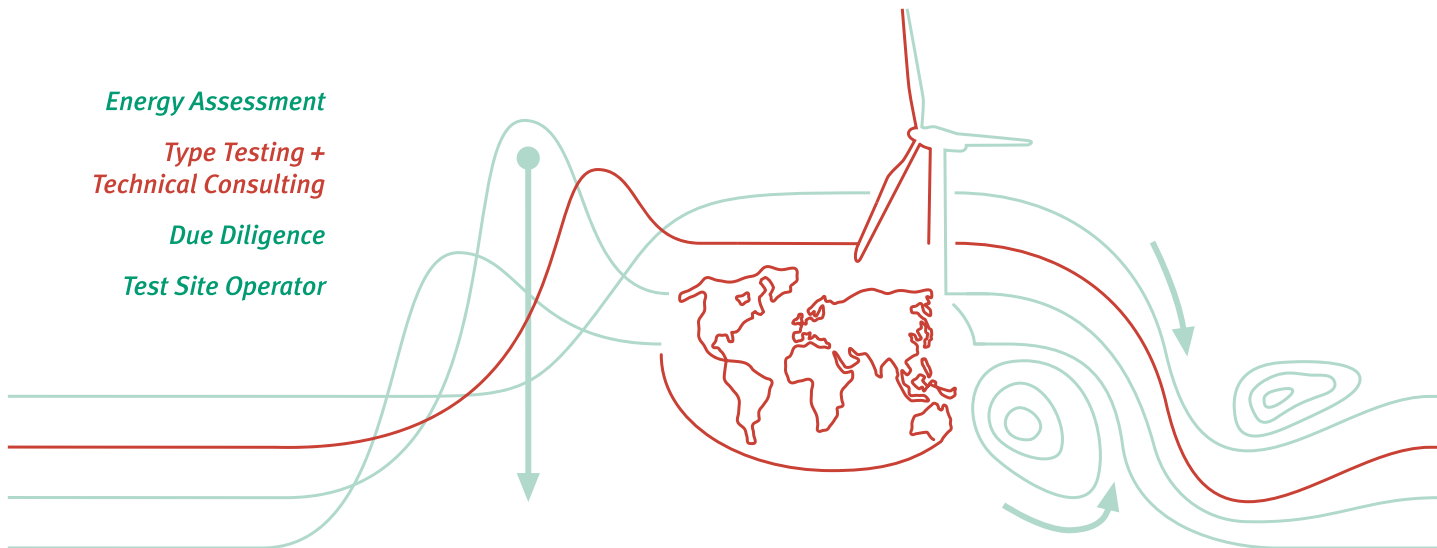


Energy Assessment

Type Testing +
Technical Consulting

Due Diligence

Test Site Operator



Power Performance

Power performance illustrates the level of efficiency of a wind turbine (WT) or small wind turbine (SWT). For this reason, a high-quality measurement is essential for the certification of your WT or SWT. Furthermore, the reliable technical and financial planning of the future wind farm project is built on this parameter.

The department Power Performance of windtest grevenbroich gmbh (wtg) offers various accredited measurement services for WTs and SWTs according to national and international standards.

Customer Benefits

For manufacturers, it is important to validate the power performance in a standard-compliant measurement in order to ensure the successful sale of a newly developed WT and to prove the contractually agreed technical characteristics of the WT. But also the operators as well as the investors of future wind farm projects need a credible power performance for the

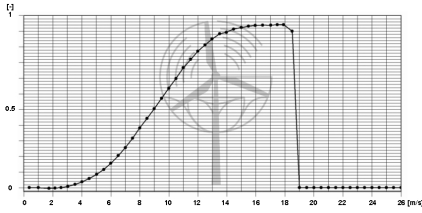
- reliable calculation of the annual energy yield for planning the wind farm;
- reliable calculation of the cost-effectiveness of a wind farm project.

Even after WT commissioning, measurement of the power performance may be highly beneficial. This is the case, for example, if a WT or an entire wind farm does not achieve the guaranteed performance designated by the manufacturer. In this case, we offer a measurement at the specific location in accordance with an accredited standard. The results can be used for any claims or negotiations with the manufacturer.

Basic implementation

For the accredited measurement of your power performance, we offer you the following services:

- Site inspection and site calibration: Our engineers appraise and evaluate the terrain in which the measurement of the WT is to be carried out in accordance



with the requirements of IEC 61400-12-1. A measurement concept is developed on the basis of the local situation, a wind measuring mast (WMM) and measurement technology selected, configured and installed. The measurement period as well as validation and evaluation of the data are followed by the standard-compliant measurement of the power curve.

- **Prototype measurement:** The power performance of your prototype is measured in accordance with international guidelines and standards. This is based on national or international standards like IEC 61400-12-1, FGW technical guideline 2 or MEASNET Power Performance Measurement Procedure.
- **Subsequent power performance measurement:** On the basis of or in accordance with international guidelines, the performance of individual or several WTs is measured in an existing wind farm. Here, the measurement concept is drawn up after an inspection of the site in close consultation with the customer. The customer is provided with everything from a single source. This includes the installation of the wind measuring mast with sensors and performance measurement system, monitoring of the measurement, data evaluation and presentation of the results in a detailed report. Of course, we also offer this measurement service with remote sensing systems such as SoDAR or LiDAR systems as a supplement for wind measurement masts.

Usually the measurement period of a power performance lasts for 3 to 6 months, depending on the wind conditions on site. Monthly interim reports are prepared as well as the final report, which is needed by the certification body.

Competence

wtg is a service supplier accredited in accordance with DIN EN ISO / IEC 17025 and offers all necessary measurements based on national and international standards. Furthermore, our specialists are members of several national and international working committees like MEASNET Power Performance Expert Group and the FGW Fachausschuss Leistungskurve

The department Power Performance of wtg is accredited in accordance with DIN EN ISO / IEC 17025:2005 for measurements of the power performance on wind turbines and holds the

- FGW seal of conformity for measuring the power performance of wind turbines; it also collaborates with the Power Performance Technical Committee of the FGW;
- MEASNET seal of conformity for measurement of the power performance of wind turbines.

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