



Inter-annual variation of wind speed in southern Norway

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Knowledge about the wind speed distribution is of critical importance when assessing the wind energy potential at a site. Small changes in average wind speed produce large changes in the commercial value of a wind farm, and the accuracy of the long-term wind estimates will therefore be central to the risk assessment of any wind farm development project.

Long-term production estimates are traditionally based on historical limited periods of on-site wind speed data extrapolated to longer term estimates through correlating them to data from long-term reference stations. Often these kinds of datasets are unavailable or it is uncertain to what extent they are descriptive of the new location.

According to a widely used and referred rule-of-thumb the inter-annual variability of the wind speed can be reasonably characterized by a standard normal distribution with a standard deviation of 6 % [1]. There has however been reported that the actual variability at complex sites and sites in the northern part of the North-Sea area is higher [2]. These are areas where the wind resources in general are very good.

This paper investigates the inter-annual variation in wind speed for three sites in south-western Norway. A 35 year long (1978 – 2012) time series of one/ three hour mean wind speeds are used to compute annual means. No long-term trends were found in the data. The range of the inter-annual variation of the means is found to be between 13 % and 26 % of the overall mean.

It is found that by assuming a standard deviation of 6% for the annual means, a 20 year long period would be necessary to assure that the true 35 year mean falls within the 90 % confidence interval around the sample mean. The length of the required subset of years is shown to be heavily dependent on the assumptions made about the probability distribution of the annual mean wind speeds.

[1] EWEA: Wind Energy – The Facts, Technology. EWEA 2009

[2] Candlish, G. N., et.al: Interannual wind variation from observations and numerical weather analyses. Proceedings EWEA 2012