Partners in UK offshore wind

MONA OFFSHORE WIND PROJECT

Appendix to December Hearing Action Points – Response to ISH6.10 net effects on greenhouse gas emissions

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Glossary

Term	Meaning
Applicant	Mona Offshore Wind Limited.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Project (NSIP).
Environmental Statement	The document presenting the results of the Environmental Impact Assessment (EIA) process for the Mona Offshore Wind Project.
Mona Array Area	The area within which the wind turbines, foundations, inter-array cables, interconnector cables, offshore export cables and offshore substation platforms (OSPs) forming part of the Mona Offshore Wind Project will be located.
Mona Offshore Wind Project	The Mona Offshore Wind Project is comprised of both the generation assets, offshore and onshore transmission assets, and associated activities.

Acronyms

Acronym	Description
DESNZ	Department of Energy Security and Net Zero
DUKES	Digest of UK Energy Statistics
EIA	Environmental Impact Assessment
ExA	Examining Authority
ExQ	Examining Authority's written questions
GHG	Greenhouse gas
IEMA	Institute of Environmental Management and Assessment
IP	Interested Party
OFGEM	Office of Gas and Electricity Markets
REGO	Renewable Energy Guarantees of Origin

Units

Unit	Description
MWh	Megawatt hours

1 Appendix to December Hearing Action Points – Response to ISH6.10: net effects on greenhouse gas emissions

1.1 Introduction

1.1.1.1 This note presents the Applicant's response to Action Point 10 arising from Issue Specific Hearing 6: Onshore and Offshore Environmental Matters and the DCO (ISH6), in which the Examining Authority (ExA) requested that: "*Further to the Applicant's response to ExQ2.19.5, use the figures provided in the Wood Thilsted report to provide a calculation of the net effects on Greenhouse Gas emissions.*"

1.1.1.2 The Applicant has duly considered the ExA's request and has concluded that, at the current time, it is not appropriate to present a calculation of the net effects on greenhouse gas (GHG) emissions using the figures provided in the Ørsted Interested Parties (IPs) Wake impact assessment report (REP5-120), for the following reasons:

- Firstly, the Applicant's assessment of GHG emissions (as presented in Volume 4, Chapter 2: Climate change (APP-076)) already adequately factors in uncertainty to account for any potential change in GHG emissions that may be associated with wake losses (as detailed in section 1.2, below)
- Secondly, it has not been possible to adequately check and validate the claimed wake effect values which are presented in the Ørsted IPs Wake impact assessment report (REP5-120), and therefore the Applicant does not consider that it is feasible to undertake a meaningful or robust assessment of the subsequent effect on GHG emissions based upon them (as detailed in section 1.3, below).

1.1.1.3 The Applicant will continue to consider whether it will be possible to present a robust and meaningful calculation of the net effects on GHG emissions resulting from potential wake effects in light of the above considerations.

1.2 Greenhouse gas emissions assessment

1.2.1.1 The Examining Authority's written question (ExQ2) Q2.19.5 queried the following:

"***Wake effects: EIA Regulations***

Do you accept, as a matter of principle, that wake loss can be of relevance to the EIA Regulations in terms of assessing the impact of a project on climate (such as contribution to the abatement of fossil fuel generation within the UK grid during the operational phase)? Explain your response."

1.2.1.2 The Applicant's Response to the Examining Authority's written question (ExQ2) Q2.19.5 (REP5-080) discussed the uncertainty built into the assessment of greenhouse gas emissions and the resulting assessment of significance. This is further expanded on below.

1.2.1.3 As stated in the Applicant's Response to ExQ2 Q2.19.5 (REP5-080) Volume 8, Annex 2.1: Greenhouse gas assessment technical report (APP-182) considers avoided emissions, the quantity of renewable energy use it enables by avoiding curtailment, the quantity of fossil fuel generation it displaces, and the associated GHG impacts of both. The assessment makes a calculation of the Mona Offshore Wind Project's GHG balance against the Department of Energy Security and Net Zero (DESNZ, 2023a) long-run marginal emissions factors, and the estimated intensity from electricity

supplied for 'all non-renewable fuels' (DESNZ, 2023b), providing a range of likely avoided emissions associated with the renewable electricity generated.

1.2.1.4 The use of such emissions factors results in inherent uncertainty in the final estimate of emissions avoided by the Mona Offshore Wind Project. This is because:

- The marginal source of energy generation displaced by new renewable generation must be based on a prediction of the future long-term trends of generation type, which has inherent uncertainty built-in given the exact mix of future generators cannot be determined with complete certainty.
- Any assessment must be considered on the basis that the long-run marginal emission of future generation may at any point include more, or less, renewables generation from other generators than the long-run marginal data set assumes. In this regard at a high-level possible reduction of generation by the Orsted IPs and replacement of generation by alternative generators, is already factored into the assessment.
- It is also noteworthy that as the UK moves towards its 2050 net zero carbon target, the marginal source of electricity generation will likely become a combination of renewables (predominately solar and wind) and storage. Therefore, from circa 2040 onwards, comparing the Mona Offshore Wind Project's GHG impacts with the marginal source of generation is akin to comparing it with itself and has limited value.

1.2.1.5 Further uncertainty is built into the assessment of emissions through the use of capacity factors used to determine the annual and lifetime MWh output, and consequently the magnitude of avoided emissions from the Mona Offshore Wind Project:

- A capacity factor of 34.9% (sourced from Digest of UK Energy Statistics (DUKES): renewable sources of electricity, DESNZ (2024c)) was applied to the rated power of the Mona Offshore Wind Project. This factor comprises historic load factors for existing offshore wind and as such is assumed to account for, to some extent, the result of wake effects acting on existing offshore wind projects from neighbouring projects. By applying this factor to the Mona Offshore Wind Project, generation losses as a result of wake effects are already accounted for within the assessment of avoided emissions.
- The use of historic capacity factors provides a conservative assessment of likely avoided emissions as it does not account for efficiency improvements associated with new technologies which are likely to improve the generation capacity of future offshore wind projects. Therefore, annual and lifetime MWh output of Mona Offshore Wind Project, and thereby associated avoided emissions, are likely to be underestimated.
- Given the capacity factor is derived from historic averages across wind projects (accounting for the range of technologies and project parameters currently in operation), the technology type and specific project parameters (i.e. type, height, spacing of the wind turbine generators) of the Mona Offshore Wind Project are not accounted for. It is likely that the Mona capacity factor would be greater than that used in the assessment, as informed by project engineers, and as such the assessment underestimates the annual energy output and associated avoided emissions.

1.2.1.6 It could be argued that the historic capacity factors do not account for any additional wake loss effects as a result of a future increase in proximity of new offshore wind

projects to neighbouring projects as they are consented and constructed. However, in the balance of the above listed uncertainties (i.e. where the capacity factors likely present an underestimate of final project capacity factors and resultant avoided emissions), it is unlikely that any additional effect of wake loss on generation capacity and avoided emissions would outweigh the conservative assumptions built into the assessment.

1.2.1.7 Despite such uncertainty, it is clear that the Mona Offshore Wind Project would enable the increased supply of renewable energy into UK grid electricity, and would result in avoided emissions over its lifetime consistent with a trajectory towards net zero by 2050, thereby resulting in the significant net beneficial effect concluded within the assessment of significance in Volume 4, Chapter 2: Climate change (APP-076), in line with Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment (EIA) Guidance on Assessing GHG Emissions (IEMA, 2022). As described above, the impact of wake effects on the avoided emissions enabled by the Mona Offshore Wind Project have already been accounted in the assessment of GHG emissions through the application of historic capacity factors which include potential year on year fluctuations in capacity of existing offshore wind infrastructure, including as a result of wake effects, and as such are considered within the associated assessment of significance.

1.3 Required inputs to calculation of net effects on greenhouse gas assessment outputs

1.3.1.1 The closing paragraph of the Applicant's Response to ExQ2) Q2.19.5 (REP5-080) stated that *"However, the Applicant considers it could be possible to utilise the figures provided by the Ørsted IPs, as referenced in ExA Q2.19.1, to provide a calculation of the effects of the project on climate, specifically the net effects on GHG emissions. This would in no way suggest agreement with those figures (as set out in the Applicant's response to Q2.19.1 above). The Applicant would need to be provided with a more detailed breakdown of the output of the figures, in particular which impacts the Ørsted IPs consider relate to which project*."

1.3.1.2 The Ørsted IPs have provided a Wake impact assessment report at Deadline 5 (REP5-120) which contains a breakdown of wake effects for each project within its portfolio in the Irish Sea. The Applicant has undertaken a review of this report and provided comments in its response at Deadline 6 (S_D6_53). The Applicant notes several methodological concerns which mean that it has not been possible to adequately check and validate the results it presents. Therefore, the Applicant does not consider that it is possible to undertake a robust calculation of net effects on GHG emissions based on these results which would provide meaningful or reliable conclusions.

1.3.1.3 The Applicant also notes that the Ørsted IPs have not included details of the annual energy production of their projects within the Wake impact assessment report (REP5-120). This is a key input parameter which is required to undertake a calculation of net effects on GHG emissions, and whilst information on electricity generation is available in the public domain (for example through Renewable Energy Guarantees of Origin (REGO) certificate reporting by the Office of Gas and Electricity Markets (OFGEM)), it is not possible to determine the specific values the Ørsted IPs have used within their Wake impact assessment report (REP5-120).

1.3.1.4 As stated in previous submissions (paragraphs 65 and 66 of the Applicant's summary of oral submissions made at Issue Specific Hearing 4: Offshore matters (REP4-034)), the Applicant is not able to model potential wake effects on operational offshore wind

farms in the Irish Sea. The Applicant considers that undertaking calculations for Ørsted IPs projects only based upon values presented Ørsted IPs Wake impact assessment report (REP5-120) would not provide a complete picture of the potential net effect of the Mona Offshore Wind Project on the avoided GHG emissions from operational offshore wind farms in the Irish Sea.

1.3.1.5 The Applicant will continue to consider whether it will be possible to present a robust and meaningful calculation of the net effects on GHG emissions resulting from potential wake effects in light of the above considerations.

References

DESNZ (2023a) Valuation of Energy Use and Greenhouse Gas: Supplementary guidance to the HM Treasury Green Book. Available: https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal. Accessed December 2024.

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