Certification of Cogeneration Units

Paper delivered to the Affiliate Country Programme participants

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8.2 Group

Decentralized network of experts in renewable energies

8.2 GROUP

- 8.2 Denmark
- 8.2 Germany
- 8.2 Austria
- 8.2 France
- 8.2 Portugal
- 8.2 Pakistan
- 8.2 South Africa

- 28 international 8.2 offices
- 130 experts worldwide

Wind Onshore
Wind Offshore
Photovoltaics
Biogas/Biomass
Grid Integration
Condition Monitoring

More than 20 years of experience
Certification of power plants

» Experience in grid connection since 2009

- Cogeneration (e.g. biogas plants)
- Wind power
- Photovoltaic

» Certification of power plants

- In close cooperation with the VDE Institute (accredited acc. to IEC 17065)
- According to German law

» Over 150 plant certificates are to our credit
European Network Codes – Authority of Implementation
European Network Codes – Implementation in Germany

Different Committees

- Grid operators
- Producer Union
- Plant operators

Technical Guideline
- VDE-AR-N 4105
- BDEW MR VDE-AR-N 4110
- VDE-AR-N 4120 (TC 2007)

Technical Matter

- Grid Codes
- System Operation Codes
- Market Codes

Market Matter

ENTSO-E Network Codes

EU-Commission & ACER

Technical Guideline

- VDE-AR-N 4105
- BDEW MR VDE-AR-N 4110
- VDE-AR-N 4120 (TC 2007)
Interaction of German law and present technical guidelines

German legislator
Law of Implementation of Renewable Energies (EEG)

Ordinance of System Services

Guideline Medium Voltage (BDEW)
Guideline High Voltage (TC 2007)

Federation of wind power and other renewable energies

Technical Directives (as interface between law & practice)
All power plants have to support the grid by providing system services:

- Frequency stability
- Voltage stability
- Management of supply failures (short circuits such as earth faults)

Renewable power plants should behave like conventional power plants:

- Since Medium Voltage Guideline 2008

In case of supply failure, RPP are supposed to support the grid similar to conventional plants.
• Renewable power plants must be able to weather voltage dips
• The plant must remain connected to the grid at voltages above the limit curve
• Causes for undervoltage: Supply failure, e.g. short circuit
Who needs a certificate?

Generation Units:
» All Generation Units > 100 kW

Power Plants:
» Power plants from 1 MVA_{el} or 2 km supply line
» In case of substantial changes / repowering to the plant
Why is a certificate needed?
Data Acquisition, Unit certificate and Plant Certificate

TD 8 by FGW
(Certification body accredited acc. IEC 17065)
Certification of electrical components of RGU and RPP

TD 3 by FGW
(IEC 17025)
Determination of electrical properties

TD 4 by FGW
Requirements on modeling and validation of simulation models

Validation
Comparison of measured results with results of simulation

Unit certificate

Measure-
ment

Modeling

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Certification process of a power plant

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What we assess in a plant certificate

- Frequency dependant behaviour of active power
- Voltage dependant behaviour of reactive power
- Reaction of power plant to grid fault
Single line overview of a main components

Grid
Grid operator
Plant
Plant op./planner
RGU
Unit Certificate
And Producer Info

Legacy RGU need to be taken into account as well
Time management is crucial

- Inclusion of certifier: 6 months before commission
- Time for calculation and simulation: 8 weeks after submission of all documents
- Preparation of documents: 2 weeks to 2 months
- Coordination with grid operator: 2 weeks to 6 weeks
- Deadline for completion: 2 weeks before commission
- Conformity check within 6 months after commission
Summary

» Indirect contribution of IEC to German directives
Influencing European System through CENELEC and EU-C

» European norms are implemented through national committees including Stakeholder Committees in Germany

» Technical Directives to support parties with fulfillment

» Certification bodies evaluate plants and units with respect to standards

» RGU suppliers must provide unit certificates

» Sufficient planning time in plant certification is crucial
Thank you.

Thank you for your attention!

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Grid Integration
Consulting & Expert Assessments

Renewable power plants' grid connection has to meet high requirements so that the power produced can be safely fed into the grid. The experts of 8.2 Consulting AG provide the necessary electro-technical information to make the right decision and assure that your project is in accordance with the grid requirements.

We support you along the way and ensure that a trustful relationship can be established with all relevant stakeholders in the sensitive process of grid connection of power plant projects.

Our Services

8.2 Consulting AG is an acknowledged cooperation partner with the VDE Testing and Certification Institute. We have been active in the field of electrical grid calculations for renewable energy plants since 2009.

Our grid connection services for renewable energy power plants include:

» Consultancy
» Expert assessments
» Conformity verification
» Issuing of system certificates for wind energy, PV and combustion turbines
» Technical Due Diligence of wind farms with focus on grid connection and transformer stations
» Simulation and analysis

Our experts use the world's most recognized simulation software DlgsILENT PowerFactory. This planning tool is highly recognized by grid providers, planners and is used by many manufacturers in the field of renewable energy.
Critical aspects with respect to grid integration

» Short-circuit resistance, continuous current carrying capacity and switching capacity of the main components
» System perturbations as fast voltage changes, long-term flicker, harmonics and inter-harmonics
» System dynamics and stability
» Validation of electrical design control system

» Operational reliability and safety
» Short-circuit current contribution
» Static reactive power supply
» Connection conditions and decoupling protection
» Voltage and frequency stability
» Energy management
» Losses and self consumption

8.2 Consulting AG provides support with the complex guidelines and criteria and paves the way for a successful grid connection.

About us

8.2 Consulting AG is your reliable partner throughout all project phases. As part of the 8.2 Group we provide a wide range of consulting services and technical inspections.

Since 2006 we have been active in the offshore wind industry and are now involved in more than 70% of the German offshore wind projects.

Our experts provide knowledge and practical experience of more than 20,000 wind turbine inspections and more than 6,000 MW Due Diligence projects on- and offshore worldwide.

8.2 References

Our grid integration experience is based on:

» More than 130 expert reports on wind farm’s grid connection for the most common turbine types
» More than 15 expert reports and consulting on grid connection for PV plants larger than 1 MW
» More than 30 expert reports for CHP plants with synchronous generators
» More than 30 technical wind farm due diligences with focus on grid connection and substations
» Consulting on grid integration issues of offshore wind farms
» Expert reports on electrical properties and operational readiness for offshore wind farms