EMS Annual Meeting Abstracts
Vol. 9, EMS2012-397, 2012
12th EMS / 9th ECAC

Lidar Measurement Accuracy under Complex Wind Flow in Use for Wind Farm Projects

M. Boquet
(mboquet@leosphere.fr)

Understanding the wind resource at a prospective project site has long been considered a critical step in the wind farm development process, particularly where high variations in the topography and roughness of the site can lead to uncertain local wind regimes.

The use of remote sensors is one such approach developed by wind experts to reduce project uncertainties related to the wind speed estimation at turbines hub height and over the entire site area.

The remote sensing device must however provide accurate wind data, with the same low uncertainty than traditional anemometry. Measurement campaigns, with inter-comparison between different instrument types, have shown that the estimated uncertainty of most lidars meets the expectations on terrains of relatively simple topography and flow.

Indeed, to enhance the widespread of lidar technology, the previous statement should also be true on terrains where wind regimes are more complicated, especially where loss of spatial flow homogeneity occurs. In that sense, various methodologies are being developed by lidar manufacturers to circumvent this issue. Among them is the introduction of additional measurement points.

In this presentation, we show and explain how topographic variations, roughness, canopy height, high turbulence intensities and high wind shear and veer can affect the remote sensor accuracy. We present lidar specific solutions to reduce their impact. Measurement campaigns in Canada, Greece and Spain, as well as simulations will support the presentation.

We conclude on the usefulness of a mast plus lidar combination to reduce uncertainties in the wind resource estimation of complex sites.