Independent energy production assessment from wind farm in Maharashtra

Executive summary

This project was an assignment involving a third party evaluation of energy generation estimation from a wind farm proposed by a wind farm developer. The activities performed in this task consist of wind resource assessment and energy generation, along with calculation of probability of exceedance.

Wind speed and direction data for one year, which was provided by the wind farm developer, was screened in order to eliminate any kind of discrepancies. This data was collected from the wind mast installed at the site. Windographer—a simulation tool to assess the characteristics and consistency of the wind data, was also used to screen the data. Further, the contour map of the site was generated by suitable means.

The energy generation analysis was carried out by using Wind Atlas Analysis and Application Programme (WAsP) software. In this simulation tool, the processed and compacted wind data in the form of (dot).tab was inserted along with the power curve of the offered turbine, contour map, roughness (embedded inside the contour map), location of wind mast, and location of the proposed wind turbines. The output retrieved after simulation was Net Annual Energy Production (NAEP) estimates. The results were factored with uncertainty parameters to receive actual Annual Energy Production estimates.

These estimates are further used to carry-out the probability of exceedance. The probability values for the wind energy generation are estimated using a tool and considering the actual site conditions, such as site slopes, wind mast distances, wind measurement height, availability of the actual coordinates of the mast and wind turbines, period of wind measurement, and so on. The estimated probabilities, i.e., P50, P75, P90, and P95 values along with annual PLF were hence generated. Based on above, relevant recommendations were provided.