

Assessment of the Uncertainty in Wind Resource Measurement

The evaluation of the wind resource and its associated energy production over the life cycle of the wind power project is one of the most important elements to determine the profitability of the wind power project. The evaluation of a wind resource and the associated annual energy production (AEP) is a highly uncertain process and it requires the assessment of the uncertainty in the measurement of the wind resource. When asked to finance a wind power project, a bank bases its response on the energy production that is estimated to occur with a 99% probability.

It is important to find a mathematical approach to account properly for uncertainty in wind resource assessment and wind energy production estimation, in order to bring rigour and sound methodology to this evaluation. Uncertainty arises at all stages in the process, from measuring the wind speed to the uncertainty in a power curve. A proper assessment of uncertainty is critical for judging the feasibility and risk of a potential wind energy development.

One needs to combine the uncertainties arising from various measurements in the assessment of the wind resource. These measurements come from various inputs (MET Towers at various locations, remote sensing devices, wind speed extrapolation at the location, height of the wind turbines). There is a need to combine properly the uncertainties arising from various causes in the evaluation of the energy production corresponding to the wind turbine power output; the uncertainties are related to the power curve, to various power losses, and to turbine or network unavailability.

The project will review the comprehensive methodology used by Hatch to evaluate the annual energy production and examine the best approach to incorporate various types of remote sensing data in order to reduce the uncertainty.