



**Royal Institute of
Technology**
Stockholm, Sweden



TSO - Western Part of Denmark

**Fourth International Workshop on Large-Scale
Integration of Wind Power and Transmission Networks
for Offshore Wind farms
October 20-21, 2003
In Billund, Denmark**

Preliminary Program
(Version 1.3, 2003-08-06)

Program Overview			
Sunday 19	Monday 20	Tuesday 21	Wednesday 22
	8:00 - 9:00		Eltra Day
	Registration		
	9:00 - 11.10	9:00 - 10.30	9:00 - 13:00
	Welcome and Session 1: Danish Perspective	Session 5: Wind Turbine Modelling	Eltra Presentations
	11:30 - 12.50	11:00 - 13.00	
	Session 2: World-Wide Experience	Session 6a: Grid Integration I	Session 6b: System Operation
	13:00 - 14.00	13:00 - 14.00	13:00 - 14.00
	Lunch	Lunch	Lunch
	14:00 - 16.00	14:00 - 15.20	
	Session 3a: Energy Management	Session 3b: Offshore Wind Power	Sightseeing Flights Horns Rev Offshore Wind Farm
	16:15 - 18.00	15:35 - 17.15	
	Session 4a: Power Quality	Session 4b: Wind Prediction	
	18:00 - 20:00		
Registration & Snack	19:30		
	Dinner		

Sunday 19 October 2003

18:00-20:00 Registration & Snack

Monday 20 October 2003

8:00-9:00 Registration

9:00 - 9:10 Welcome and Introduction, Thomas Ackermann, KTH

9:10 - 9:20 Welcome from Eltra

9:20-11:10 Session 1:

9:20 - 10:40 Presentations: **The Danish Perspective**
(20 minutes each)

- ***Impacts Of Large-Scale Wind Power On The Power Market***, Berit B. Kristoffersen, Bjarne Donslund, Peter Børre Eriksen, Eltra, Denmark;
- ***Integration Of Wind Power In The Grid In Eastern Denmark***, C. Rasmussen, P. Jørgensen, J. Havsager Elkraft System, Denmark;
- ***The Active And Reactive Power Control System For The Horns Rev Offshore Wind Farm And The Results Of Its Commissioning***, Peter Christiansen, Jesper R. Kristoffersen, Tech-wise A/S, Denmark.
- ***Energy System Analysis of Large-Scale Integration of Wind Power***, Henrik Lund, Department of Development and Planning, Aalborg University, Denmark.

10:40 - 11:10 Discussions, Discussion leader: to be announced;

11:10 - 11:30 Coffee break

11:30-12:50 Session 2:

11.30-12.30 Presentations: **Worldwide Experience**
(20 minutes each)

- ***Integration Of 6.000 MW Offshore Wind Energy In Dutch Electrical Grid***, J.W. Cleijne, C.P.J. Jansen, KEMA; J.G. Sloopweg, W.L. Kling, Delft University of Technology, the Netherlands;
- ***Offshore Wind Power In German Transmission Networks***, M. König, M. Luther, W. Winter, E.on, Germany;
- ***Experience With Large Scale Integration Of Wind Power***, Herman Annendyck, Electric Power Research Institute (EPRI), USA.

12:30-12:50 Discussions, Discussion leader: to be announced;

13:00-14:00 Lunch

14:00-16:00 Parallel Session 3a

14.00 - 15.30 Presentations: **Energy Management**
(18 minutes each)

- ***Simulation Model Including Stochastic Behaviour Of Wind Power***, Jens Pedersen, Peter Børre Eriksen, Eltra, Denmark;
- ***Analysis Of Large Scale Integration Of Wind Power In Regional HV-Grids Using Probabilistic Power Flow***, Diedrichs, V., Wieben, E., Wilhelmshaven, Germany;
- ***Dimensioning Of Wind Power Plants In Areas With Limited Transmission Capacity***, Julija Matevosyan, Royal Institute of Technology, Stockholm, Sweden;
- ***Integration Of Large Offshore Wind Power Into Energy Supply***, B. Ernst, M. Hoppe-Klipper, K. Rohrig, Institute für Solare Energieversorgungstechnik, Kassel, Germany;
- ***EMS Principals For Wind Power Plant Operation And Market Interaction***, Jörgen Svensson, Dept. of Industrial Electrical Engineering and Automation, Lund University, Sweden;

15:30-16:00 Discussions, Discussion leader: to be announced;

14:00-16:00 Parallel Session 3b

14.00 - 15.30 Presentations: **Offshore Wind Power**
(18 minutes each)

- ***AC Cable Versus DC Cable Transmission For Offshore Wind Farms, A Study Case***, Kent Søbrink, Eltra, Dennis Woodford, Electranix and Régine Belhomme, Eric Joncquel, EDF, France;
- ***Aspects Of Cabling In Offshore Windfarms***, Heinrich Brakelmann, University Duisburg-Essen, Germany;
- ***System Approach On Designing An Offshore Windpower Grid Connection***, Dr. Juergen Bernauer, ABB Utilities, Mannheim, Germany; Kjell Eriksson, ABB Power Systems, Ludvika, Sweden; Ove Tollerz, ABB High Voltage Cables, Karlskrona, Sweden; Dorman Wensky, ABB Utilities, Manheim Germany;
- ***Engineering Design And Integration Experience From Cape Wind 420 MW Offshore Wind Farm***, Jeff Smith, Bob Zavadil Electrotek Concepts, Inc. Knoxville, TN; Chris Bryan, CBX Energy Engineering Waterville, ME, USA;
- ***Regulations To Award Concessions For Offshore Wind Power Plants***, Ole Langniss. Lund University Sweden and Poul-Erik Morthorst, Riso National Laboratory, Denmark.

15:30-16:00 Discussions, Discussion leader: to be announced;

16:00-16:15 Coffee break

16:15-18:00 Parallel Session 4a

16.15-17.35 Presentations: **Power Quality**
(20 minutes each)

- ***Power Quality Responsibilities by Grid Impedance Assessment at a Wind Power Production***, by A.Morales, J.-C. Maun, Université Libre de Bruxelles - Service de Génie Electrique, Belgium,
- ***An Enhanced Method For Determining The Power Quality In The Power***, Peter Axelberg, Unipower AB, Sweden;
- ***Harmonics And Interharmonics Generated By Wind Energy Converters – Measurements And A Novel Modelling Approach In The Frequency Domain***, Saniter Christoph, Schulz Detlef, Hanitsch Rolf Technical University of Berlin, Institute of Energy and Automation Technology, Germany;
- ***Windfarm Power Quality Monitoring And Output Comparison With EN50160***, Ivan Codd, ESB Networks, Dublin, Ireland.

17:35-18:00 Discussions, Discussion leader: John Eli Nielsen;

16:15-18:00 Parallel Session 4b

16.15-17.35 Presentations: **Prediction of Wind Power**
(20 minutes each)

- ***The State-of-the-Art in Short-Term Prediction of Wind Power - From a Danish Perspective***, Gregor Giebel, George Kariniotakis, Richard Brownsword, Risoe National Laboratory, Denmark;
- ***Design Of A Control Algorithm For Wind Speed Prediction Purposes***, P. Flores, A. Tapia, G. Tapia, EUITI, San Sebastián, Spain;
- ***Evolution Of Offshore Wind Power Prediction – Example Horns Rev***, U. Focken, M. Lange, J. Tembke, Carl von Ossietzky University of Oldenburg & I. Waldl, Overspeed GmbH, Oldenburg, Germany;
- ***Modeling, Simulation and Control of Large Wind Plants in Power Systems***, Lawrence E. Jones, Fabrice Hudry and Louis Signoretty, Alstrom EAI, USA & France.

17:35-18:00 Discussions, Discussion leader: to be announced;

19:30 Dinner

Tuesday 21 October 2003

09:00-10:30 Session 5

9:00-10:00 Presentations: **Wind Turbine Modelling**
(20 minutes each)

- ***Dynamic Phasor Modelling Of The Doubly-Fed Induction Machine In Generator Operation***, Emmanuel Delaleau, Univ. Paris-sud, France and Aleksandar M. Stankovic, Boston, USA;
- ***Direct Drive Synchronous Machine Models For Stability Assessment Of Wind Farms***, Markus Pöller and Sebastian Achilles, DIgSILENT GmbH, Germany;
- ***Validation Of DFIG Model Using 1.5 MW Turbine For The Analysis Of Its Behaviour During Voltage Drops In The 110 KV Grid***, Jens Fortmann, REpower Systems AG, Rendsburg, Germany.

10:00-10:30 Discussions, Discussion Leader: *to be announced*

10:30-11:00 Coffee break

11:00-13:00 Parallel Session 6a

11:00-12:30 Presentations: **Grid Integration Issues I**
(18 minutes each)

- ***Consideration Of System Requirements For Wind Farms During Grid Faults***, M.J.Lahtinen, A.R.Katančević, Fingrid Oyj, Finland;
- ***Integration Of A 300 MW Wind Park At Fladen, Kattegatt, Into The Swedish 130 KV Grid***, Kjell Jonasson, Mats Carlson, Göteborg Energi AB, Sweden;
- ***About Possibilities To Integrate Wind Farms Into Estonian Power System***, by Olev Liik, Mart Landsberg, Rein Oidram, Tallinn Technical University, Department of Electrical Power Engineering, Estonia;
- ***Installation Of A Fault Current Limiter As An Alternative To Upgrade Substation Equipment***, Magnus Öhrström, Lennart Söder, and Henrik Breder, Royal Institute of Technology, Stockholm, Sweden.
- ***New Topology For More Efficient AC/DC Converters For Future Offshore Wind Farms***, Stephan Meyer, Remy Kollessar and Hans-Peter Nee, Royal Institute of Technology, Stockholm, Sweden.

12:30-13:00 Discussions, Discussion Leader: *to be announced*

11:00-12:50 Parallel Session 6b

11.00-12.20 Presentations: **System Operation**
(20 minutes each)

- ***Scheduling Of Wind Generation Resources And Their Impact On Power Grid Supplemental Energy And Regulation Reserves***, Yuri V. Makarov, California Independent System Operator, USA;
- ***Two Wind Power Prognosis Criteria And Regulating Power Costs***, C. S. Nielsen, Hans F. Ravn, Camilla Schaumburg-Müller, Informatics and Mathematical Modelling, Technical University of Denmark, Lyngby, Denmark;
- ***Utility Planning And Operational Security Standards And Their Applicability To Wind Based Power Sources***, D. Bailey, F. Castro Sayas, K. Harmer, M.King, PB Power, UK;
- ***The Effect Of Large-Scale Wind Power To A Thermal System Operation***, Hannele Holttinen, VTT Finland and Eltra.

12.20-12.50 Discussions, Discussion Leader: *to be announced*

13.00-14.00 Lunch

14:00-15:15 Session 7

14.00-15.00 Presentations: **Grid Integration Issues II**
(20 minutes each)

- ***Vestas Handles Grid Requirements: Advanced Control Strategy For Wind Turbines***, Sigrid Bolik, Björn Andresen, John G. Nielsen, Jens Birk, Vestas Wind Systems, Denmark;
- ***Power System Dynamic Performance Improvements From Advanced Power Control Of Wind Turbine-Generators***, Nicholas W. Miller, GE Power Systems, USA;
- ***Short Circuit Behaviour Of Wind Energy Converter - Advanced Features Of Enercon Infeed Inverter Concept***, S. Hartge, ENERCON, Aurich, Germany.

15.00-15.20 Discussions, Discussion Leader: *Thomas Ackermann, KTH*

15:20-15:35 Coffee break

15:35-17:15 Session 8

15.35-16.55 Presentations: Modelling
(20 minutes each)

- ***Voltage Stability Of Large Power Networks With A Large Amount Of Wind Power***, Vladislav Akhmatov, ELTRA, Denmark;
- ***Fast Dynamic Models Of Offshore Wind Farms For Power System Studies***, Johan Morren, Delft University of Technology, The Netherlands;
- ***Aggregated Wind Park Models For Analyzing Power System Dynamics***, Markus Pöller and Sebastian Achilles, DIgSILENT GmbH, Germany;
- ***Modelling Of Wind Farms In PSS/E***, Steven Stapleton Power Technologies International Ltd, UK; Yuriy Kazachkov, Power Technologies Inc., USA.

16.55-17.15 Discussions, Discussion Leader: *to be announced*

17:15-17.20 **Closing Remarks**

Wednesday 22 October 2003 - “Eltra Day”

9:00 – 13:00 Eltra Presentations

13:00 – 14:00 Lunch

14:00 - ?? Sightseeing flights to Horns Rev Offshore Wind Farm (weather depending)