

FUNDAMENTALS OF WIND RESOURCE ASSESSMENT

Søren GJERDING

ABSTRACT

The wind energy technology has indeed become mature and wind energy projects are becoming commercially attractive in still more parts of the world. Further, the size of wind energy projects is increasing, and hence the project investment is increasing as well. Therefore, a very reasonable requirement by financing institutions and other investors, is feasibility studies including a reliable forecast of the energy production by the projects. Further to the good estimates, there is also a need to optimise the energy yield of a certain investment in order to maximise profitability and/or attract capital.

One of the most important parts of a feasibility study is, thus, the wind study and the degree of certainty of the estimates presented. This, in turn, makes demands to the quality of wind data, i.e. the data base of climate statistics to be used in the estimate calculations. In order to provide for optimal output of a wind measurement programme, to secure the reliability of data, and to limit the uncertainties of the estimates, planning and documentation are the key elements in addition to knowledge and experience.

All measurement programmes have to be tailored to the specific needs of a developer, i.e. the project, the area, the plans, the time schedule, and other factors. The planning process could include:

- Definition of the objective of the measurement programme.
- Analysis and assessment of existing information.
- Decision regarding data analysis method.
- Planning of the measurement programme.
- Specification and procurement of equipment.
- Preparation of data handling procedures.
- Installation of equipment.
- Data collection, handling, and quality check
- Data analysis.
- Preparation of the wind study to be part of the feasibility study.

The wind energy specialist is too often consulted at a late stage in the process and, therefore, many errors and inexpedient solutions are experienced. Some of these are:

- Masts installed at inappropriate locations, or even at locations compromising the value of the collected data.
- Sensor mounting errors.
- Missing calibrations of anemometers and/or information on sensor mounting and orientation.
- Data loss for extensive periods.
- Lack of documentation - missing information.
- Insufficient measuring period.

In general, many of the errors experienced could easily have been avoided and the lessons learned are:

- Plan the measuring programme.
- Start the measurement programme “as soon as possible”.
- Do things right in the first place.
- Secure documentation of all steps in the measurement programme.

The presentation will elaborate on these subjects and other important aspects of wind resource assessment, estimate preparation and optimising.

ABOUT THE WRITER

Managing Director and co-founder of the TRIPOD Group. M.Sc. in civil engineering, project planning and M.Sc. in commerce. 21 years of experience in working with wind energy on six continents. Specialized in project preparation, i.e. planning of wind measurements, micro siting, preparation and appraisal of wind studies and feasibility studies. Consultancy to project developers, investors, and financing institutions.