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BDEW Bundesverband der Energie- und Wasserwirtschaft e.V.
Reinhardtstraße 32
10117 Berlin

Rules and transitional periods for specific requirements complementary to the technical guideline:

Generating plants connected to the medium-voltage network - Guideline for generating plants' connection to and parallel operation with the medium-voltage network

June 2008 edition

Effective from 1st January 2013

Contents

1 Introduction

The Technical Guideline on „Generating Plants Connected to the Medium-Voltage Network – Guideline for generating plants' connection to and parallel operation with the medium-voltage network" was issued by BDEW[1] in June 2008 [1] to replace the previous VDEW Guideline „Eigenerzeugungsanlagen am Mittelspannungsnetz" [Industry's own generating plants connected to the medium-voltage network] (2nd edition) published in 1998.

Generally, the Guideline [1] is applicable to new generating plants of a network operator which are to be connected to the medium-voltage network, and to existing generating plants which are subjected to substantial modifications (e.g. re-powering).

A generating plant may be composed of a single generator or of several generating units. The electrical energy can be generated by synchronous or asynchronous generators with or without converters or by direct-current generators with inverters.

The requirements of the technical Guideline „Generating Plants Connected to the Medium-Voltage Network" (June 2008 edition, BDEW) are to be generally complied with from 1st January 2009 (beginning of the Guideline's validity [1]). The survey of the generating units shall be based on FGW TR 3 [2], the evidence for generating units and generating plants shall be provided according to FGW TR 8 [3].

Rules and transitional periods going beyond those mentioned above are described in Chapter 2 of this „Supplement to the Technical Guideline".

As from 1st January 2013, this document shall replace all previous „Supplements to the Technical Guideline".

2 Supplements to the Guideline / Transitional periods

2.1 Chapter 2.5.1.2 „Dynamic network support

Delimitation of the control and regulation functions from protection equipment

In the BDEW Guideline on „Generating plants connected to the medium-voltage network" the requirements to be met by dynamic network support are described in Chapter 2.5.1.2. This chapter contains inter alia the following specifications:

[1] After the foundation of the Forum Netztechnik/Netzbetrieb – FNN - within VDE (Network Technology / Network Economy Forum) as rule-setting organisation, technical connection and operation issues are treated within the FNN. The revision of the BDEW Guideline [1] and its supplements as VDE application rule are currently prepared within the FNN.

„Depending on the concrete technical network conditions, the actual duration of the generating facility's connection to the medium-voltage network can be reduced by requirements of the network operator in terms of ***protection equipment****."*

„As a matter of principle, the requirements in terms of dynamic network support apply to all facilities irrespective of their type and connection variant. They shall be implemented through setting of the generating plants' or units' ***control equipment****."*

Within the meaning of the BDEW Guideline, protective functions have to be realised **independently** of control / regulation functions. By specifying the protection settings, the desired behaviour of the generating plant can be compelled regardless of the setting of the generating plant's control functions. Adjusted parameterisation of an LVRT curve does not meet the requirements in terms of an independent protection function. Among other things, protective functions contribute to monitoring a possible malfunction of the plant's control system.

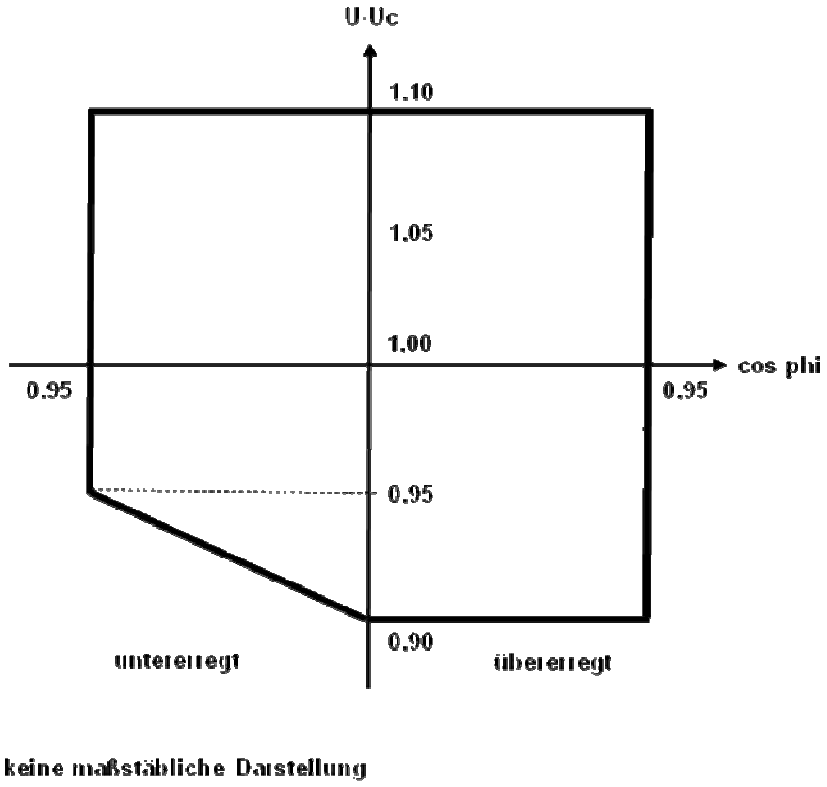
2.2 Chapter 2.5.4 „Reactive power"

Chapter 2.5.4 of the BDEW Guideline on „Generating plants connected to the medium-voltage network" is amended with regard to the partial power range between 0 % and 10 % P_n, in that the generating plant must not accept or provide more reactive power than 10 % at the most of the amount of the agreed active connection power P_{AV}.

Dimensioning of the generating plant regarding the required reactive power provision at the network connection point is the responsibility of the generating plant operator. In order to be able to maintain reactive power, predetermined by the network operator, at the network connection point also for network voltages of < 95 % U_c, the plant operator may reduce the active power. This reduction is no active power reduction within the meaning of feed-in management according to the German Renewable Energy Sources Act.

The requirements described from this third paragraph of this Chapter will be effective from 01/01/2014. Until then, evidence shall be made of inspection items according to FGW TR 8, Rev. 5. In addition, the plant certificate shall document the complete maximum reactive power range which can be covered by the respective generating plant.

A basic requirement for generating plants is that operation of the generating plant must be permanently possible within a voltage range of 0.9 to 1.1 U_c at the network connection point as shown in figure 1.



Legend: under-excited overexcited
no full-scale representation

Figure 1: Requirements for active power provision of generating plants

Consequently, the calculations of the characteristics of the maximum reactive power Q_{max} shall be carried out and represented under-excited and overexcited as a function of the generating plant's active power P for voltages at the network connection point of 0.9 U_c, 0.95 U_c, U_c, 1.05 U_c and 1.1 U_c. From 01/01/2014, newly established and revised unit and plant certificates must additionally contain information about the expected active power reduction. A qualitative information stating that a reactive-power-oriented operation of the generating plant was necessary is not sufficient.

For a project-related appraisal, the following principles shall at least be applied if no other instructions are given by the network operator concerned:

- When the generating plant is connected to the busbar of the transformer station, it is not admissible to reduce the active power within the adjusted voltage range of the HV/MV transformer's tapping switch control. The corresponding voltage range is determined by the network operator. Outside this range (see Figure 2), active power may be reduced for the purpose of complete reactive power feed-in. In this case, the reduction is no active power reduction within the meaning of the feed-in management pursuant to the Renewable Energy Sources Act (EEG).

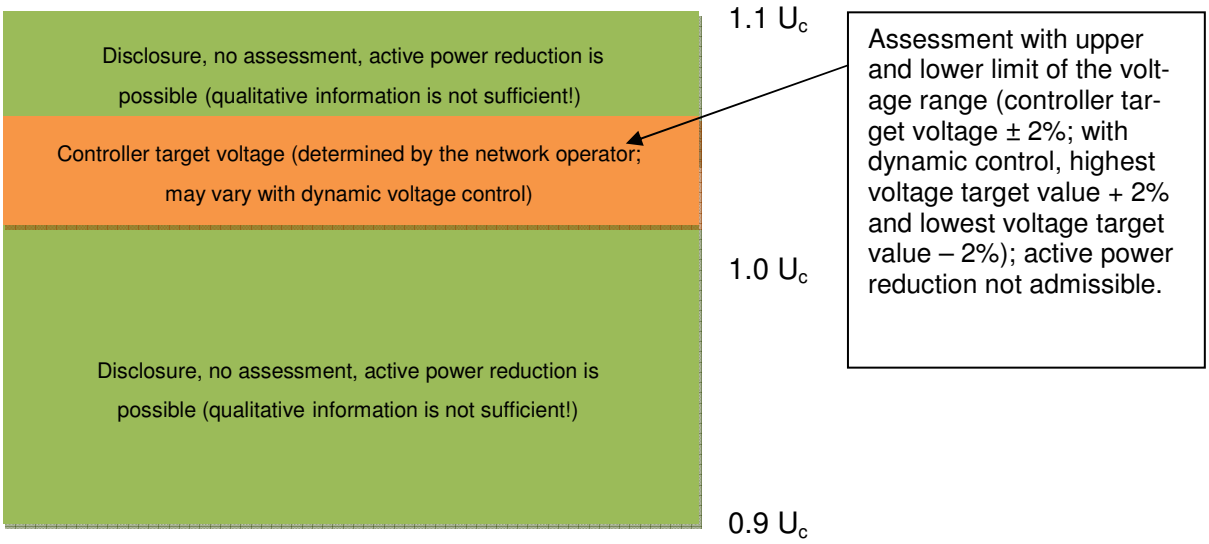


Figure 2: Explication of requirements for connection to the busbar of a transformer station

- The active power reduction within the range of >0.95 U_c to 1.05 U_c is usually a decisive factor for connecting the generating plant to the medium-voltage network. Within this range, a reduction of active power is not allowed. Outside this range (see Figure 3), active power may be reduced for the purpose of complete reactive power feed-in. This reduction is not to be considered here as an active power reduction within the meaning of feed-in management pursuant to the Renewable Energy Sources Act (EEG).

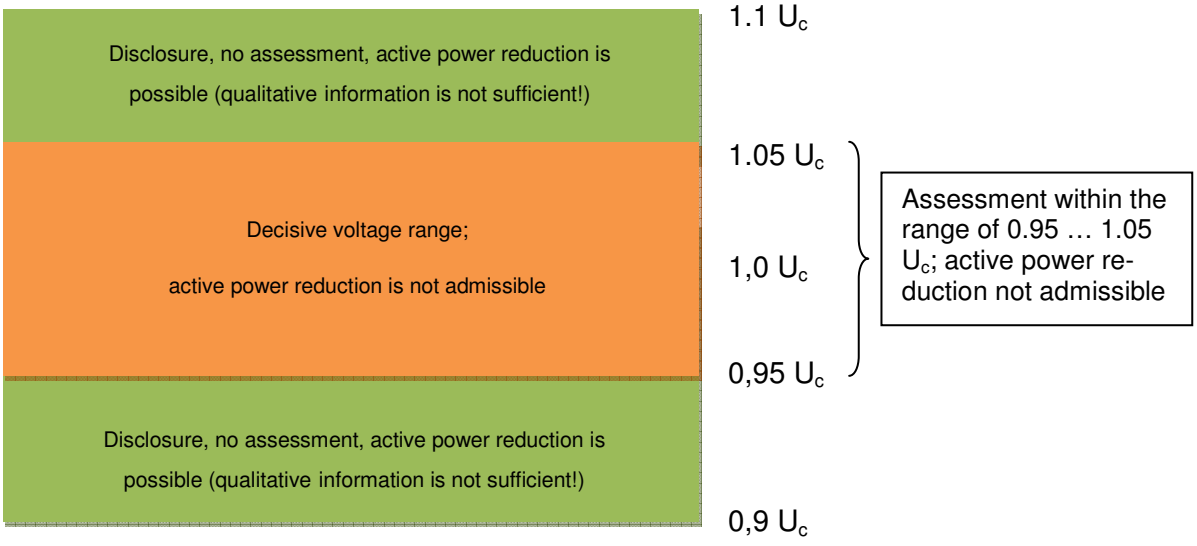


Figure 3: Explanation of requirements for connection to the medium-voltage network

2.3 Chapter 3.2.3.1 „Protection equipment - General"

COncerning the intrinsic protection of generating plants/generating units, Chapter 3.2.3.1 „Protection equipment / General" reads as follows:

„The connection owner shall be responsible for the protection of the generating plant or the generating units, respectively (guarantee of intrinsic protection). Consequently, the protection concept described in these Guidelines needs to be adequately extended by the connection owner of the generating plant. However, intrinsic protection must not undermine the requirements described in these Guidelines regarding steady-state voltage control and dynamic network support of the generating plant or the generating units."

Figure 4 below represents the correlation between:

- setting of the protective disconnection device,
- intrinsic protection and
- capacity of the generating plant/generating units.

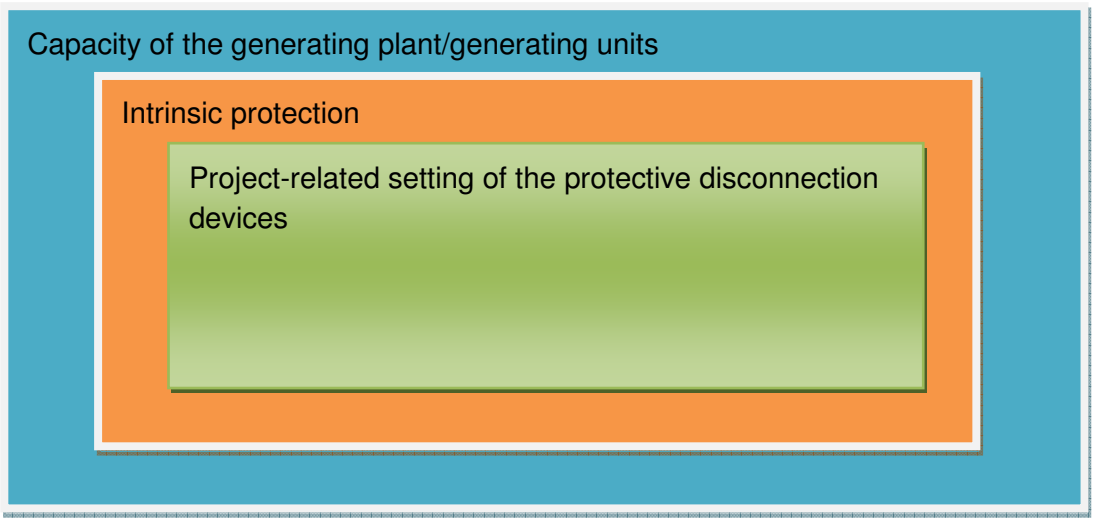


Figure 4: Correlation between protective disconnection-intrinsic protection capacity of the plant

The BDEW Guideline on „Generating plants connected to the medium-voltage network" does not contain any requirements in terms of dynamic network support above 110 % U_c. This 4th supplement does not define any new requirements for dynamic network support outside the voltage range of ± 10% $U_{c;}$, the existing rules shall thus remain unchanged.

2.4 Chapter 3.2.3.2 „Protective disconnection devices"

Requirements regarding the integrated protection of generating units

Chapter 3.2.3.2 „Protection equipment / Protective disconnection devices" of the BDEW Guideline states that

„*Protective disconnection can be realized within a self-sufficient device or integrated in the control system of the generating unit. The loss of the auxiliary voltage of the protection equipment or of the plant's control system must lead to an instantaneous tripping of the switch. Tripping through integrated protection relays must not be inadmissibly delayed by other functions of the control system.*"

It should be noted that the same hardware platform may be used for protective functions and control and regulation functions but that protective functions must operate absolutely independently (separate software component). Evidence of the independence of protective functions shall be furnished within the framework of unit certification. Parameter settings in system control must not have an influence on the settings and functions of protective disconnection devices.

In order to make also provisions for a potential hardware fault, independent protection is recommended to manufacturers for the realisation of protective disconnection functions if a failure of the corresponding protective functions is not remedied by additional independent protective functions.

„intermediate" protective disconnection for PV generating units

Chapter 3.2.3.2 „Protection equipment / protective disconnection devices" of the BDEW Guideline further states that

„*Protective disconnection devices are installed at the transfer point and/or at the generating units. The protective disconnection devices at the generating units can be connected on the high or on the low-voltage side of the unit transformer. The following figures and connection examples show the protective disconnection equipment on the low-voltage side of the unit transformer. Equal recommendations on adjustments shall apply irrespective of the connection of the protective disconnection devices to the generating unit.*"

All generating units shall be basically equipped with protective disconnection devices in accordance with the aforementioned requirements, and tested when the unit is put into operation. The test shall be documented by an inspection record.

Contrary to that, the presentation of protection inspection records may be foregone for PV plants with regard to protection devices for the different generating units if an additional protective disconnection device is provided on the low-voltage side of the relevant unit transformer (intermediate protection, independent of the superior protective disconnection device at the network connection point). The protection functions of the different generating units must not trip prior to the protective disconnection device. This shall be confirmed in the conformity declaration. The protection

inspection record shall be submitted in this context for the additional protective disconnection device.

2.5 Chapter 5.7 „Connection conditions and synchronisation" and Chapter 6.5 „Verification of connection conditions"

In Chapter 5.7.1 „General", 4th paragraph, second sentence „This shall only apply to generating plants with an agreed connection power of more than 1 MVA" shall be replaced by the sentence „This shall apply to all generating plants; generating plants with internal combustion engines and an agreed connection power of ≤ 1 MVA shall however be excluded." Furthermore, the expression in brackets „(applies only to generating plants of > 1 MVA)" in Chapter 6.5, second bullet, shall be replaced by the expression in brackets „(applies to all generating plants; generating plants with internal combustion engines and an agreed connection power of ≤ 1 MVA shall however be excluded.").

2.6 Chapter 6.3 „Verification of network interactions"

Since 1st April 2011 (date of commissioning of generating plants) a simplified calculation method has been applied for issuing plant certificates regarding harmonic and inter-harmonic currents I_{vAzul}. This simplified method provides that instead of using the equations 2.4.3-2, 2.4.3-3 and 2.4.3-4 of the BDEW Guideline, the admissible harmonic currents and frequency ranges between 2 and 9 kHz are determined as follows:

$$I_{\nu\,Azul} = i_{\nu\,zul} \cdot S_{kV} \cdot \sqrt{\frac{S_A}{S_{Gesamt}}}$$

with

S_A	Apparent connection power of the generating plant to be assessed
S_{Gesamt}	Total connectable or planned feed-in power at the junction point under consideration
S_{kv}	Short-circuit power at the junction point under consideration

Inter-harmonic currents are calculated only for the ripple control frequency/frequencies used in the respective network and its/their sideband frequencies with a distance of 100 Hz according to the following formula:

$$I_{\mu\,Azul} = i_{\mu\,zul} \cdot S_{kV}$$

Even-numbered harmonic currents are exempted from the calculation.

The conditions for certification are considered to be met if no more than 6 calculated values exceed the admissible limit values I_{Azul}. These violations of limits are restricted to a maximum of 200 % for harmonics of the ordinal numbers (6n) ±1 (with n=1…4) and for the remaining frequencies to a maximum of 400% of the limit value. Violations of limit values are not admissible for inter-harmonic currents.

If more than 6 violations occur during the calculation, the pre-conditions for issuing the plant certificate are not met. In this case it is essential that

- plans be revised by the plant operator (keyword „filter circuits"),
- a network connection point with higher short-circuit power be used (in consultation with the network operator) or
- a different, more precise calculation method be applied

in order to meet the aforementioned requirements for certification.

Should more than 6 violations occur, a plant certificate may be issued with the proviso of an additional metrological evidence of conformity of the generating plant. In this case, evidence shall be furnished by a harmonics measurement ordered by the plant operator and evaluated by the expert or the certifier within 6 months after commissioning of the generating plant's first unit showing that the aforementioned admissible limit values of the generating plant are observed. The submission of evidence shall be receipted in the conformity declaration on the generating plant.

Should the harmonics measurement show one or more violations of admissible limit values, remedy, that is to be re-controlled by the certification office, shall be provided within one year. If observance of all harmonics limit values cannot be confirmed within one year by re-measurement, the plant certificate must be cancelled by the certification office.

If impacts on the network resulting from the generating plant's operation occur after its commissioning, the network operator may demand the plant's disconnection.

2.7 Chapter 6.6 „Verification of the properties of protective disconnection devices"

Chapter 6.6 „Verification of the properties of protective disconnection devices" of the BDEW Guideline states that

„The observance of the requirements determined in Chapter 3.2.3 for protective disconnection devices has to be proven. This shall apply as well if the protection devices are integrated in the system control. For instance, the required setting ranges for setting values, disconnection times, the reset ratio and the total off-period (examination of the complete causal relationship) shall be verified through measurements."

The protection equipment integrated into the generating unit shall be indicated in the unit certificate. At least the protective disconnection devices with the necessary setting ranges for the tripping value and delay of the protection relay tripping need to be in place. Additional protection devices in place shall be indicated with their setting ranges in order to be able to make sure that their tripping does not undermine the function of the protective disconnection device.

The generating plant's overall protection concept shall be reviewed for issuing the plant certificate. The requirements of the network operator in terms of short-circuit protection and protective disconnection devices and the generating plant's or unit's intrinsic protection must have been taken into consideration.

For generating plants and generating units evidence has to be provided that

- the functions of short-circuit protection and protective disconnection can be implemented;
- the intrinsic protection does not undermine the requirements described in the BDEW Guideline in terms of steady-state voltage control and dynamic network support. In particular, throughout the entire operating range of voltage and frequency, the intrinsic protection must not anticipate the required protection settings of the protective disconnection functions;
- devices such as test terminals are used for all short-circuit protection devices and protective disconnection equipment throughout the generating plant (also within the generating units) in order to enable inspections to be carried out without disconnection of wires;
- settings of the protective disconnection functions can be parameterised and are readable (directly on the equipment's display) without using any additional means;
- the protection devices are supplied with network-independent auxiliary energy (Note: For generating units, the requirement that the protection functions are available for at least 3 seconds (duration of a network fault) must be met.);
- an outage of the auxiliary energy source of the protection equipment or of the plant's control system gives rise to instantaneous tripping of the switch;
- the planned protection devices comply with the required accuracies (e.g. in terms of the reset ratio and accuracy of the measurement) and setting ranges.

Moreover, for generating plants it has to be proven that

- a general back-up protection concept is in place;
- Q-U protection can be realised with the scheduled protection equipment and current transformers according to the requirements of the FNN Note on directional reactive power under-voltage protection (Q-U protection), of February 2010.

Where an integrated protection device is used in generating units, it has to be made sure in addition that this device operates independently of control functions (see also Chapter 2.4).

Impacts of reactive power provision on the setting of overvoltage and under-voltage protection devices on the generating units shall be assessed by the certifier when issuing the plant certificate, and the protection setting shall adjusted, where necessary, in agreement with the network operator. The protection setting must not restrict the requirements in terms of reactive power provision.

Moreover, possible impacts of under-excited operation of the generating plant on the functioning of Q-U protection shall be represented.

The evidence to be furnished according to this Chapter 2.7 relating to generating units shall be provided by means of unit certificates (for new or revised unit certificates) from 1st April 2013. Till then, evidence may be furnished through a manufacturer's declaration for issuing the plant certificate.

Note:
With regard to the plant certification, it is not allowed to the certifier to modify the network operator's requirements in terms of protection settings on its own accord. Should the certifier deem adjustments of the protection provisions necessary, the network operator shall be consulted in due time in advance.

2.8 Photovoltaic plants and fuel cell plants

The requirements in terms of **steady-state voltage control** according to Chapter 2.5.1.1 and Chapter 2.5.4 of the Guideline [1] must be complied with **from 1st April 2011,** at the latest.

From 1st April 2011 at the latest, photovoltaic plants and fuel cell plants must be technically capable of participating in **overall dynamic network support.**

- The generating plant must not disconnect from the network in the event of network faults.
- During a network fault, the network voltage shall be supported by feed-in of a reactive current into the network.
- After fault clearance, the generating plant is not allowed to withdraw more inductive reactive power from the network than prior to the fault.

Basically, proof of the **satisfaction of the Guideline's requirements** according to Chapter 6 of the Guideline [1] shall be furnished to the network operator. This proof shall relate to the technical requirements to be satisfied at the date of commissioning of the photovoltaic plants or of the fuel cell plants pursuant to [1] and this „Supplement to the Technical Guideline".

Proof of the satisfaction of requirements shall be furnished not later than 1st April 2011 at least through the forms F.1, F.4 and F. 5 in Annex F of the Guideline [1] (or alternatively through the forms attached to the Technical Connection Conditions of the network operators) and by means of a corresponding inspection record about the measurements of the electrical properties regarding the generating plant's connection to the network.

Complete evidence of the electrical properties (certification requirements) according to Chapter 6 of the Guideline [1] became effective with a corresponding delay from 1st April 2011. If the certificates for PV and fuel cell plants commissioned from 01/04/2011cannot be submitted yet at the time of commissioning, the plant operator shall prove to the network operator that issuing of the certificates has been ordered. Proof can be furnished through the acknowledgement of order by the certification body. The implementation of all relevant technical connection conditions of which proof has to be furnished in the certificates shall be guaranteed by the plant operator. Moreover, the plant operator shall declare by written mail to the network operator that the certificates, including the conformity declaration, will be supplied as soon as possible, but not later than 31 December 2012. The conformity declaration shall prove that the generating plant was constructed in conformity with the plant certificate.

If the plant operator has not yet submitted any certificates for these PV or fuel cell plants by 1st January 2013 to the responsible network operator, and if these plants do not comply with the requirements of this Chapter 2.8, the network operator shall be entitled to demand the disconnection of this generating plant from the network or may itself disconnect this plant from the network.

2.9 Generating plants with internal combustion engines

Concerning the reduction of **active power output** according to Chapter 2.5.3 of the Guideline [1], the maximally admissible operating times in terms of motor engineering shall be taken into consideration for set points below 50 % of the agreed active connection power P_{AV}. If this power is below 50 % P_{AV} and the admissible operating times are exceeded, a generating plant with internal combustion engine may disconnect from the network.

A change of active power (reduction and increase) shall total for generating plants with a nominal capacity of

- ≤ 2 MW at least 66 % P_{Emax} per minute (corresponding to ≥ 1.11 % P_{Emax} per second),
- > 2 MW at least 20 % P_{Emax} per minute (corresponding to ≥ 0.33 % P_{Emax} per second).

Note:
The aforementioned framework conditions shall be applicable to all operating conditions where the active power has to be changed due to the requirements of the Guideline [1], except for the gradient (required according to Chapter 5.7.1) of maximally 10% P_{AV} per minute after tripping of a protective disconnection device. In this case, the gradient of maximally 10% P_{AV} per minute has to be observed. Where operational reasons require a power adjustment that is not demanded by the Guideline, the plant operator shall be responsible for the determination of the gradient while taking account of the network operator's requirements resulting from the connection assessment.

The requirements in terms of **steady-state voltage control** according to Chapters 2.5.1.1 and 2.5.4 of the Guideline [1] must be satisfied in technical terms **from 1st January 2010,** at the latest.

Not later than **1st January 2013,** generating plants with internal combustion engines must be technically capable of participating in **full dynamic network support.**

- Generating plants with internal combustion engines may instantaneously disconnect from the network after voltage drops in the medium-voltage network to values below 30 % U_c (at the network connection point). After voltage drops to values above 30 % U_c, generating plants with internal combustion engines must fulfil the technical functions of full dynamic network support.

  Note: Taking account of the above, under-voltage protection U<< shall be instantaneously adjusted to 0.45 U_{NS} (thus on the under-voltage side of the unit transformer).

- During a network fault, the network voltage shall be supported by feed-in of a reactive current into the network.

- After fault clearance, the generating plant must not withdraw more inductive reactive power than prior to the fault.

Notes:

- *The use of vector surge relays is admissible until 1st January 2013.*

- *Generating plants with internal combustion engines do not supply the maximum possible short-circuit power in the event of faults. The k-factor cannot be adjusted.*

- *In German medium-voltage networks, the system short-circuit capacity usually amounts to at least 15 MVA.*

Basically, proof of the **satisfaction of the Guideline's requirements** according to Chapter 6 of the Guideline [1] shall be furnished to the network operator. This proof shall relate to the technical requirements to be satisfied at the date of commissioning of the photovoltaic plants or of the fuel cell plants pursuant to [1] and this „Supplement to the Technical Guideline".

Proof of the satisfaction of requirements shall be furnished not later than 1st January 2014 at least through the forms F.1, F.4 and F. 5 in Annex F of the Guideline [1] (or alternatively through the forms attached to the Technical Connection Conditions of the network operators) and by means of a corresponding inspection record about the measurements of the electrical properties regarding the generating plant's connection to the network.

Complete evidence of the electrical properties (certification requirements) according to Chapter 6 of the Guideline [1] shall become effective with a corresponding delay from 1st January 2014. If it is not possible to submit the certificates for generating plants with internal combustion engines from 01/01/2014, the plant operator shall prove to the network operator that issuing of the certificates has been ordered. Proof can be furnished through the acknowledgement of order by the certification body. The implementation of all relevant technical connection conditions of which proof has to be provided in the certificates shall be guaranteed by the plant operator. Moreover, the plant operator shall declare by written mail to the network operator that the certificates, including the conformity declaration, will be supplied as soon as possible, but not later than 31 December 2014. The conformity declaration shall prove that the generating plant was constructed in conformity with the plant certificate.

If the respective plant operator has not yet submitted any certificates for these generating plants with internal combustion engines by 1st January 2015 to the responsible network operator, and if these plants do not comply with the requirements of this Chapter 2.9, the network operator shall be entitled to demand the disconnection of these generating plants from the network or may itself disconnect them from the network.

2.10 Definition „agreed service voltage U_c„

In the BDEW Guideline „Generating plants connected to the medium-voltage network", U_c (definition of U_c is identical with DIN EN 50160 in terms of contents) is described as follows:

„Normally, the agreed service voltage is equal to the rated network voltage U_n. If the network operator and the customer agree on a voltage at the transfer point which is at variance with the rated voltage, this voltage is the agreed service voltage U_c."

German medium-voltage networks show the particular feature that network operators contractually agreed with a certain part of the medium-voltage customers on the „agreed service voltage U_c" and not on the rated voltages (10 kV, 20 kV or 30 kV). This is due to historical reasons which take account of the development of electricity networks and customer facilities. For instance, agreed service voltages of 8.5 kV, 15 kV, 27 kV or 33 kV are known. The term „agreed service voltage" is therefore consistently used in the BDEW Guideline within this meaning though the agreed service voltage is identical with the rated network voltage in a major part of medium-voltage networks. Normally, the agreed service voltage is not equal to the target value of the voltage controller for the HV/MV transformer. Agreed service voltages are not common in German low and high-voltage networks.

2.11 Summary

Table 1 provides a survey of the transitional periods for meeting specific technical requirements in addition to the Guideline [1].

Table 1: Survey of transitional periods

Technical requirement	**To be satisfied (at the latest) from:**	
	Wind energy plants, photovoltaic plants / fuel-cell plants	**Generating plants with internal combustion engines**
Steady-state voltage control	01/04/2011	01/01/2010
Full dynamic network support	01/04/2011	01/01/2013
Certification obligation	01/04/2011 *	01/01/2014 **

Note: If the certificates for PV and fuel cell plants commissioned from 01/04/2011cannot be submitted yet at the time of commissioning, the plant operator shall prove to the network operator that issuing of the certificates has been ordered. Proof can be furnished through the acknowledgement of order by the certification body. The implementation of all relevant technical connection conditions of which proof has to be furnished in the certificates shall be guaranteed by the plant opera-*

tor. Moreover, the plant operator shall declare by written mail to the network operator that the certificates, including the conformity declaration, will be supplied as soon as possible, but not later than 31 December 2012. The conformity declaration shall prove that the generating plant was constructed in conformity with the plant certificate.

If the plant operator has not yet submitted any certificates for these PV or fuel cell plants by 1st January 2013 to the responsible network operator, and if these plants do not comply with the requirements of Chapter 2.8 of this paper, the network operator shall be entitled to demand the disconnection of these generating plants from the network or may itself disconnect them from the network.

*Note **: If it is not possible to submit the certificates for generating plants with internal combustion engines as from 01/01/2014, the plant operator shall prove to the network operator that issuing of the certificates has been ordered. Proof can be furnished through the acknowledgement of order by the certification body. The implementation of all relevant technical connection conditions of which proof has to be furnished in the certificates shall be guaranteed by the plant operator. Moreover, the plant operator shall declare by written mail to the network operator that the certificates, including the conformity declaration, will be supplied as soon as possible, but not later than 31 December 2014. The conformity declaration shall prove that the generating plant was constructed in conformity with the plant certificate.*

If the respective plant operator has not yet submitted any certificates for these generating plants with internal combustion engines by 1st January 2015 to the responsible network operator, and if these plants do not comply with the requirements of Chapter 2.9 of this paper, the network operator shall be entitled to demand the disconnection of these generating plants from the network or may itself disconnect them from the network.

Regarding wind energy, photovoltaic and fuel cell plants, the date of commissioning shall be applicable; concerning generating plants with internal combustion engines, the date at which the complete application documents (except for the unit certificate; deadline see note **) are available to the network operator shall be applicable.

References

[1] Technical Guideline „Generating plants connected to the medium-voltage network – Guideline for generating plants' connection to and parallel operation with the medium-voltage network", June 2008, BDEW, Berlin

[2] FGW TR3 „Determination of electrical characteristics of power generating units connected to medium voltage, high voltage and extra-high voltage grids", Fördergesellschaft Windenergie und andere Erneuerbare Energien FGW e. V. (current status: Revision 22)

[3] FGW TR8 „Zertifizierung der Elektrischen Eigenschaften von Erzeugungseinheiten und -anlagen am Mittel-, Hoch- und Höchstspannungsnetz", Fördergesellschaft Windenergie und andere Erneuerbare Energien FGW e. V. (current status: Revision 5)