VETENSKAP OCH KONST

eltra

TSO - Western Part of Denmark

Royal Institute of Technology

Stockholm, Sweden

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

Organised by Royal Institute of Technology, Stockholm, Sweden

Special this year: ELTRA day on 22 October including a seminar about ELTRA's experience with the large-scale integration of wind power and the opportunity to visit Horns Rev, the largest offshore wind farm in the world.

International Advisory Committee:

Göran Andersson	ETH, Switzerland
John Eli Nielsen	ELTRA, Denmark
Paul Gardner	Garrad Hassan, UK
Siegfried Heier	ISET, Germany
Hans Knudsen	DEA, Denmark
Lennart Söder	KTH, Sweden
Lawrence E. Jones	ALSTOM-EAI, USA

Into this fourth year, this workshop has developed into one of the premier conferences in its field. The workshop provides an international forum for researchers, engineers, economists and practising engineers in the fields of wind energy technologies, and transmission technologies/ systems, from around the globe to exchange knowledge and discuss their experience.

A major goal of this workshop is to develop a platform for discussing and sharing ideas and knowledge regarding the key issues. **An important part of the workshop will be devoted to in-depth discussions and brainstorming.**

Special: Eltra Day on 22. October

Eltra will hold a special seminar presenting Eltra's practical experience with large scale integration of wind power. Depending on the interest of attendance and the weather conditions, there will be an opportunity for a sightseeing flight to Horns Rev, the largest offshore wind farm in the world. The Cost of the flight are 900 SEK per person and booking for the flight must be made before August 31, 2003.

Participation in the Workshop

If you would like to attend this workshop please use the registration templet on our web page:

http://www.ekc.kth.se/ees/workshop/offshore

The workshop will be held in English. Up-dated information about the workshop will be available on the workshop web page.

Venue

The workshop will take place at Hotel Legoland in Billund, Denmark. For booking your hotel accommodation, please contact the hotel via fax: + 4575353810 or via email: hotel@legoland.dk. Important: You must mention "windpower" when booking to receive the special rate and you must book not later than 20 August.

Bring your kids, Legoland will still be open!

Registration Fee:

Early bird registration between 21 July and 31 August is 4,000 SEK (~435 Euro**) per person.** Registration fee after August 31 is 4,500 SEK (~490 Euro). Participation in the ELTRA day on the 22 October is free, but registration is necessary. Also register and pay for the flights to Horns Rev by **August 31.**

Preliminary Program

Monday 20 October 2003

Session 1 - The Danish Perspective

- ***Impacts Of Large-Scale Wind Power On The Power Market,*** Berit B. Kristoffersen et al. Eltra.;
- ***Integration Of Wind Power In The Grid In Eastern Denmark,*** C. Rasmussen et al. Elkraft;
- ***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,*** H. Lund, Aalborg University, Denmark;

Session 2 - Worldwide Expierence

- ***Integration Of 6.000 MW Offshore Wind Energy In Dutch Electrical Grid,*** J.W. Cleijne *et al.* KEMA;
- ***Offshore Wind Power In German Transmission Networks,*** M. König *et al.*, E.on, Germany;
- ***Experience With Large Scale Integration Of Wind Power,*** Herman Annendyck, EPRI, USA.

Session 3a - Energy Management

- ***Simulation Model Including Stochastic Behaviour Of Wind Power,*** Jens Pedersen *et al.* Eltra, Denmark;
- ***Analysis Of Large Scale Integration Of Wind Power In Regional HV-Grids Using Probabilistic Power Flow***, Diedrichs *et al.*, 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 *et al.*, ISET, Germany;
- ***– EMS Principals For Wind Power Plant Operation And Market Interaction,*** J. Svensson, Lund University, Sweden.

Session 3b - Offshore Wind Power

-AC Cable Versus DC Cable Transmission For Offshore Wind Farms, A Study Case, Kent Søbrink, *et al*, Eltra;
- Aspects Of Cabling In Offshore Windfarms, Heinrich Brakelmann, University Duisburg-Essen, Germany;
- System Approach On Designing An Offshore Windpower Grid Connection, J Bernauer, *et al.*, ABB Utilities, Mannheim, Germany;
- Engineering Design And Integration Experience From Cape Wind 420 MW Offshore Wind Farm, Jeff Smith *et al.*, Electrotek Concepts, USA;
- Regulations To Award Concessions For Offshore Wind Power Plants*, Ole Langniss et al. University Sweden.*

Session 4a - Power Quality

-Power Quality Responsibilities by Grid Impedance Assessment at a Wind Power Production, by A.Morales *etal.*, Université Libre de Bruxelles, Belgium;
– An Enhanced Method For Determining The Power Quality In The Power, Peter Axelberg, Sweden;
- Harmonics And Interharmonics Generated By Wind Energy Converters – Measurements And A Novel Modelling Approach In The Frequency Domain, Saniter Christoph, *et al.*, Technical University of Berlin, Germany;
- Windfarm Power Quality Monitoring And Output Comparison With EN50160, Ivan Codd, ESB Networks, Dublin, Ireland.

Session 4b - Wind Forecasting

- The State-of-the-Art in Short-Term Prediction of Wind Power - From a Danish Perspective, Gregor Giebel, *et al.*, Risoe National Laboratory, Denmark;
- Design Of A Control Algorithm For Wind Speed Prediction Purposes, P. Flores, *et al.*, EUITI, Spain;
-Evolution Of Offshore Wind Power Prediction – Example Horns Rev, U. Focken *et al.*, Carl von Ossietzky University, of Oldenburg, Germany;
-Modeling, Simulation and Control of Large Wind Plants in Power Systems, Lawrence E. Jones *et al.*, Alstrom EAI, USA & France.

Tuesday 21 October 2003

Session 5 - Wind Turbine Modelling

- Dynamic Phasor Modeling Of The Doubly-Fed Induction Machine In Generator Operation, Emmanuel Delaleau *et al.*, Univ. Paris-sud, France;
- Direct Drive Synchronous Machine Models For Stability Assessment Of Wind Farms, Markus Pöller *et al.*, DIgSILENT GmbH, Germany;
- Validation Of DFIG Model Using 1.5 MW Turbine For The Analysis Of Its Behavior During Voltage Drops In The 110 Kv Grid, Jens Fortmann, REpower Systems, Germany.

Session 6a - Grid Network Integration I

- Consideration Of System Requirements For Wind Farms During Grid Faults, M.J.Lahtinen *et al.*, Fingrid Oyj, Finland;
- Integration Of A 300 MW Wind Park At Fladen, Kattegatt, Into The Swedish 130 Kv Grid, Kjell Jonasson, Göteborg Energi AB, Sweden
- About Possibilities To Integrate Wind Farms Into Estonian Power System, Olev Liik *et al.*, Tallinn Technical University, Estonia;
- Installation Of A Fault Current Limiter As An Alternative To Upgrade Substation Equipment, Magnus Öhrström *et al.* Royal Institute of Technology, Stockholm, Sweden;
- New Topology For More Efficient AC/DC Converters For Future Offshore Wind Farms, Stephan Meyer, *et al.*, Royal Institute of Technology, Stockholm, Sweden.

Session 6b -System Operation

- 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, *et al.*, Technical University of Denmark, Lyngby, Denmark;
- Utility Planning And Operational Security Standards And Their Applicability To Wind Based Power Sources, D. Bailey, *et al.* , PB Power, UK;
- The Effect Of Large-Scale Wind Power To A Thermal System Operation, Hannele Holttinen, VTT Finland;

Session 7 - Grid Integration Issues II

- Vestas Handles Grid Requirements: Advanced Control Strategy For Wind Turbines, Sigrid Bolik *et al.*, Vestas Wind Systems A/S, 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.

Session 8 - Modelling

- 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 *et al.*, DIgSILENT GmbH, Germany;
- Modelling Of Wind Farms In PSS/E, Steven Stapleton Power Technologies International Ltd, UK; Yuriy Kazachkov, Power Technologies Inc., USA.

Wednesday 22 October 2003

Eltra Day and Flight to Hors Rev

Organisers/ Contact Details:

Web Page:
http://www.ekc.kth.se/ees/workshop/offshore

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