Review of the paper

"Brief Communication: On the influence of vertical velocity profiles on the combined power output of two model wind turbines in yaw"

This manuscript presents a wind-tunnel study of the influence of vertical velocity profiles on the power production of two model turbines in a row, while the upwind one operates under yaw. The results show that the variation of the combined power production (and also the power produced by the downwind turbine) as a function of the yaw angle of the upwind turbine γ_1 is asymmetric in a sense that the results are different for positive and negative yaw angles. Two different incoming boundary-layer profiles were employed to show that this asymmetrical behavior is due to the vertical velocity profile of the incoming flow.

There is an untapped potential to control the yaw angle of turbines for the sake of power-production improvements in wind farms. As a result, studying the performance of yawed turbines as well as turbines located downstream is of great importance for the wind energy community. However, there are some major issues with the contribution of this paper as well as the presentation and discussion of the results that need to be first addressed. I therefore believe that the paper in its current form does not merit publication in "WES: brief communications", which is intended for high-impact research. Lists of my major and minors comments are found below:

Major comments:

- One of the main criticisms to the paper is the fact that it suffers from the lack of velocity and thrust measurements. For instance, wake measurements at different yaw angles can provide more insights on the asymmetric behavior observed in the power of the downwind turbine. Even only thrust measurements for the upwind turbine can shed lights on the overall strength of the turbine wake, and consequently the performance of the downwind turbine. However, I do appreciate that the authors are motivated to perform velocity measurements in their future research.
- Apart from the yaw angle, the operating tip-speed ratio is very important as it significantly affects the turbine power. It is not clear in the manuscript if turbines always operate at the optimal tip-speed ratio (i.e., the one at which the turbine power is maximum) or a constant tip-speed ratio is used for all the different yaw angles. In other words, please explain how the effect of yaw angle on power production is isolated from the effect of other parameters such as the operating tip-speed ratio.
- The literature review has to be improved. Some very relevant experimental and numerical studies in the literature (e.g., Jimenez et al. 2010, Howland et al. 2016, Bastankhah and Porte-Agel 2016) are not mentioned in the manuscript. In particular, Bastankhah and Porte-Agel (2016) has recently showed that, in addition to the lateral deflection, the wake of a yawed turbine moves vertically, and the magnitude and the direction of both horizontal and vertical displacements depend on the yaw-angle direction. This can explain why the power of the downwind turbine (or the combined power) depends on the yaw-angle direction of the upwind turbine.

- Please explain why a relatively unrealistic spacing between turbines (3D) is selected. In wind farms, turbine spacing usually falls in the range of 5D to 7D depending on terrain and flow conditions.
- There is no information on how the turbine power is measured. Is it the electrical power? Or the mechanical power extracted by the turbine from the wind?
- Please provide more information about the wind tunnel (e.g., wind-tunnel type, test section size, and blockage ratio).
- I suggest the authors to also test the performance of the turbines under uniform inflow conditions as a *reference case*. This can strengthen the authors' arguments. Moreover, *Profile 2* does not have a good quality. It has a positive slope at lower heights and a fairly negative slope at higher heights. A profile with a clearly negative slope (in contrary to *profile 1*) is more constructive.
- Figure 2: Please add the variation of the power with the yaw angle for the upwind turbine. This helps readers to easier realize how yawing the upwind turbine reduces its own power and increases the power of the downwind one.
- Please define which yaw-angle direction is assumed to be positive in this study. Moreover, please specify in the manuscript the rotational direction of the turbine.

Minor comments:

- P3, L2: replace "… for every examined …" with "… as a function of …".
- P3, L5: I think it is better to use "maximum" instead of "maximal" here and in the rest of the manuscript.
- P3, L5: "perfect yaw alignment" is a bit vague. Maybe, it can be replaced with "no yaw misalignment".
- P3, L15: replace "during" with "for".
- P3,L16: remove the comma in "our results suggest,".
- P3, L15: you can replace "Also for the total power output, the sign of the maximum's location …" with "Moreover, the yaw-angle direction at which the combined power is maximum …".
- P4, L9: "than" is supposed to be "then".

Additional references:

- Jiménez, Á., Crespo, A., & Migoya, E. (2010). Application of a LES technique to characterize the wake deflection of a wind turbine in yaw. *Wind energy*, 13(6), 559-572.
- Howland, M. F., Bossuyt, J., Martínez-Tossas, L. A., Meyers, J., & Meneveau, C. (2016). Wake structure in actuator disk models of wind turbines in yaw under uniform inflow conditions. *Journal of Renewable and Sustainable Energy*, 8(4), 043301.
- Bastankhah, M., & Porté-Agel, F. (2016). Experimental and theoretical study of wind turbine wakes in yawed conditions. *Journal of Fluid Mechanics*, 806, 506-541.