

# Experiences with certification process and certified model validation in Germany

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**Moeller Operating Engineering GmbH**

2011-06-17



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## Agenda



### 1. Presentation of M.O.E

- a) Jochen Möller
- b) Competences; Accreditations; capacity; Organisation

### 2. Current Situation in Germany

- a) Rate of RE
- b) Requirement of certification
- c) Processes of certification

### 3. LVRT Test and Certification

- a) Required Test
- b) Model validation

### 4. Project certification

- a) Process
- b) Target

### 5. Summary

# Speaker

## Dipl.-Ing. Jochen Möller

### **Past :**

Technical Director WINDTEST

Several International Standards WG

### **Nowadays:**

Convener FGW TC Electrical behaviour and WG-Leader for Certification

Publicly appointed and authorized by the chamber of industry and commerce

Managing director and owner of M.O.E.

Head of Certification body GGC



**Study: E-Technical**  
**From 1993 Wind&Grid**

**Expert for Grid integration**



MOE: SDL Wind Jochen Möller

No. 3

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## Location of M.O.E

- **Itzehoe Fraunhoferstraße 3, seit 11/2009**
- **Hamburg, Spaldingstraße 210, ab 05/2011**
- **Kiel, Am Kielkanal 2, ab 06/2011**



MOE: Technische Richtlinien Jochen Möller

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## What is M.O.E. doing?

### Grid connection/grid integration

- Certification, reports SDL and Grid code compliance
- Wind and sun and others

### Target Grid integration of RE without reduction of availability of the power supply

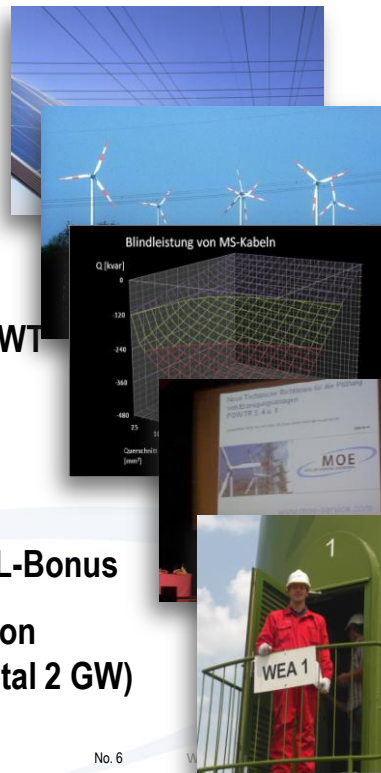
M.O.E.: SDL Equipment Jochen Möller



## GridCert References last two years M.O.E.

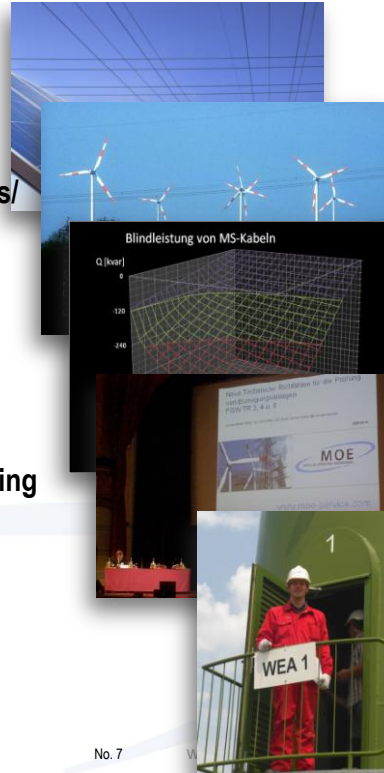
- 12/2010: Inspection of 1500 existing WT (3 GW)
- 04/2011: 15 type certification (PV and Wind)
- 04/2011: >40 project certification SDL-Bonus
- Until 12/2011: >200 project certification already contracted wind and sun (total 2 GW)

M.O.E.: Jochen Moeller ©



# Competence M.O.E.

- **Frame Contracts with the largest Owners/ Developers e.g. WPD, Ostwind, WKN**
- **First Certification body with acc. EN45011 and FGW TR8**
- **First general acceptance by the grid operator association and FGW**
- **Convener/Chairman for the German testing and certification guideline**



M.O.E.: Jochen Moeller ©

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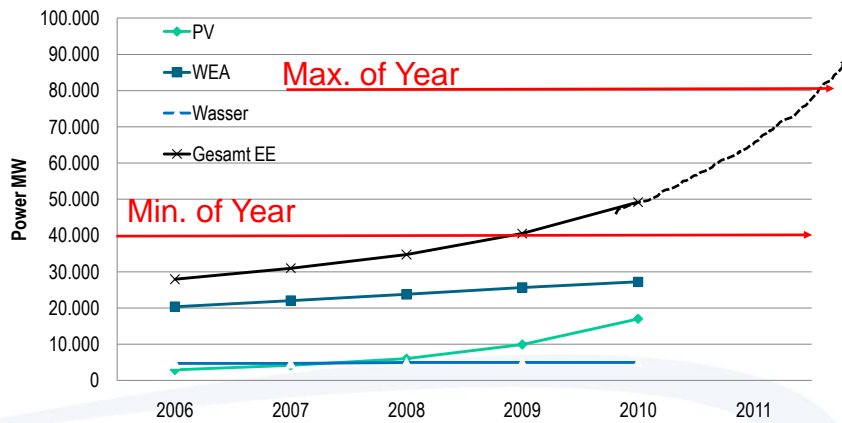
M.O.E.: SDL Wind Jochen Möller ©

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## RE in Germany

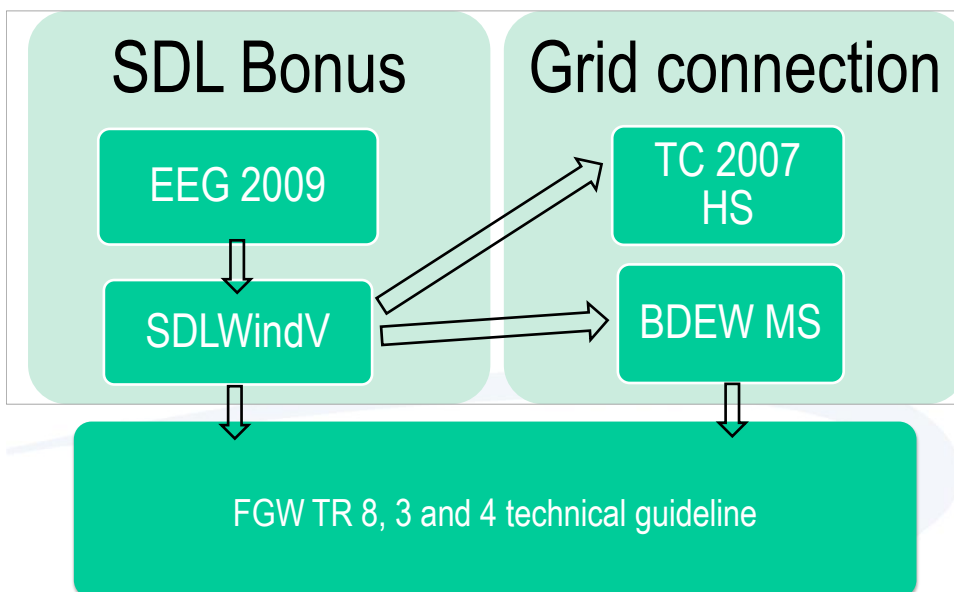
RE installed in Germany



Quelle: Entwicklung der erneuerbaren Energien in Deutschland im Jahr 2010  
Grafiken und Tabellen  
BMU Stand: 14. März 2011

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## Rights and Requirements

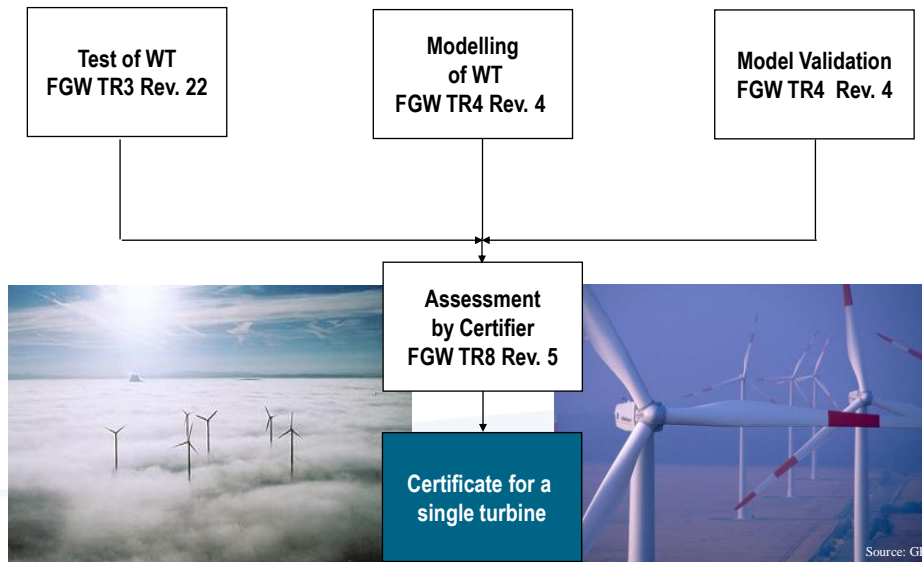


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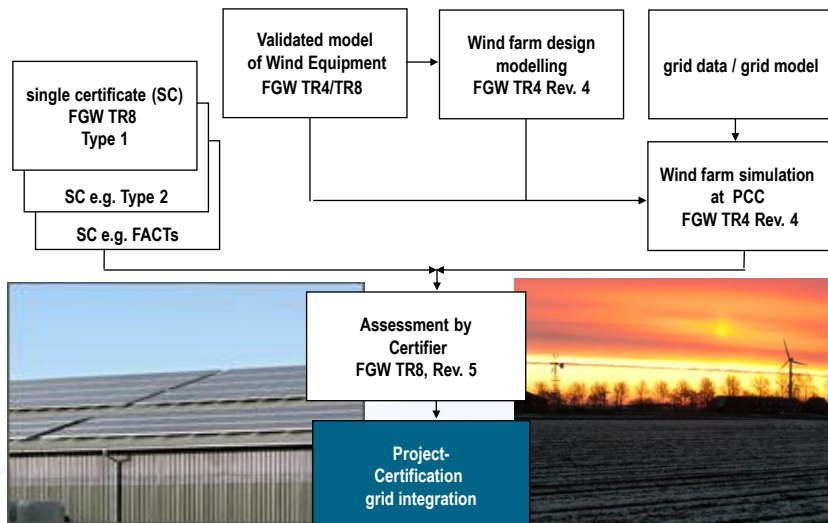
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# 1 Type test acc. BDEW/EEG



# Project acc. BDEW/EEG



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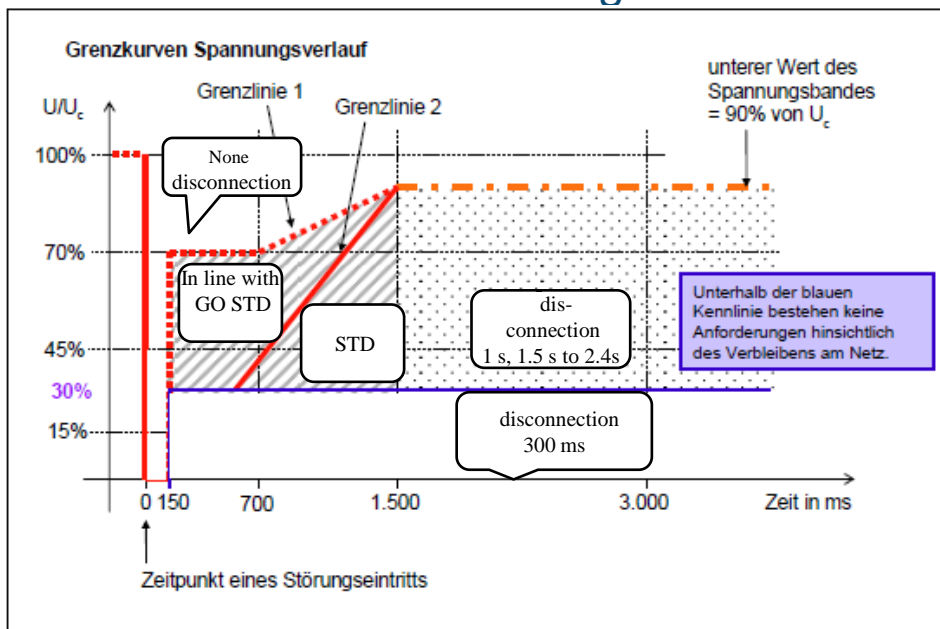
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# BDEW MV Level for RE generator

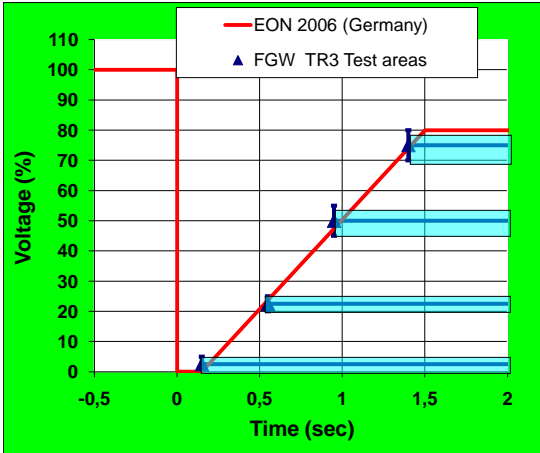


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No. 15

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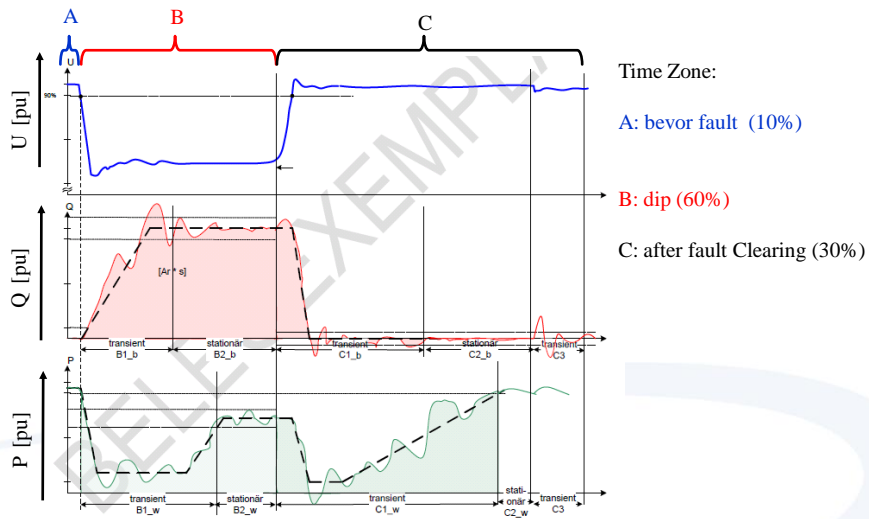
# Voltage dip test



Two- /three phase  
Part and full load

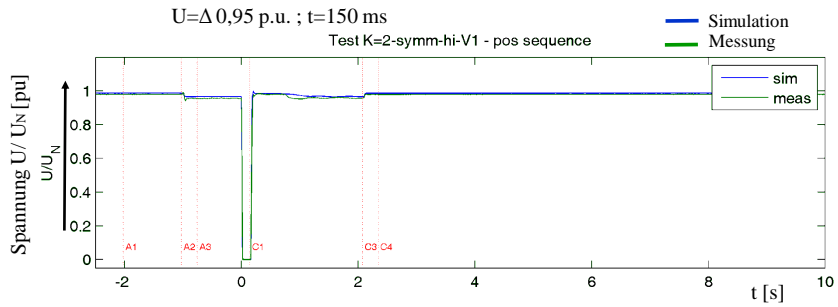
	Phase to phase Voltage ( $U/U_0$ )	period (ms)
	$\leq 0.05$	$\geq 150$
2	0.20 – 0.25	$\geq 550$
3	0.45 – 0.55	$\geq 950$
4	0.70 – 0.80	$\geq 1400$

# Time Area FGW TR4



Quelle: FGW TR4 Rev.5

## Example of model validation model

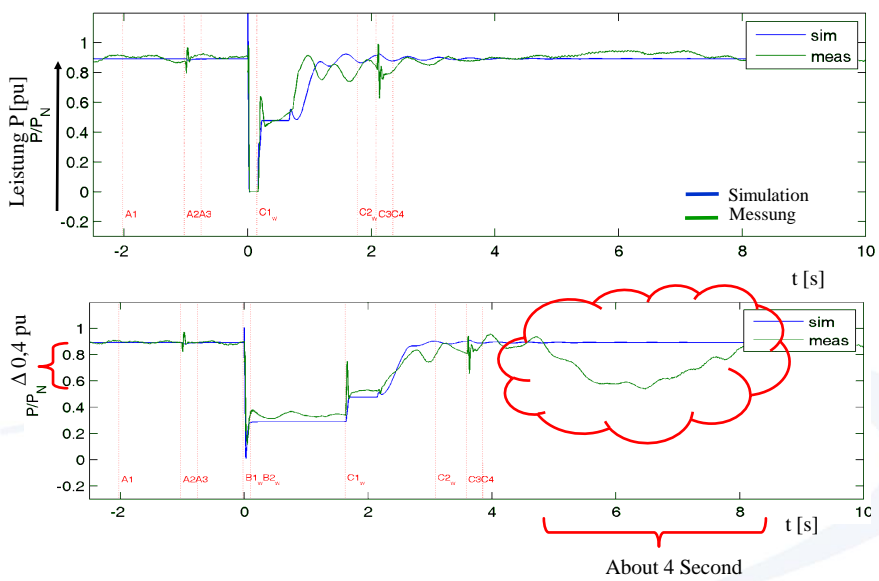


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## Example of model validation model

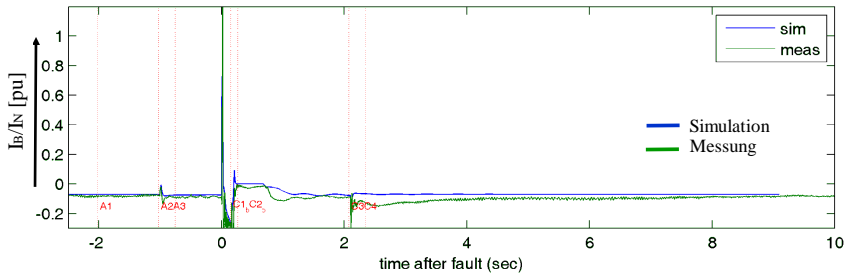


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# Beispiel: Modellvalidierung



# Certification of type Models

The image displays three documents related to model certification. On the left is a 'Validation plan' (A1) showing a grid of test cases. In the middle is an 'Overview plan' with sections for 'Nennleistung' (Nominal power) and 'Teilleistung' (Partial power), each containing sub-sections for 'Stromrichter' (Converter) and 'Generator'. On the right is a 'Zertifikat/Certificate' issued by DAKS (Dachau) and MCE (Munich) for 'Einheitszertifikat für Windenergieanlagen/ Type certificate for wind turbines'. The certificate includes technical details and a unique md5-number.

Quelle: FGW TR4

Validation plan by Certification body

Over view plan

Manufacturer:

•Unit certification and model with md5-number

# Experiences of type certification

- Need around 9 months
- 3 iteration of model design: Before the model fit the requirement according TR4



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# Basic for project certification is unit certification

**Total 63 type certification acc. TR8**  
**39 for Solar inverter**  
**24 for wind turbines**

**Valid longer than 30.06.2011**

**Total 39 type certification**  
**34 solar inverter**  
**5 Wind turbines**

Neuanlagen (Inbetriebnahme ab 01.01.2009)										Liste Stand 31.05.2011		
der einzelnen Erzeugungseinheiten nach 123 Mindestanforderungen für die einzelnen Erzeugungseinheiten am Mittelspannungsnetz												
Formzahl der ZVE	Typ der ZVE	Produktionsleistung der ZVE	Nennleistung der ZVE	Nennleistung des Erzeugers	Erzeugungskapazität des Erzeugers	Erzeugungskapazität des Erzeugers	Erzeugungskapazität des Erzeugers	Erzeugungskapazität des Erzeugers	Erzeugungskapazität des Erzeugers	Erzeugungskapazität des Erzeugers	Erzeugungskapazität des Erzeugers	Erzeugungskapazität des Erzeugers
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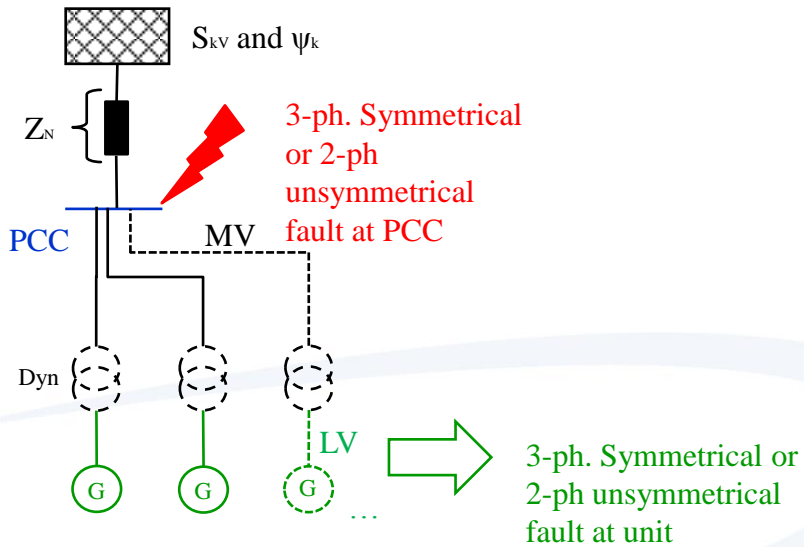
MOE: SDL Equipment Jochen Möller

# Grid protection review for unit and PCC

Specification of the grid operator for unit and PCC acc. TR8, Appendix Part A and B

**Review by the certification body**

## Example: LFRT Simulation of farm

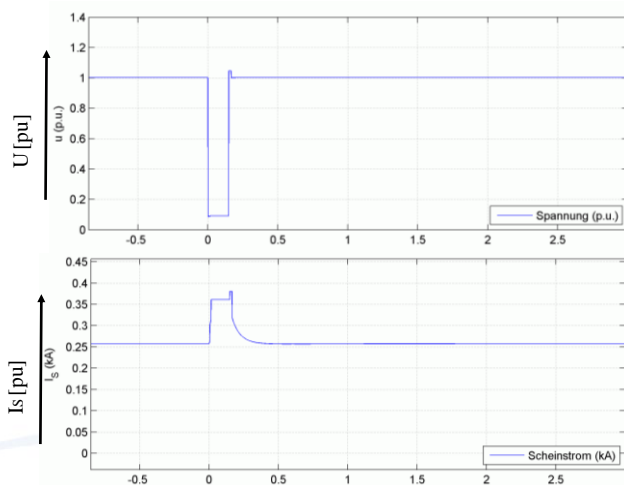


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No. 27

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## LFRT Simulation of farm

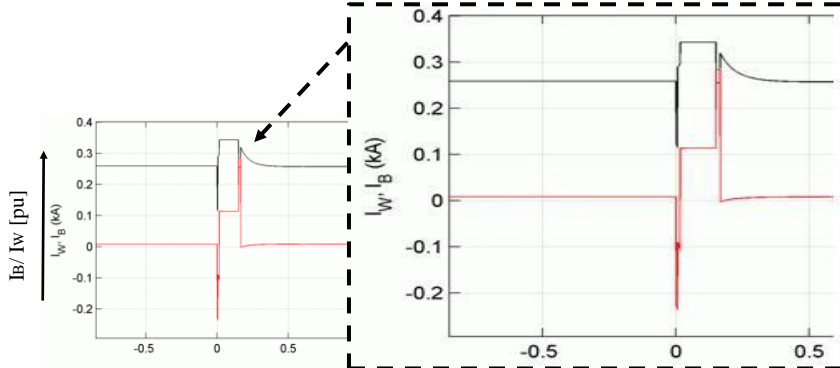


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## LFRT Simulation of farm



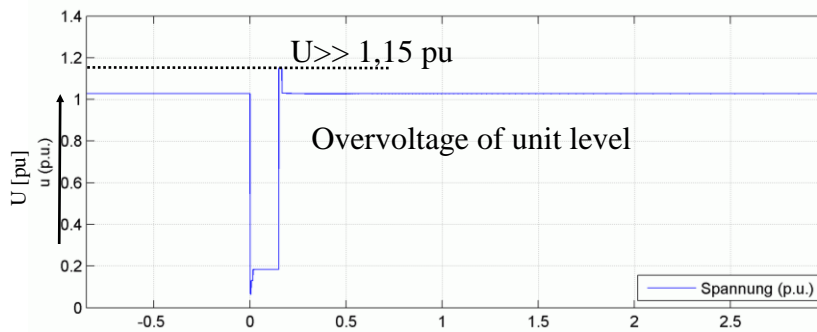
Versuch Nr.	Restspannung ( $U/U_C$ ) ohne Berücksichtigung der EZA	Blindstromeinspeisung während des Fehlers ( $I_B/I_{w'}$ )	Spannung am NVP ( $U/U_C$ ) mit Berücksichtigung der EZA	Spannung an der EZE <sub>wc</sub> ( $U/U_{N,EZE}$ )
1	9%	42,6%	9,18%	18,3%
2	25%	85,1%	25,95%	35,9%
3	50%	75,9%	51,70%	60,8%
4	80%	29,5%	81,15%	86,5%
5	12%	66,7%	14,10%	23,7%
6	25%	87,1%	28,58%	38,6%
7	50%	73,1%	53,16%	62,1%
8	80%	29,2%	81,39%	86,7%

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## LFRT Simulation of unit

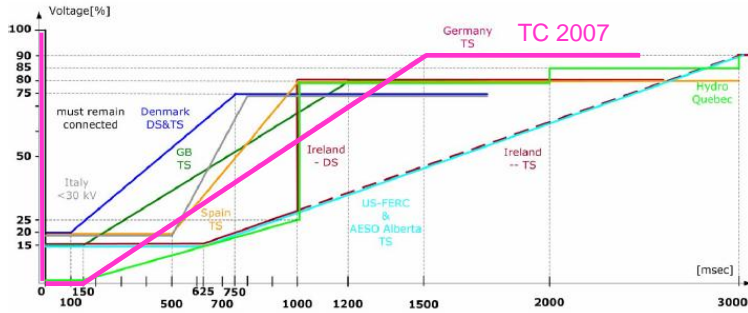


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No. 30

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# Target Transfer to different voltage dips

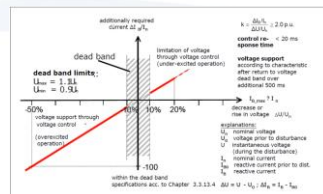
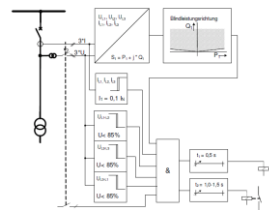


Quelle: RISØ, 2007, Mapping of grid faults and grid codes

# Final Target aspect of the dyn. model

## Simulation of

- the k-Factor at the turbine for the PCC
- Review of the grid protection settings
  - Overvoltage  $U <$
  - Current  $I \ll$  and  $I >$
  - $Q \rightarrow \& U >$
- Level of LVRT trigger  $U_{LVRT}$



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No. 33

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## Advantage by certification process

- Manufacture:** Independent Proven Quality has a better market share  
Risk reduction to fail the requirement  
Model and Knowledge is protected by NDA
- Operator of power plant:** Independent process from the grid operator  
Risk reduction and clear confirmation
- Grid operator:** Less work for assessment  
Reduction of liability  
At least four eye check of results  
None NDA with manufactory is necessary  
Grid data confidential handled by the certification body
- Power supply client and global:** transparency of the process and higher availability of the service function of the power supply by RE

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No. 34

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## Summary



### Wind

- Since 2009 Bonus of 0.5 cent /kWh if certified
- Since 01.04.2011 without certification none payment acc. EEG.

### Solar

- Since 01.04.2011 Solar parks > 1 MW certification for grid access

### Biomass/block heat and power plant

- From 01.08.2013 full certification for grid access

Grid operator get much more information than ever before.  
Independent body between developer/operator of solar or wind farm and Grid operator by the certification body

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No. 35

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## Further Links

- Full 36 slides ppt download [www.moe-service.com/Downloads](http://www.moe-service.com/Downloads)
- Free open Generic model DIFG Model based on MatLab [www.moe-service.com](http://www.moe-service.com) will be available in the two or three weeks

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No. 36

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**Thank you for your attention!**



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No. 37

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