



FGW e. V. • Oranienburger Straße 45 • 10117 Berlin • Deutschland

FGW TC WP- resolution for  
technical guideline TG 6 Rev. 9

**FGW e.V.**

Fördergesellschaft Windenergie  
und andere Erneuerbare Energien  
Oranienburger Straße 45  
10117 Berlin  
Tel. : +49 (0)30 / 3010 1505 0  
E-Mail : [info@wind-fgw.de](mailto:info@wind-fgw.de)  
[www.wind-fgw.de](http://www.wind-fgw.de)

Berlin, 21<sup>th</sup> of September 2016

**FGW Technical Committee for Wind Potential (TC WP) – resolution of 21<sup>th</sup> of September 2016:**

The TC WP votes for the following supplement to revision 9 of the technical guideline part 6 (TG 6).

Appendix C “Determining the site quality for commissioning in accordance with the German Renewable Energy Act (EEG 2017)” is added to the revision 9 of the TG 6.

On behalf of FGW TC

Bente Klose

# Appendix C Determining the site quality for commissioning in accordance with the German Renewable Energy Act (EEG 2017)

## C.1 GENERAL INFORMATION

These guidelines describe a method to determine the wind potential and energy yield at wind turbine sites. In Germany, the determination of energy yield at a wind turbine site in accordance with these Technical Guidelines, compliant with the Act on the Priority of Renewable Energy Sources 2017 (German Renewable Energy Act – EEG 2017)<sup>1</sup> serves to demonstrate the anticipated site quality at the wind turbine site relative to the reference yield (in accordance with the EEG 2017) on commissioning.

The testing method for determining the site quality (corresponds to the ‘quality factor’ term in the EEG 2017) using the energy yield at wind turbine sites calculated on the basis of these guidelines is described below. This testing in compliance with the Technical Guidelines is to be performed by qualified institutions. Determination of energy yield must be performed by accredited institutions approved in the use of these guidelines compliant with DIN EN ISO/IEC 17025 [10].

If the site quality is determined, the results shall be summarised in an excerpt from the test report in accordance with the specifications of these guidelines (see Appendix C.4).

## C.2 DETERMINING THE SITE QUALITY

The procedure for determining the wind potential and the energy yield at wind turbine sites is performed as described in Section 2.

### C.2.1 DETERMINING SITE YIELD

1. The site yield of a wind turbine or a wind farm compliant with TG 5 is the wind power yield measured at the point of supply to the grid operator. Transmission losses between the wind turbine and the point of supply are not added to the measurement result at the point of supply. Wind power used outside of the wind turbine by the wind turbine operator or supplied to third parties and thus not fed into the public supply grid, must be added to the existing, measured site yield. If the wind power used outside of the wind turbine was not recorded by measurements, it must be calculated in agreement between the wind turbine operator and the grid operator, based on energy-related principles. Performance reductions recompensed to grid operators compliant with Section 14 of the EEG must be taken into consideration in the site yield.
2. The site yield prior to commissioning is determined from the gross power yield minus the loss factors. Loss factors are reduced power yields caused by:
  - a) wake effects,
  - b) lacking technical availability of the system,
  - c) electrical efficiency losses in wind turbine operation between the power terminals on the respective wind turbines and the wind farm's point of common coupling,
  - d) licensing constraints, for example regarding noise emissions, shadow flicker, nature conservation or flight operations safety, including radar. (Information on licensing constraints must be provided by the client. See page 1, Section 1.1)

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<sup>1</sup> ERNEUERBARE-ENERGIEN-GESETZ (EEG, GERMAN RENEWABLE ENERGY ACT) 2017, German Renewable Energy Act passed on 8 July 2016.

3. The gross energy yield determined during the preceding energy yield assessment, taking the wind turbine's site-specific performance characteristics into due consideration, is then used as the basis for verification. The losses anticipated compliant with Appendix C.2.1 No. 2 taken from the preceding energy yield assessment are adopted as efficiency values and taken into consideration as their product (see Section 2.6.2). Here, compliant with the EEG 2017 and possibly deviating from the energy yield assessment, the following minimum values are allowable:
  - a) Availability: 98%

In this context, the temporal availability corresponds to the energy availability.

4. The same power curve published compliant with TG 5<sup>2</sup> Appendix D is to be used as the basis for calculating the gross energy yield for the purpose of determining site quality compliant with Section 36h of the EEG 2017. TG 6 Appendix C.2.3 regulates the procedure if no power curve compliant with TG 5 is available for the calculation in accordance with Section 2.

## C.2.2 DETERMINING THE SITE QUALITY

The following equation is used to determine site quality:

$$SG = \left( \frac{5 \cdot E_{St0}}{R} \right) \cdot 100\% \quad (\text{C-1})$$

Where:

*SG* (“Standortgüte”) Site quality (ratio of site yield to reference yield), given as a rounded integer percentage

*E<sub>St0</sub>* Site yield determined for the wind turbine on the site compliant with C.2.1 No.3

*R* Reference yield (with the reference site conditions compliant with the EEG 2017) of the same power curve published compliant with TG 5, used to determine the energy yield compliant with these guidelines

## C.2.3 WIND TURBINES WITHOUT A REFERENCE YIELD COMPLIANT WITH THE EEG 2017

In accordance with the EEG 2017, Annex 2, a power curve shall be used for calculation of the reference yield of a wind turbine, which was measured using generally recognised rules of technology. In order to make it possible to determine the site quality and the site-specific compensation on the basis of a correction factor, also for wind turbines for which no reference yield data is available, an equivalent power curve and the corresponding equivalent reference yield is determined for this procedure as described below:

1. Use of the power curve provided by the manufacturer and previously used for the calculations made in Section 2. If this power curve displays wind speed and wind turbine power values with a bin size of greater than 0.5 m/s, linear interpolation must be performed such that a bin size of 0.5 m/s results.
2. Determination of the equivalent (“Ersatz”) reference yield (*R<sub>Ersatz</sub>*) in accordance with the EEG 2017, Annex 2, based on the power curve according to Point 1.

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<sup>2</sup> FGW E.V.-FÖRDERGESELLSCHAFT WINDENERGIE UND ANDERE ERNEUERBARE ENERGIEN, Technical Guidelines for Wind Turbines, Part 5 “Determination and Application of Reference Yield”, Revision 6, Berlin (D), 24.02.2016

3. Determination of the equivalent energy yield ( $E_{St0,Ersatz}$ ) in accordance with Section 2, based on the power curve according to Point 1. No additional reductions for this power curve may then be adopted.
4. Determination of the site quality in accordance with Appendix C.2.2 using  $E_{St0,Ersatz}$  and  $R_{Ersatz}$  instead of  $E_{St0}$  and  $R$ .

The result of the determination of site quality performed on the basis of equivalent data should be regarded as final and requires no recalculation. However, this only applies in the context of determining site quality for commissioning the wind turbine and the associated determination of the correction factor.

### **C.3 REPORT**

A report shall be compiled taking Section 3 and the demands arising from ISO/IEC 17025 [10] into account. In addition, each report shall include the following information:

1. Reference to the preceding energy yield determination compliant with TG 6
2. Power curve and reference yield of the wind turbine
3. Copy of the excerpt from the test report for the reference yield compliant with the EEG 2017 of the wind turbine
4. Site yield, giving the gross energy yield and the adopted losses per wind turbine and hub height.
5. Site quality compliant with Appendix C.2.2 as a rounded integer percentage.
6. Excerpt from the 'Site quality' test report in accordance with Section C.4.

### **C.4 EXCERPT FROM THE TEST REPORT (SAMPLE)**

Site quality

Report no.:

Excerpt from the report:

Client:

Accredited testing institute:

Proof of suitability:

Site Location:

Wind turbine type:

Manufacturing company:

Swept rotor area:

Rated power:

Hub height:

Power curve:

Reference yield:

