

[wes-2024-79] Authors' 3rd response to Referee #2

We thank the referee once again for reviewing our manuscript, even though it seems that we were unable to reach an agreement on minor points. We also appreciate that the referee suggests our manuscript be published to allow readers to “have a chance to formulate their own opinions”.

Note that since text has only been removed from this revision, there are no track changes in blue in the uploaded version.

This time the referee commented on 2 points, and our responses are as follows:

1. We prefer to avoid repeating our previous answers here, but just briefly, we still argue that $C_p/C_{p,Nishino}$ is a good measure for “turbine-scale power loss” (which is, by our definition, the power loss that is not due to reduction of farm-average wind speed). This is because, as the referee also agrees, $C_{p,Nishino}$ is a good approximation of the performance of “near-ideal” wind farm that has only “farm-scale power loss” (which is, by our definition, the power loss due to reduction of farm-average wind speed). We believe that our results shown in Section 4.1 are clear enough to support these concepts.

Regarding the latest change we made (in the first paragraph of Section 5), we follow the referee’s suggestion and remove

“(in the sense that how the power of downstream turbines would have been reduced if they had been located in such a locally slower flow region)”

The aim of this added sentence was to briefly summarise the results shown earlier in Section 4.1, but we agree that this sentence, on its own, could be confusing to readers.

2. We follow the referee’s suggestion and remove

“and thus the vertical mixing due to turbulence”

as we agree that this could also be confusing to readers. To explain this properly, we would need to go through our recent work (Kirby et al. 2023, Journal of Fluid Mechanics 976) but we prefer to avoid having a long explanation here.