WOOD THILSTED

Wake Impact Assessment Report Response to Comments from Morgan OWF

Irish Sea Cluster - Ørsted

P0253-C2021-CA-REP-003-B 25.02.2025

Ørsted

1. RESPONSES TO QUERIES RAISED AT ISSSUE SPECIFIC HEARING 2 & SUBSEQUENT COMMUNICATIONS

WT provide the following written responses to the queries raised for the Morgan wind farm through Issue Specific Hearing No. 2 and in subsequent communications.

1.1. Independence of the report

WT stands by the statement that the report is an independent assessment of the impacts of neighbouring wind farm wakes. WT has applied the same approach that would be used for any Energy Yield (including wake effects) assessment. This is a method which has been built on a number of past studies for multiple clients, and for this assessment documents the assumptions used for each of the wind farms being considered. WT has made its preferred selection of key parameters in the assessment as well as its derived power curves for the future proposed turbine types independent of any client view on their use.

WT is regularly engaged by clients to provide 3rd party independent assessments of Energy Yield. This is typically in situations where Energy Yield assessments are being used to support financial decision making and have been undertaken by a separate consultant and the Client has their own internal assessment. In these situations, WT retains full control of the analysis choices for its best practice approaches that it has developed. Use of multiple independent assessments using similar but slightly different methods and tools is common wind industry practice.

1.2. Model choices

The Wind Farmer Analyst model used for this difference analysis assessment is a tool created by DNV, an Offshore Wind industry consultancy and certification body. Wind Farmer was developed to enable more consistent application of the AEP methodologies and the technical components that can otherwise influence the analysis outcomes. These tools are as close to an industry standard as is available and are often the first of several tools that are applied in this type of assessment. The tools have been validated by DNV on hundreds of wind farm projects, and importantly form the basis for many of the assessments of AEP that are being taken forward around the world. This type of tool is also particularly effective for looking at relative wake loss effects, which form the basis of the report submitted to the Examining Authority.

It is important to note that more complex engineering models exist. However, the work by RWE & DNV referenced in our conclusions, which validates a range of models against operational data, compares well with the study undertaken by WT. The wake loss approach applied as part of WT's preferred approach was very similar

to that selected in the RWE study (specifically the use of Wind Farmer Analyst with the Eddy Viscosity Model with the Large Wind Farm correction).

These methods are being used on hundreds of projects by a range of practitioners around the world to estimate the potential effects of internal and external wake effects on AEP estimates for proposed wind farms.

1.3. Baseline definition

WT would like to clarify that the Baseline scenario included all existing operational wind farms in the Irish Sea, not just Orsted IP assets. As such, the effect of wakes from existing wind farms interacting with themselves (internal wake) and each other (external wake) has already been accounted for in the Baseline. This includes for example Gwynt y Môr, Rhyl Flats, North Hoyle and Ormonde, and the effects of the Orsted IP assets on themselves and each other. Reference is made to Table 5-1 in the WT report.

The operating performance of the existing assets is included in the baseline and crucially, this doesn't change between scenarios. Other factors affecting production, such as maintenance or specific operational considerations are not specifically considered in the model, however are assumed to be constant between scenarios. As such the key benefit of the modelling approach applied is that the assessment is a difference analysis, where everything is kept constant between the scenarios except for the external wake environment which differs between the scenarios. This approach is similar to other modelling methods used for EIA assessment for significance of effect.

Additionally, it is noted that Awyl y Môr was included within the final scenario (Scenario 5) as it has the latest Commercial Operation Date according to public statements from developers of the farms (even though it is currently consented), therefore its effect will likely be later than those of the Mona, Morgan and Morecambe sites, hence the approach undertaken in the scenario assessments.

1.4. Annual variability

A question was raised regarding the context of the wake effect with respect to inter annual variability. It should be noted that the difference % values provided in Table 5-4 and 5-5 in our report are the difference in the long term Annual Energy Production (AEP). The Measure Correlate Predict (MCP) method used within the Wake Assessment undertaken seeks to incorporate interannual variability as a long term effect in the assessment, therefore it is not correct to compare the wake results directly to what a farm would see between one year and the next.

The wake loss would typically vary between low average wind years and high average wind years as the turbines across the farm would spend different amounts of time at different points on their power curves, causing the resulting wake impacts to vary, but never disappear. The MCP process accounts for annual variability, by allowing calculations over longer time scales representative of the

wind farm's potential life, and improves statistical significance of calculated net AEP.

To provide context for the values provided, it may be worth considering the uncertainty associated with the main loss of interest to this study, namely the wake losses. In a Wind Farmer assessment, the uncertainty due to the wake loss can vary. For Scenario 5 in the assessment a mean wake loss of -3.8% is predicted across all Orsted assets. Assuming a normal distribution at 1 standard deviation from the mean this could lead to a variance of between -3.1 % and -4.5 %. As such, the uncertainty in the wake loss in the assessment can lead to a variability of less than 0.7% of the Annual Energy Production.

1.5. Confidential input information

Power Curves and other parameters relevant to energy yield from turbine manufacturers are confidential, but it is common practice that these are shared with relevant practitioners, under NDA restrictions, to enable assessments to be made of the AEP and for other reasons. As such, these critical values have been redacted from the WT report, but are included in the assessment.

Many other inputs in the assessment have been derived from publicly available information, and importantly WT have used derivations of power curves for two potential future turbines, namely the WT 15MW-236m and WT 22.6MW-276m. These power curves are not confidential and have been supplied in Appendix B.

It is also noted that a query was raised over the future scenarios not being for the maximum design envelope of the proposed wind farms. Due to the availability of suitable power curves, as noted above, as well as the uncertainty in turbine selection two potential turbine sizes for the project commencement years were assumed, leading to this difference to the maximum design envelope.