

Wind Energ. Sci. Discuss., community comment CC1
<https://doi.org/10.5194/wes-2021-7-CC1>, 2021
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Comment on wes-2021-7

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Community comment on "Recovery processes in a large offshore wind farm" by Tanvi Gupta and Somnath Baidya Roy, Wind Energ. Sci. Discuss.,
<https://doi.org/10.5194/wes-2021-7-CC1>, 2021

Thanks for sharing your interesting analysis of recovery processes in a hypothetical wind farm with realistic wind conditions.

I would like to post two comments to your paper.

The first one is related to the replenishment of kinetic energy from downward transport in the boundary layer. Ken Caldeira and I recently published a paper on geophysical limits to power density in large wind farms [1]. We showed that while it is true that there is downward transport in the boundary layer, the energy does not originate from the free troposphere above the boundary layer as usually assumed, but it is supplied by the atmospheric pressure gradient within the boundary layer.

The second comment is related to the power density. In the same paper [1], we provide a simple analytic framework for estimating the power density of large wind farms around the globe. Since the wind farm that you considered has quite large dimensions, I am curious if what would be estimated with our framework is broadly consistent with what you are getting.

[1] E.G.A. Antonini, K. Caldeira, "Atmospheric pressure gradients and Coriolis forces provide geophysical limits to power density of large wind farms", Applied Energy, Vol. 281, p. 116048, 2021.