Orbicon A/S
Linnés Allé 2
2630 Taastrup
Denmark
Att.: Kristian Nehring Madsen

DNV GL Energy
Renewables Certification
Tuborg Parkvej 8, 2nd Floor
DK2900 Hellerup
Denmark
Tel: +45 39 45 48 00
Fax: +45 39 45 48 01

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Amendment to "Navigational Risk Assessment Jammerland Bugt Offshore Wind Farm" 1KNPOEP-6, Rev. 0

After issue of the analysis carried out in report 1KNPOEP-6, Rev. 0 the turbine layouts has been changed. The purpose of present letter is to evaluate the effect of the new layouts in terms of navigational risk.

Possible turbine specifications where originally either 80 3MW or 35 6MW. Since the final layout of the turbines in the offshore wind farm was not known, the navigational risk assessment was performed such that it would represent a worst case, with respect for navigational risk, for all possible turbine layouts i.e. both with regards to turbine size and location of the turbines within the offshore wind farm area.

The allision frequency analysis was based on a layout of wind turbines that, in the context of navigational risk, was considered as the worst-case scenario. The chosen worst-case scenario was 80 3MW turbines since that would result in the highest risk of allision. A layout with 35 6MW turbine would take up approximately the same area, but the lower number of turbines would present fever obstacles to the ship traffic which would lead to a reduced potential of ship allisions. The 80 3MW turbines are in the worst-case scenario distributed over the entire offshore wind farm area since this represent the case where the existing ship traffic would be disturbed the most.

The outcome of the analysis (see 1KNPOEP-6, Rev. 0) showed that the largest contribution to the calculated allision return period was found to be from ship traffic on the north and south going route T west of the wind farm.

The AIS analysis of the ship traffic on route T showed that the standard deviation of the frequency distribution of the route was very narrow compared to the distance to the nearest turbines of the farm. This together with the shielding effects by "Lysegrunde" and "Elefantgrunde" resulted in that the contribution of powered allisions to the cumulated allision frequency was marginal.

More pronounced, yet still quite low, was the drifting allision frequency. Contributing factors to the low frequency where the sheltering effects mentioned above together with a larger probability of western wind.

Presently, the possible turbines to be installed are changed to 60 3MW or 34 7 MW. Appendix 1 of this letter gives an illustration as to how the turbines will be located compared to the old layout as described above (i.e. 80 3MW or 35 6MW).

The impact of the new layout is evaluated in the following;

Firstly, regarding the 7MW case it is evaluated that the new positions have changed so little, compared to the 6MW case, that the scenario is practically unchanged. Moreover the total number of turbines are now 34 compared to 35 previously.

Secondly, regarding the 3MW case the cumulated allision frequency is evaluated to decrease marginally since 1) the distance between the turbine row closest to route T is increased and 2) a number of turbines forming a band on the eastern most part are removed and giving no contribution to the allision frequency – the total number of turbines are changed from 80 to 60.

Based on the above evaluations it is judged that the 3MW case analysed in 1KNPOEP-6, Rev. 0 is still valid as a worst case assumption and that the change in layout from 80 3MW to 60 3MW will give a lower allision frequency.

Yours Faithfully,
for DNV GL Denmark A/S

Lasse Sahlberg-Nielsen
Senior Engineer

Niels Bo Kristensen
Principal Engineer

Appendix 1 – Comparison of new and old turbine positions