

Dear Peer Reviewer,

Thank you for your valuable and insightful comments on our manuscript. Your feedback has been instrumental in improving the quality and clarity of the paper.

Attached, you will find a detailed response to each of your comments, along with an updated version of the manuscript reflecting these improvements.

Thank you once again for your thorough review and constructive suggestions.

Best regards,

Tahir Malik

Review of “Full-Scale Wind Turbine Performance Assessment using TPI: A Study of Aerodynamic Degradation and Operational Influences” by Tahir H. Malik and Christian Bak

I clearly recommend this work to be published as the novelty of the methodology TPI is not seen before, secondly the analysis performed, and data visualization is excellent. I foresee that that the TPI could be paramount methodology to understand the change in behavior of turbines and also has the possibility to be a substitute for the old fashioned way of determining power curves (some work still needed to be done) – this not even discussed in this paper and I urge the authors to pursue this methodology – which could supersede the contractually defined power curves in the endless discussion of defining the free wind and compare to the power curve – by instead using turbine parameters as the TPI. (A possible suggestion for a new paper).

The paper has identified several contradiction mechanism that shows how degradation and upgrades of the turbines makes it very difficult to isolate the LE erosion effect on the effect of the turbines and such this is a very nice piece of work

I have the following comments for suggested need to be changed

- Abstract Line 1-13

The findings that the change or upgrade of the controllers in the turbines the first 10 years have improved the performance of the turbines according to figure 2 needs to be included on the conclusion of the abstract more clearly.

- [Abstract amended](#)

- Introduction line 15-59

The sensitive to LE erosion depends of the aero dynamic shape of the blades – here it would be nice if there was a description of this and an expected theoretical range of sensitivity due the different shapes.

- [Thank you for your valuable feedback regarding the sensitivity of LEE to the aerodynamic shape of the blades. We appreciate the suggestion to include a description and theoretical range of sensitivity. While we recognize the importance of this topic, we have chosen to focus our current analysis on empirical data and methodologies directly related to our research objectives. We will certainly consider your recommendation for future work, where a more detailed exploration of blade shapes and their aerodynamic implications can be included. Thank you again for your input.](#)

- Method line 60- 70

Please clarify if the 12 wind turbine are from the same wind farm and all are the same type ? also, in relation the question above in the introduction. This seem to be case from description further down ?

- Text amended for clarity: “*turbines within the same wind farm*”

- Line 171 -203

2.5 Turbine Performance Integral: A method for assessing wind turbine performance.

The TPI methodology is so central for the paper so I suggest that you introduce an mathematical description of the TPI in a formula at line 189 and also describe how you use it in mathematical terms

- Mathematical description added

- Section 3.1 is very well written and I suggest that the range where you calculate TPI is shown graphical on the figure1 and figure 2

- An additional Figure 1 has been added to Section 2.5 for this purpose.

3.6 Statistical analysis this part is a really nice job and the methodologies can certainly be used in the monitoring of repairs and enhancement of the performance by OEM's

- A conclusion could be made on the blade enhancement that these should be done together with adjusting the controllers which purely belong to OEMs and therefor buying this by third party vendors is merely a vast of money and damaging for the performance.

- Text sharpening this conclusion added

- From figure 8 and combined with figure 2 there seems to be an benefit of the software upgrade the significance test however fails – this might be due just to one outlier – if outliers was removed would this change the picture (i.e apply a filter of e.g. 3 x stdv on the TPI) on the significance test ?

- Thank you for your encouragement. Indeed digging deeper into the statistical aspects is the intention of a further scientific paper.