



Q&A Webinar Wind Resource Assessment HKN

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Questions: from the audience

Answers given by: Erik Holtslag (Pondera Consult), Andy Oldroyd (Oldbaum Services); Remco Verzijlbergh (Whiffle), Johannes Eckstein (Fichtner), Frank van Erp (Netherlands Enterprise Agency).

Question: On page 38 under Table 3-6 it states that ZP428 was used to validate the FLS at Frøya, is this correct?

Answer: This is a typo. The reference LiDAR at Frøya which was consistent for all FLS verification tests should read ZP495.

Question: Why have you used the coarse resolution ERA5 data?

Answer: The ERA5 data was used as it scored best of all long-term sources in terms of correlation with onsite measurement data. Nevertheless, it is not entirely impossible that other sources with higher resolution will outperform ERA5 in the future (e.g. from the DOWA dataset).

Question: Is there an ultrasonic anemometer installed on the buoys to verify wind direction measurement by the floating LiDAR?

Answer: There is an ultrasonic anemometer on the buoy system that helps with determining the wind direction.

Question: Why did you use two WRAs and why did you use ERA5 in both WRA reducing their independency?

Answer: It was tried to use the same approach as for HKZ, with two WRA considering independent sources as much as possible (e.g. different measurement technologies, variant long-term sources). For measurement technologies, keeping the two WRA independent was possible (i.e. one buoy and one met mast measurement considered). In terms of long-term sources, several independent sources were tested. These sources showed a significant lower correlation with on-site measurement data than for HKZ. As ERA5 gave the highest correlation it was decided to consider the same long-term source in both WRA which on the other hand reduces independency and therefore increases the uncertainty.

Question: Why have you only used a long-term period of 15 years in the WRA instead of e.g. 20 years?

Answer: The reason is that there are indications that the long-term wind climate is changing. For this reason, we don't want to use wind statistics of periods that are too far in the past. The 15-year period is a balance between long enough for good statistics and recent enough to reflect current wind conditions.

Question: Have you considered the offset in the direction correlation in the data quality assessment?

Answer: It was considered. The offset is a function of both the data scatter and the separation between the buoys. In this context it was considered acceptable.

Question: Did you look at combining further available data sources to further decrease uncertainty?

Answer: We did look at the possibility of other combinations to bring down the uncertainty. The combination (of the 2) selected now resulted in the lowest value. It is of course possible to add more combinations of data sources but this may either increase or decrease uncertainty depending on the data quality etc. of the additional source/combination.

Question: Are the conditions meeting the IEC design envelope for offshore turbines?

Answer: Design parameters (e.g. wind shear, extreme wind speed and turbulence intensity) are part of the scope and content of the metocean desk study, performed in parallel to the WRA. Please refer to this study to determine the IEC design envelope for offshore turbines.

Question: What verification reports are available and will there be a post-deployment verification test?

Answer: The reports are pre-deployment testing. A previous pre-/post-testing was undertaken by RVO.nl which showed consistent performance. Previous LiDAR testing has also shown typical consistent performance in pre- and post-campaign. There is therefore little evidence of instrument drift, that would point towards the requirement of post-campaign verification as standard. RVO.nl therefore follows IEA Wind TCP RP 18, Expert group report on recommended practices, 18. Floating LiDAR Systems (2017).

Question: Can you briefly explain how the two wind climates based on HKNB floating LiDAR and OWEZ met mast are combined?

Answer: The wind climate presented is combined only in terms of mean wind speed and uncertainty. The time-series themselves have not been combined.

Question: Was there a pre-validation performed for the applied floating LiDAR buoys? How were the uncertainty values associated with the floating LiDAR systems obtained?

Answer: All units underwent pre-validation which returned the system performance KPIs against the carbon trust roadmap values. The uncertainty assessment report performed by Ecofys WTTS for HKZ returned uncertainty levels for the units.

Question: Does the LES model in general produce higher or lower wake effects than engineering wake models?

Answer: The LES model results are in line with the industry standard model. The added benefit found in the WRA is that that the LES model provides more details on the various conditions under which wakes are generated. It provides more information on the behavior of the model under various stability conditions and wake propagation. Therefore, it was found a useful and much more elaborated tool to assess wake effects.

Question: If we look at comparison of the HKN WRA vs the metocean desk study, they give very similar results. Shouldn't that lead to lower overall uncertainties?

Answer: In theory it can lead to lower overall uncertainties. However, since the studies were conducted independently from each other, it was not possible to go through all the uncertainty components of the metocean desk study as detailed as for the WRA. Therefore, the results by DHI were not blend in to the results of the WRA. The opportunity is there, and it is up to the expert users of the results of both studies to assess the possibility to consider lower uncertainties.

Question: The buoys have continued measurements after the period you've analyzed for this report. What would be the added value of analyzing the second year of data and updating the report based on that?

Answer: The second year would be valuable to add, whereby a lot depends on the quality of the data in that second year. The data availability might be increased and the MCP uncertainty might be slightly reduced. In terms of the average wind speed no major effect is expected as the OWEZ and one-year buoy measurement results are already closely aligned. RVO.nl wanted to provide the market a closed set of data, allowing enough time for preparation of the tenders. Depending on the exact HKN permit tender schedule, an update might be considered. Please bear in mind that this update will need to be aligned with the metocean desk study, quality assured and certified by DNV GL.

Question: What is the total wake loss of the HKN wind farm?

Answer: The relative AEP deficit in the report is provided as an indicative value only and is based on an initial assumed layout. The purpose was to undertake an initial assessment of the potential impact of the neighboring wind farms. We would suggest that developers look at this using their own layout design rules and preferred turbines.

Question: How long will the on-site measurement campaign be ongoing by the two floating LiDAR buoys HKNA and HKNB?

Answer: The campaign has started April 2017 and is completed April 2019.