

Wake Effects of Wind Turbines and Its Impacts on Power Curve Measurements

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Abstract : Abstract—The impetus of wind energy deployment over the last few decades has seen potential sites being harvested very actively for wind farm development. Due to the scarce availability of highly potential sites, the turbines are getting more optimized in its location wherein minimum spacing between the turbines are resorted without comprising on the optimization of its energy yield. The optimization of the energy yield from a wind turbine is achieved by effective micro-siting techniques. These time-tested techniques which are applied from site to site on terrain conditions that meet the requirements of the International standard for power performance measurements of wind turbines result in the positioning of wind turbines for optimized energy yields. The international standard for Power Curve Measurements has rules of procedure and methodology to evaluate the terrain, obstacles and sector for measurements. There are many challenges at the sites for complying with the requirements for terrain, obstacles and sector for measurements. Studies are being attempted to carry out these measurements within the scope of the international standard as various other procedures specified in alternate standards or the integration of LIDAR for Power Curve Measurements are in the nascent stage. The paper strives to assist in the understanding of the fact that if positioning of a wind turbine at a site is based on an optimized output, then there are no wake effects seen on the power curve of an adjacent wind turbine. The paper also demonstrates that an invalid sector for measurements could be used in the analysis in alteration to the requirement as per the international standard for power performance measurements. Therefore the paper strives firstly to demonstrate that if a wind turbine is optimally positioned, no wake effects are seen and secondly the sector for measurements in such a case could include sectors which otherwise would have to be excluded as per the requirements of International standard for power performance measurements.

Keywords : micro-siting, optimization, power performance, wake effects

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