

Interactive comment on “The problem of the second wind turbine – a note on a common but flawed wind power estimation method” by F. Gans et al.

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We thank J. C. Bergmann for his insightful comment on our discussion paper.

As he noted, it is "impossible to maintain the free-flow velocity at turbine level by turbulent transport. A velocity gradient is inevitable in turbulent transport." (JC Bergmann; SC 43) Furthermore, our tunnel experimental design does not explicitly account for turbulence, which would increase the dissipation of kinetic energy within the tunnel boundaries. These considerations are essential to fully understand and quantify the influences of wind power extraction. However, it is our intention with this paper to highlight how the current global wind power estimates (Archer and Jacobson, 2005; Archer

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and Caldeira, 2009; Magdalena and Jacobson, 2009; Lu et al., 2009; Liu et al., 2008; Leithead, 2007) violate the law of energy conservation.

Included in a short but easy to understand text based on the above assumptions, our tunnel illustrates how some methodologies (Magdalena and Jacobson, 2009) result in drastic overestimations at the global scale. Using only energy conservation, the conclusions of our paper should be considered as an absolute optimum case. Future studies that would quantify the more detailed dynamics applicable to real-world are certainly required while we are also confident that using our tunnel experimental design would thereby result in significantly less extracted wind power

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