GW of off shore wind energy expected to be operational by mid 2013' [2], this giving the UK as an example. Wind Turbine Technology also shows that OFWT's are better placed to harness wind energy than ONWT's as 'high-speed ocean winds are considered ideal for generating large amount of electricity at lower cost' [3]. These quotes show that off-shore wind technology has the potential and ability to compete with conventional and other renewable forms of electricity generation. Although it must be considered that the information is from books and an online report, so it may not be up-to-date information.

The off-shore wind energy industry is expanding and is providing increasing number of jobs, as Renewables UK states that there has been a '45% increase in direct employment driven by the increase in deployment... and construction of projects' [4]. This helps boost the economy, in this case the UK, as along with these direct jobs, there will be indirect employment to support the manufacture of the turbines. Although Offshore Wind Turbine market is expanding rapidly, there is still a relatively small amount of operational sites and turbines. It is stated that 'offshore wind turbine market ...in 2010 was less than 2% of the world market' [5]. Although small, investment in wind turbine technology, especially from European Countries, is helping to grow the industry.

Social aspects affect other types of electricity generators adversely compared with OFWT's. A poll in the Guardian states that 'local opposition to onshore wind turbines has tripled since 2010' [6]. It also states however that 'a large majority of the British public (80%) remains firmly in favour of wind power, while also opposing the building of new nuclear or coal power plants in their local area.' [7]. This poll shows that OFWT's can overcome these concerns as it is a type of wind power. However, it does not affect the landscape, devalue people's property, or creates noise pollution as their locations are out in relatively deep sea.

OFWT's are essentially, as stated by Innovation in Wind Turbine Design [8], the same as ONWT's in design apart from a few differences due to people's reluctance to change what technology already works on land. ONWT's rotor speed are 'constrained to by requirements to limit noise' [9] whereas offshore, although 'far more difficult to build off shore than on shore' [10], have potential to have higher rotor speeds [11] and therefore be able to operate in higher speed wind conditions without causing damage to itself.

1.4 Conclusion

After researching different resources of materials on off-shore wind turbine, it can be said that they can offer a renewable and clean source of energy for large-scale consumption. They can also operate at higher speeds than on-shore wind turbines. However, they don't have as many social and environmental drawbacks as onshore wind turbines. The main factor that could affect the progression of this technology is economic factors such as funding, due to initial start-up costs being much higher than onshore wind turbines.

References

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