

Turbine lifetime limits require a reality check

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30/07/2021

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According to recent figures from WindEurope, within the next 5 years, approximately 38GW of European wind farms will reach 20 years of operations. With the industry standard lifetime for a wind turbine between 20-25 years, this means decisions will soon need to be made around life extension, repowering or full decommissioning for these assets.

However, it is not that straightforward. In reality, offshore wind turbines are expected to last up to 35 years once operational. This is not a one-off either, with turbines in early projects such as North Hoyle, Scroby Sands, Kentish Flats, Barrow and Beatrice all proving - through asset management methodologies and O&M activity - that it is realistic to expect the lifespan of a turbine to exceed 30 years.

But why is this a problem for offshore wind investors?

In short, the misconceptions and limitations on wind turbine design lifetimes are significantly hindering the ability of investors to manage costs throughout their assets' lifespan. This is reducing the effectiveness of decision-making - with developers struggling to identify when repowering, lifetime extension or full decommissioning needs to occur - and subsequently interrupting the productivity of offshore wind as an energy source in low carbon power generation.

In some cases, particularly for older nearshore projects, offshore wind owners may not even be able to repower their projects due to the increased size of modern turbine technology. This is the result of 2 decades of emphasis from original equipment manufacturers on developing and proving more efficient turbines. Whilst this may have reduced the levelised cost of energy for offshore wind, the scale of offshore turbines is no longer suitable for nearshore projects.

The potential financial challenges caused by turbine design lifetimes are not just limited to nearshore projects either. The UK's recent Round 4 offshore wind auction proposed 60-year seabed leases, suggesting a 6-decade project lifespan which is almost 3 times the approved turbine design lifetime. Ensuring that offshore wind projects are operational for as much of that time period as possible is now crucial to reducing the financial impact of the 60-year option fee payments - which will hit £879 million per annum in Round 4 - and meeting investors' expected return on investment.

Extending turbine lifetimes has long been the preference for offshore wind investors due to the relatively low cost compared to repowering, but no turbine's lifetime can be extended to 60 years. Even if investors choose to maximise a turbine's life to 35 years, that will still leave 25 years of option-fee payments without any income. This is especially financially problematic when we consider the fact that PPAs rarely stretch beyond 25 years, subsidies are being phased out across Europe and achieving a contract-for-difference is not a guarantee.



There is only so much low-hanging fruit on the tree, and repowering will soon no longer be an expensive nice-to-have, but an essential part of project and financial management.

Efficiency and profitability

For the time being, however, offshore wind developers and investors with ageing projects at the 20 to 25-year mark will need to address how their projects can continue to operate efficiently and profitably via lifetime extension. This will ensure they avoid the financial and technical hurdles that a new planning round - with all the necessary surveys required to enable larger rotors and taller towers - would bring whilst also side-stepping the challenges of logistical costs and local objections for, amongst other things, visual impact.

For offshore wind farms with longer-term seabed leases, decision-making on turbine lifetime extension and repowering will need to be made much earlier in the project's lifecycle. Some projects may even choose to make an early call and calculate into the modeling repowering a site at a given time. Differing on-site conditions will impact the rate of asset degradation at different projects, ultimately requiring robust monitoring and tailored O&M solutions.

Multiple elements such as turbine performance over time or improvements in resource assessment will be key to identifying when repowering will be more financially cost-effective than lifetime extension. And this is what will enable the best investment decisions to be made earlier before external pressures restrict alternative options.

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