

Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

The low-level jet role on the mean power and momentum transport of vertical axis wind turbines DIEGO SIGUENZA, ALI DOOSTTALAB, HUMBERTO BOCANEGRA-EVANS, Purdue University, LEONARDO P. CHAMORRO, University of Illinois at Urbana-Champaign, LUCIANO CASTILLO, Purdue University — The stable temperature stratification at the lower part of the atmosphere causes a particular phenomenon known as low-level jet (LLJ) where its velocity peak results in attractive power resource for wind turbines. The positive and negative shear layers of the LLJ influences the wake recovery by encouraging the energy entrainment into the horizontal-axis wind farm canopy. To extend the knowledge of LLJ impact on wind farms, we aim to explore the effect of the LLJ on vertical-axis wind turbines (VAWT) in terms of its wake energy entrainment. The LLJ was synthetically generated in a wind tunnel to test different arrays of scaled-down VAWT where we measured the velocity fields downstream trough particle image velocimetry (PIV), and the power output of the turbines. We will discuss the role of the wake energy entrainment induced by the positive and negative shear in comparison with a regular unstable boundary layer scenario.

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Date submitted: 01 Aug 2019

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