

GTZ-TERNA Expert Workshop 2008

Grid and System Integration of Wind Energy

Jerusalemkirche, Lindenstr. 85, 10969 Berlin, Germany

September 15 – 19, 2008

Programme

Grid and System Integration of Wind Energy					
	Wind and wind power prediction	Dispatch planning (central approach)	Power trade, windpower	TERNA Expert Dialogue 2008	Field Trip
	Monday 15.09.2008	Tuesday 16.09.2008	Wednesday 17.09.2008	Thursday 18.09.2008	Friday 19.09.2008
09:00	Registration Welcome by GTZ Introduction of the participants	Introduction to dispatch planning Optimal plant mix IEA flexibility approach Situation in participant's countries	Challenges market design with wind power Day ahead market design Pool vs. bilateral Reserve market design	TERNA Expert Dialogue "New Markets in Latin America and the Mena Region" Session I	Field Trip Start at 8:00! Vattenfall Dispatch Center
10:00	Overview of the workshop programme Defining the Integration challenge Wind energy development in Germany Analytic approach to the integration challenge	coffee break Advanced dispatch planning Reserve provision Demand response Wind curtailment	Practical market designs Country examples DE, ES NL, participants		
11:00	coffee break Introduction to windpower forecasting		coffee break Modeling power prices Influence of wind Wind impact on price (Energy Brainpool)	TERNA Expert Dialogue Session II	See detailed programme
12:00	The challenge of wind and weather prediction (MC Wetter/Meteogroup)	Lunch	Lunch		
13:00	Lunch	Control reserves with fossil fuelled power plants (Siemens)	Optimisation and trading Conv. dispatch optimisation in market environment (Vattenfall Trading)	TERNA Expert Dialogue Session III	Visit of a wind farm near Berlin
14:00	Wind power predictions Basic forecasting techniques Presentation of the physical approach with prerequisites & results	coffee break Advanced dispatch simulation Ewis II approach WILMAR model (University of Stuttgart)	Electricity trading, an operator's perspective Data process management (Winguard Dynamics)		
15:00	(energy & meteosystems) coffee break	Summary	coffee break		
16:00	Modeling of spatial dependence Modeling stochasticity and correlations Summary	Time for sightseeing and shopping	Summary day 1-3 Outlook Closing discussion		
17:00					
18:00	Sightseeing City tour with dinner		Get together BWE/VDMA	Evening Boat trip	
19:00					
20:00					

Monday, 15 September 2008

09:00 **Welcome and Registration to the Expert Workshop**

09:30 **Welcome and general Context of the Workshop**

Dr. Rolf Posorski
Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH

09:45 **Overview of the Workshop Programme**

Dr. Christian Nabe
Ecofys Germany

Defining the Integration Challenge

10:00 **Background: Wind energy development in Germany**

- Goals of wind energy development
- Political Instruments
- Development of installed capacity

Analytical approach to the integration challenge

- Technical Framework conditions of the power system
- Typical Regulatory and economic framework conditions

Dr. Christian Nabe
Ecofys Germany

11:00 **Coffee Break**

Wind energy forecasting

11:30 **Introduction to windpower forecasting**

- Overview of current approaches and the following speakers

Dr. Christian Nabe
Ecofys Germany

The challenge of wind and weather prediction

- Global wind and weather systems
- Theoretical prediction approaches
- Data requirements and management
- Range of commercial weather services

Melanie Hofmann
Meteogroup/ MC Wetter

12:45 **Lunch break**

13:45 **Wind power predictions**

- Prediction tasks: Single site vs. ensemble
- Required data
- Strength and weaknesses of methodologies
- Results and practical experiences
- Outlook on further improvements

Dr. Ulrich Focken
Energy & meteo systems

15:30 **Coffee break**

16:00 **Modeling of Spatial Dependence in Wind Power Forecast Uncertainty**

- Sources of insecurities
- Spatial correlation of insecurities
- Mathematical treatment of spatial correlations
- Synthetic simulation of wind predictions

Dr. Georgios Papaefthymiou
Ecofys Germany GmbH

Summary and final discussion of day 1

17:00 **End of day 1 and Snack**

18:00 –
20:00 **Sightseeing City tour**

Tuesday, 16 September 2008

Wind integration in plant dispatch

09:00

Introduction to dispatch planning I

- Wind in the power plant merit order
- Wind's influence on the theoretical optimal plant mix
- Considering conventional plant flexibility: the IEA "flexibility test"
- Conventional plant mix in participant's countries and implications for wind integration

Dr. Christian Nabe
Ecofys Germany GmbH

10:15

Coffee break

10:45

Introduction to dispatch planning II

- Overview Reserve provision in systems with high wind penetration
- Capacity credit and replacement reserves
- Spinning reserve requirements
- Providing reserves from wind, curtailment
- Wind and demand response
- Impacts on system size and interconnector capacity

Dr. Christian Nabe
Ecofys Germany GmbH

12:00

Lunch break

13:00

Control reserves with fossil fueled power plants

- Grid frequency control: basics, types and definitions
 - Requirements to power plants: international comparison
 - Examples for frequency behaviour in different grids
 - Technical capabilities and limitations in coal fired Steam Power Plants
 - Examples of solutions
 - Retrofit possibilities
- Combination of gas turbine and combined cycle PP with wind farms

Dr. Ulrich Tomschi
Siemens Energy, Erlangen

14:15

Coffee break

14:45

Advanced dispatch simulation

- Stochastic electricity market modelling
- i. Generation of wind power forecast scenarios
- ii. Stochastic optimisation of power plant operation
- iii. Results from optimisation
- Applications
- Summary and Outlook

Rüdiger Barth
University of Duisburg, University of Stuttgart

Summary and final discussion of day 2

16:00 **End of DAY 2, Individual time for sightseeing and shopping**

Wednesday, 17 September 2008

Wind power and power trade

09:00 **Challenges of market design with wind power**

- Principles of day-ahead market design
- Interactions of support schemes and power markets
- Design of reserve markets
- Interaction of support schemes and reserve markets

Dr. Christian Nabe
Ecofys Germany GmbH

10:15 **Practical market designs and support schemes**

- Wind and market design in various European countries (Germany, Netherlands, Belgium)
- Recent developments and upcoming regulations
- Experiences from participant's countries

Dr. Christian Nabe
Ecofys Germany GmbH

11:00 **Coffee break**

11:30 **Modeling power prices - What is the Influence of Wind Power Feed-in?**

- Influencing factors on electricity prices
- Modeling approaches for price developments
- Influence of wind to prices, theory and practise

Steffen Sacharowitz
Energy Brainpool GmbH

12:30 **Lunch break**

13:30 **Wind power and Conventional power plants - Optimization and Trading**

- Dispatching conventional plants in a market environment
- Impact of wind power on power trading

Hartmuth Fenn
Vattenfall Trading Services

14:30 **Electricity trading, a plant operator's perspective**

- Data requirements in the operational wind farm management
- Challenges of wind farm data acquisition
- Technical solutions for wind farm portfolios
- Online demonstration of W'ONDER data management

Falko Fesser
Windguard Dynamics GmbH

15:30 **Coffee break**

16:00 **Summary day 1-3, outlook and closing discussion**

Dr. Christian Nabe
Ecofys Germany GmbH

17:00 **End of the Workshop**

18:00 **Get Together from GTZ/BWE/VDMA**
venue "Landesvertretung Sachsen-Anhalt",
Luisenstr. 18, 10117 Berlin

Simultaneous Translation will be provided in English, French, Spanish and Chinese.

Wind Energy and Development Dialogue

Field Trip

19 September 2008

- 08:00 **Departure from Hotels**
- 09:00 **Visit to Vattenfall Europe Transmission Dispatch Centre in Berlin**
- 12:00 **Transfer by Bus to Nauen**
- 13:00 **Lunch in Nauen**
- 14:00 **Visit to a Wind Farm in Nauen**
- 16:00 **Transfer to the Hotels**

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