Preliminary Workshop Program

The 8th Workshop is sponsored by:

ABB  AREVA  DONG energy

ENERCON  Vestas  SIEMENS

ENERGINET/DK  DIGIT  UWIG  WOODWARD  SEG

The 8th Workshop is supported by:

wab  windenergie agentur

The 8th Workshop is organized by:

energynautics  solutions for a sustainable development
# Workshop Overview

<table>
<thead>
<tr>
<th>Time</th>
<th>Tuesday 13 Oct</th>
<th>Wednesday 14 Oct</th>
<th>Thursday 15 Oct</th>
<th>Friday 16 Oct</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 - 9:00</td>
<td>Tutorials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:00 - 11:00</td>
<td>Entrance Hall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09:00 - 13:00</td>
<td>Room Hanse</td>
<td>Room Hanse</td>
<td>Room Kaisen</td>
<td>Room Borgward</td>
</tr>
<tr>
<td>11:00 - 11:25</td>
<td>Welcome and Session 1</td>
<td>Session 5a</td>
<td>Session 5b</td>
<td>Session 5c</td>
</tr>
<tr>
<td></td>
<td>Keynote Session &amp; Panel</td>
<td>IEA Task 25</td>
<td>Grid Code Issues</td>
<td>Market Issues</td>
</tr>
<tr>
<td>11:25 - 13:00</td>
<td>Coffee Break</td>
<td>Room Kaisen</td>
<td>Room Borgward</td>
<td></td>
</tr>
<tr>
<td>13:00 - 14:00</td>
<td>Lunch</td>
<td>Room Kaisen</td>
<td>Room Borgward</td>
<td></td>
</tr>
<tr>
<td>14:00 - 15:40</td>
<td>Session 2a</td>
<td>Session 3a</td>
<td>Room Hanse</td>
<td>Room Hanse</td>
</tr>
<tr>
<td></td>
<td>Grid Integration Studies &amp; Experience: Europe</td>
<td>HVDC</td>
<td>German Grid Code Issues</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Session 2b</td>
<td>Session 3b</td>
<td>Room Kaisen</td>
<td>Room Kaisen</td>
</tr>
<tr>
<td></td>
<td>Connection of Offshore Wind Farms</td>
<td>Wind Forecast I</td>
<td>Wind Forecast II</td>
<td>Wind Forecast II</td>
</tr>
<tr>
<td>15:40 - 16:00</td>
<td>Coffee Break &amp; Poster Session</td>
<td>Room Borgward</td>
<td>Room Hanse</td>
<td>Room Hanse</td>
</tr>
<tr>
<td>16:00 - 18:20</td>
<td>18:00 - 20:00</td>
<td>20:00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conference Hotel</td>
<td>Reception, Registration &amp; Snack</td>
<td>Workshop Dinner</td>
<td></td>
</tr>
</tbody>
</table>

**Field Trip**

1. HVDC Light converter station for the BorWin1 project
2. wind turbine manufacturer ENERCON
3. BARD Engineering

<table>
<thead>
<tr>
<th>19.00-20.00 and 23.00-00.00</th>
</tr>
</thead>
</table>

---

**Workshop Overview**

- **Tutorials:** 8:00 - 9:00
- **Entrance Hall:** 9:00 - 11:00
- **Room Hanse:** Welcome and Session 1, Keynote Session & Panel, Coffee Break
- **Room Kaisen:** Session 5a, IEA Task 25, Session 5b, Grid Code Issues, Session 5c, Market Issues
- **Room Borgward:** Session 5c, Market Issues
- **Room Hanse:** Session 6a, Offshore Grid, Session 6b, Modeling I, Session 6c, Wind Power and Storage
- **Room Kaisen:** Session 6b, Modeling I, Session 6c, Wind Power and Storage
- **Room Borgward:** Session 6c, Wind Power and Storage
- **Room Hanse:** Lunch
- **Room Kaisen:** Lunch
- **Room Borgward:** Lunch
- **Room Hanse:** Session 2a, Grid Integration Studies & Experience: Europe, Session 3a, HVDC, Session 4a, Offshore Grid Connection, Session 5a, IEA Task 25, Session 5b, Grid Code Issues
- **Room Kaisen:** Session 2b, Connection of Offshore Wind Farms, Session 3b, German Grid Code Issues, Session 4b, Grid Integration Studies & Experience: North America, Session 5b, Grid Code Issues, Session 5c, Market Issues
- **Room Borgward:** Session 2c, Wind Forecast I, Session 3c, Wind Forecast II, Session 4c, SUPWIND – Decision Support Tools for Large Scale Integration of Wind / Windgrid: Wind on the Grid: An Integrated Approach, Session 5c, Market Issues
- **Room Hanse:** Session 6a, Offshore Grid, Session 6b, Modeling I, Session 6c, Wind Power and Storage, Session 7a, Power System Balancing, Session 7b, Wind Turbine Performance, Session 7c, Modeling and Offshore Transformer
- **Room Kaisen:** Session 6a, Offshore Grid, Session 6b, Modeling I, Session 6c, Wind Power and Storage, Session 7b, Wind Turbine Performance, Session 7c, Modeling and Offshore Transformer
- **Room Borgward:** Session 6a, Offshore Grid, Session 6b, Modeling I, Session 6c, Wind Power and Storage, Session 7b, Wind Turbine Performance, Session 7c, Modeling and Offshore Transformer

---

**Location:**
- Field Trip: i) HVDC Light converter station for the BorWin1 project
- ii) wind turbine manufacturer ENERCON
- iii) BARD Engineering

---

**Additional Information:**
- **Reception, Registration & Snack:** 19.00-20.00 and 23.00-00.00
- **Shuttle Service between Hotel Maritim and Hudson Loft:** 19.00-20.00 and 23.00-00.00

---

**Conference Hotel:**
- **Conference Hotel:**
- **Workshop Dinner:** 20:00
Tuesday 13 October 2009
18:00 – 20:00 Registration

Wednesday 14 October 2009
08:00 – 09:00 Registration
09:00 – 09:20 Opening
  09:00 – 09:10 Welcome and introduction, Thomas Ackermann
  09:10 – 09:15 Structure of the workshop

09:15 - 11:00 Session 1: Keynote Session & Panel
09:15 – 10:35 Presentations (20 minutes each):
  • Europe Going Renewable: The TSOs’ Power Transmission Challenges, A. G. Orths, P.B. Eriksen (Energinet.dk, Denmark)
  • European Wind Integration Study, L. Dale (National Grid, United Kingdom), L. Fischer (Vattenfall, Germany), D. Klaar (Tennet, The Netherlands), O. Alonso (REE, Spain), H. Vanderbroucke (ELIA, Belgium), K. Kolharkar (Transpower, Germany), W. Winter (Transpower, Germany), M. Uusitalo (NORDEL, Finland)
  • European Electrical Transmission System Export Capability for Increasing Wind Power Penetration, S. Beharrysingh, F. Van Hulle, (EWEA, Belgium)
  • Transmission Planning for Wind Energy: Status and Prospects, J. C. Smith (UWIG;USA), D. Osborn (MISO, USA), R. Piwko (GE, USA), R. Zavadil (Enernex, USA), B. Parsons (NREL, USA) D. Hawkins (CAISO, USA), W. Lasher (ERCOT, USA), B. Nickell (WECC, USA)
10:35 – 11:00 Discussions, discussion leader: Thomas Ackermann (Energynautics, Germany)

11:00 - 11:25 Coffee break

11:25 - 13:00 Session 2a: Grid Integration Studies and Experience: Europe
11:25 – 12:45 Presentations (20 minutes each):
  • Wind Energy Integration in the Spanish Electrical System, O. Alonso Garcia, M. de la Torre Rodríguez, E. Prieto García, S. Martínez Villanueva, J. M. Rodríguez García (REE, Spain)
  • Efficient Integration of Wind Energy at EnBW TSO, D. Graeber, O. Chatillon (EnBW, Germany)
• **Future Challenges of the Danish Power System - Results of Ecogrid.dk - Phase 1**, T. Ackermann (Energynautics, Germany), K. Norregaard (Teknologisk Institute, Denmark), P.-F. Bach, M. Lind (CET-DTU, Denmark), P. Sorensen (Risø-DTU, Denmark), B. Tennbakk (Econ Pöyry AS, Denmark), M. Togeby (EA Energy Analyses, Denmark), J. Østergaard (CET-DTU, Denmark)

12:45 – 13:00 Discussions, discussion leader: Antje G. Orths (Energinet.dk, Denmark)

### 11:25 - 13:00 Session 2b: Connection of Offshore Wind Farms

11:25 – 12:45 Presentations (20 minutes each):

- **Experience of transpower offshore with the first F50two grid connection projects for offshore wind parks (alpha ventus as an HVAC single connection and BARD Offshore 1 as an HVDC cluster connection)**, T. J. Lebioda, D. Zhang (transpower, Germany)
- **Innovative platform solutions with integrated design for offshore AC substations from 60 MW to 800 MW - experience from realized projects and future challenges**, Sven Höpfner; Uwe Gierer (AREVA Energietechnik, Germany), Richard Cooke (AREVA T&D UK, United Kingdom)
- **Integration of Offshore Wind with Modern HVDC Technology**, G. Stark (ABB, Germany)
- **International Grid solution at Kriegers Flak involving both Offshore Wind Power Plant and Interconnector Capacity**, H. K. Nielsen, P. B. Eriksen (Energinet.dk, Denmark)

12:45 – 13:00 Discussions, discussion leader: Sigrid. M. Bolik (REpower UK, United Kingdom)

### 11:25 - 13:00 Session 2c: Wind Forecast I

11:25 – 12:45 Presentations (15 minutes each):

- **Reduction of Wind Power Induced Reserve Requirements by Advanced Shortest-Term Forecasts and Prediction Intervals**, J. Dobschinski, A. Wessel, B. Lange, L. von Bremen (IWES/ISET, Germany)
- **Performance and Benefits of Ensemble Prediction Systems**, M. Denhard (ECMWF, United Kingdom), T. I. Petroliaigis, J. Tambke (ForWind/University of Oldenburg, Germany), R. Hagedorn (ECMWF, United Kingdom)
- **A new algorithm for Upscaling and Short-term forecasting of Wind Power Using Ensemble Forecasts**, C. Möhrlen (WEPROG, Germany), J. U. Jørgensen (WEPROG, Denmark)
- **Operational Experience with the Optimal Combination of Weather Models for Improved Wind Power Predictions**, M. Lange, U. Focken, K. Peters (energy & meteo systems, Germany)

12:45 – 13:00 Discussions, discussion leader: Gregor Giebel (Risø-DTU, Denmark)

### 13:00 - 14:00 Lunch
14:00 – 15:40 Session 3a: HVDC
14:00 – 15:20 Presentations (20 minutes each):

- **Multi-Terminal HVDC System for Large Offshore Wind Farm Integration and Transmission Network Support**, L. Xu (Queen's University Belfast, United Kingdom), Y. Wang (North China Electric Power University, China), L. Yao, J.-L. Rasololjanahary (AREVA, United Kingdom)
- **Grid connection of Krieger's Flak**, Å. Larsson (Vattenfall, Sweden)
- **Simulation Study of Wind Power Plant, VSC-HVDC and Grid Integrated System**, Sanjay K. Chaudhary, R. Teodorescu, R.N. Mukerjee (Aalborg University, Denmark), P. Rodriguez (Technical University of Catalonia, Spain), P.C. Kjær, P. W. Christensen (Vestas, Denmark)

15:20 – 15:40 Discussions, discussion leader: Peter W. Christensen (Vestas, Denmark)

14:00 – 15:40 Session 3b: German Grid Code Issues
14:00 – 15:20 Presentations (20 minutes each):

- **Compliance with Technical Codes Becomes Obligatory for Receipt of Feed-in Tariff and Ancillary Services Bonus for Wind Power Plants in Germany**, J. C. Boemer, K. Burges (Ecofys, Germany), T. Kumm (VDE/FNN, Germany), M. Pöller (DIgSILENT, Germany)
- **Validation of an RMS DFIG Simulation Model According to New German Model Validation Standard FGW TR4 at Balanced and Unbalanced Grid Faults**, J. Fortmann (REpower, Germany), S. Engelhardt, J. Kretschmann (Woodward, Germany), C. Feltes, I. Erlich (University of Duisburg-Essen, Germany)
- **Certification of Advanced Electrical Characteristics based on Validation of WEC Models and Simulation of Wind Farms**, B. Schowe-von der Breelie, H. Vennegeerts (FGH, Germany) M. Schellschmidt (ENERCON, Germany)
- **Role of Regulations and Standards for the Grid Connection of Wind Turbines - Integrating more Wind Energy**, M. Ibsch, K. Nohme (WINDTEST, Germany)

15:20 – 15:40 Discussions, discussion leader: Markus Pöller (DIgSILENT, Germany)

14:00 – 15:40 Session 3c: Wind Forecast II
14:00 – 15:20 Presentations (20 minutes each):

- **Transformer Congestion Forecast Based on Highly Localized Wind Power Predictions**, U. Focken (energy & meteo systems, Germany), J. Jahn (EWE, Germany), M. Schaller (energy & meteo systems, Germany)
- **Impact of Wind Power Forecasting on Unit Commitment and Dispatch**, J. Wang, A. Botterud, G. Conzelmann (Argonne National Laboratory, USA), V. Miranda, C. Monteiro, G. Sheble (INESC Porto, PORTUGAL)
- **Estimation of the increased ampacity of overhead power lines in weather conditions with high wind power production**, M. Lange, U. Focken (energy & meteo systems, Germany)
- **Temporal Forecast Uncertainty for Ramp Events**, B. Greaves, J. Collins, J. Parkes, A. Tindal (Garrad Hassan, UK)

15:20 – 15:40 Discussions, discussion leader: Corinna Möhrle (WEPROG, Germany)
15:40 – 16:00  Coffee break & Poster Session

16:00 – 18:20  Session 4a: Offshore Grid Connection
16:00 – 18:00  Presentations (20 minutes each):

- **Strategies for Offshore Windpark Clustering and Cluster Grid Connection**, T. Ahndorf, R. Witzmann (Technical University of Munich, Germany)
- **Optimising Redundancy of Offshore Electrical Infrastructure Assets by Assessment of Overall Economic Cost**, A. R. Henderson, L. Greedy, F. Spinato, C. A Morgan (Garrad Hassan, UK)
- **Analysis of Switching Overvoltages in Offshore Transmission Systems**, H. Brakelmann, T. Dong (University Duisburg-Essen, Germany)
- **Offshore Transformer Platform Design**, T. Boehme, G. MacAngus Gerrard (Det Norske Veritas, UK)
- **Optimisation of Onshore Bipolar HVAC Cable Systems**, H. Brakelmann (University Duisburg-Essen, Germany)
- **Onshore Continuation of Bipolar Cable Systems for Bulk Wind Power Transmission**, H. Brakelmann, J. Brüggmann, J. Stammen (University Duisburg-Essen, Germany)

18:00 – 18:20  Discussions, discussion leader: Ralph Hendriks (Siemens, Germany)

16:00 – 18:20  Session 4b: Grid Integration Studies: North America
16:00 – 18:00  Presentations (20 minutes each):

- **Eastern Wind Integration and Transmission Study - Preliminary Findings**, D. Corbus, M. Milligan, E. Ela (National Renewable Energy Laboratory, USA), M. Schuerger (Energy Systems, USA), B. Zavadil (EnerNex, USA)
- **Impacts of Large Scale Integration of Wind Power into the Power System of British Columbia**, T. Broeer, N. Djilali, A. Rowe (University of Victoria, Canada)
- **Assessment of AGC and Load-Following Definitions for Wind Integration Studies in Québec**, I. Kamwa, A. Heniche, M. de Montigny (Hydro-Québec, Canada)
- **Wind Power Integration into Los Angeles Electric System**, M. Beshir (Los Angeles Department of Water and Power, USA)
- **Risks of Extreme Wind Generation Output Changes in the ERCOT Market**, R. Walling, L. Freeman, N. Miller (GE Energy, USA), J. Freedman (AWS Truewind, USA), W. Lasher (ERCOT, USA)

18:00 – 18:20  Discussions, discussion leader: Charles Smith (UWIG, USA)
**16:00 - 19:00  Session 4c: SUPWIND/Windgrid**

**Part I: SUPWIND - Decision Support Tools for Large Scale Integration of Wind**

16:00 – 17:40 Presentations (20 minutes each):

- **Impacts of Intra-day Rescheduling of Unit Commitment and Cross Border Exchange on Operational Costs in European Power Systems**, P. Meibom (Risø DTU, Denmark), C. Weber (University of Duisburg-Essen, Germany)

- **Estimating Tertiary Reserves in the Danish Electricity System**, T. Kristoffersen, P. Meibom (Risø-DTU, Denmark), A. Gøttig (Energinet.dk, Denmark)

- **Network and Power Plant Investments - Country Case Study With High Wind Power Penetration**, J. Apfelbeck (University of Stuttgart, Germany), P. Vogel (University Duisburg-Essen, Germany), R. Barth (University of Stuttgart, Germany), D. Bechrakis (HTSO, Greece), H. Brand (University of Stuttgart, Germany), J. Kabouris (HTSO, Greece)

- **Load-flow Based Market Coupling with Large-scale Wind Power in Europe**, R. Barth, J. Apfelbeck (University of Stuttgart, Germany), P. Vogel (University of Duisburg-Essen, Germany), P. Meibom (Risø-DTU, Denmark), C. Weber, (University of Duisburg-Essen, Germany)

- **Investment planning of Interconnectors under consideration of wind power extensions in Europe**, S. Spiecker, P. Vogel, C. Weber (University of Duisburg-Essen, Germany), C. Obersteiner (Technical University Vienna, Austria)

17:40 – 18:00 Discussions, discussion leader: Prof. Christoph Weber (University of Duisburg-Essen, Germany)

**Part II: Windgrid - Wind on the Grid: An Integrated Approach**

18:00 – 18:50 Presentations: Further details to be announced

- **Project presentation and overview**, M. Lorenzo (REE, Spain)

- **System security management**, E. Doheijo, E. Martín (Deloitte)

- **Technical Solutions: Wind Cluster Management System**, N.N. (IWES/ISET, Germany)

- **Field Tests**, E. Quitmann (ENercon, Germany)

18:50 – 19:00 Discussions, discussion leader: Prof. Christoph Weber (University of Duisburg-Essen, Germany)

**20:00  Conference Dinner**

---

1 [http://supwind.risoe.dk/](http://supwind.risoe.dk/)

2 [http://www.windgrid.eu/](http://www.windgrid.eu/)
Thursday 15 October 2009

08:30 - 10:40 Session 5a: IEA Task 25

08:30 – 10:20 Presentations (22 minutes each):

- Impacts of Large Amounts of Wind Power on Design and Operation of Power Systems, Results of IEA Collaboration, H. Holttinen (VTT, Finland), P. Meibom (Risø DTU, Denmark), A. Orths (Energinet.dk, Denmark), B. Lange (IWES/ISET, Germany), M. O'Malley (University College Dublin, Ireland), J.O. Tande (SINTEF, Norway), A. Estanqueiro (INETI, Portugal), E. Gomez (University Castilla-La Mancha, Spain), L. Söder (KTH - Royal Institute of Technology, Sweden), G. Strbac (DG&SEE, UK), J.C. Smith (UWIG, USA), F. Van Hulie (EWEA, Belgium)

- Large-Scale Wind Integration Studies in the United States: Preliminary Results, M. Milligan, D. Lew, D. Corbus (NREL, USA), R. Piwko, N. Miller, K. Clark, G. Jordan, L. Freeman (GE Energy, USA), B. Zavadil (EnerNex, USA), M. Schuerger (Energy Systems Consulting, USA)

- Calculation of Balancing Reserve Incorporating Wind Power into the Hydro-Quebec System over the Time Horizon of 1-48 Hours, N. Menemenlis, M. Huneault (IREQ-Hydro-Québec, Canada), J. Bourret, A. Robitaille (Hydro-Québec, Canada)

- Coping with Wind Power Variability: How Plug-in Electric Vehicles ould Help, J. Kiviluoma (VTT, Finland), P. Meibom (Risø-DTU, Denmark)

- Evaluating which Forms of Flexibility most Effectively Reduce Base-load Cycling at Large Wind Penetrations, N. Troy (University College Dublin, Ireland), E. Denny (Trinity College Dublin, Ireland), Mark O'Malley (University College Dublin, Ireland)

10:20 – 10:40 Discussions, discussion leader: Hannele Holttinen, VTT, Finland

08:30 - 10:40 Session 5b: Grid Codes Issues

08:30 – 10:20 Presentations (18 minutes each):

- Grid Connection of Large Wind Power Plants: a European Overview, A. R. Ciupuliga, M. Gibescu (Delft University of Technology, The Netherlands), G. Fulli (DG Joint Research Centre – European Commission, The Netherlands), A. L’Abbate (ERSE, Italy), W. L. Kling (Delft University of Technology, The Netherlands)

- Grid Code Compliance Beyond LVRT, Tobias Gehlhaar (Germanischer Lloyd, Germany)

- The Development of Connection Requirements for Offshore Generation and Transmission in Great Britain, A. Johnson, N. Tleis, J. Greasley (National Grid, U.K.)

- Grid Code Compliance Process of Wind Farms in Great Britain, S. M. Bolik (REpower UK, UK)

- Compliance of REE’s Operational Procedure 12.3 Regarding Fault Ride-Through Capability: The Experience of a Multi-technology Owner, J. Ruiz Guillén, E. Giraut Ruso, G. Quiliones-Varela, Á. Navarrete Pablo-Romero, I. Rebollo Rico, T. Hernández Fernández de la Pradilla (Acciona Energía, Spain), M. Paz Comench, M. García-Gracia (CIRCE - University of Zaragoza, Spain)

- Fault Ride Through Test based on Transformer Switching, R. Klosse, F. Santjer (DEWI, Germany)

10:20 – 10:40 Discussions, discussion leader: Anthony Johnson (UK Grid, United Kingdom)

3 http://www.ieawind.org/AnnexXXV.html
08:30 – 10:40 **Session 5c: Market Issues**

08:30 – 10:20 Presentations (18 minutes each):

- **Rules and Mechanisms for Integrating Wind Power in Electricity Markets**, A. Waltham (IPA Economics, UK)
- **A Modeling Approach to Compute Scenarios of Electricity Generation from Wind and other Renewable Energy Sources in Europe**, C. Golling, D. Lindenberger (University Cologne, Germany)
- **Imbalance Costs in the Swedish System with Large Amounts of Wind Power**, F. Carlsson, V. Neimane (Vattenfall, Sweden)
- **Allocation of Interconnector Capacity with In-between Stochastic Generation**, S. T. Schröder (Risø - DTU, Denmark)
- **Effect of wake consideration on estimated cost of wind energy curtailments**, M. Ali (University of Manchester, UK), J. Matevosyan (Parsons Brinckerhoff, UK), J. V. Milanic (University of Manchester, UK), L. Söder (KTH - Royal Institute of Technology, Sweden)

10:20 – 10:40 Discussions, discussion leader: Peter Meibom (Risø-DTU, Denmark)

10:40 – 11:00 **Coffee break**

11:00 – 13:00 **Session 6a: Offshore Grid**

11:00 – 12:20 Presentations (20 minutes each):

- **The IEE Project OffshoreGrid: Objectives, Approach and First Results**, J. De Decker, A. Woyte (3E, Belgium), C. Srikandam, J. Völker, C. Funk (dena, Germany), K. Michalowska-Knap (EC BREC IEO, Poland), J. Tambke (ForWind – University Oldenburg, Germany), G. Rodrigues (EWEA, Belgium)
- **Cluster Interconnection of Offshore Wind Farms using a Direct AC High Frequency Links**, A. Garcés Ruiz, M. Molinas (Norwegian University Of Science and Technology Trondheim, Norway)
- **Interconnection of Direct-Drive Wind Turbines Using DC Grid**, E. Veilleux, P. W. Lehn (University of Toronto, Canada)
- **6 GW Offshore Wind Power in The Netherlands - Technology Options and Connection Configurations**, K. Burges (Ecofys, Germany), D. Schoenmakers (Ecofys, The Netherlands), G. Papaefthymiou (Ecofys, Germany)

12:20 – 13:00 Discussions, discussion leader: Thomas Ackermann (Energynautics, Germany)

11:00 – 13:00 **Session 6b: Modeling I**

11:00 – 12:40 Presentations (20 minutes each):

- **Reduced Order Model of Wind Turbines based on Doubly-Fed Induction Generators during Voltage Imbalances**, S. Engelhardt (Woodward SEG, Germany), C. Feltes (University Duisburg-Essen, Germany), J. Fortmann (REpower, Germany), J. Kretschmann (Woodward SEG, Germany), I. Erlich (University Duisburg-Essen, Germany)
- **Contribution of Wind Energy Converters with Inertia Emulation to Frequency Control and Frequency Stability in Power Systems**, S. Wachtel, A. Beekmann (ENERCON, Germany)
- **Models and Simulations for the Danish Cell Project: Running PowerFactory with OPC and Cell Controller**, N. Martensen, E. Tröster, P. Lund, R. Holland (Energynautics, Germany)
- **Large Wind Power Plants Modeling Techniques for Power System Simulation Studies**, C. Larose, R. Gagnon, G. Turmel, P. Giroux, J. Brochu, D. McNabb, D. Lefebvre (Hydro Québec Canada)

12:40 – 13:00 Discussions, discussion leader: V. Akhmatov (Siemens Wind Power, Denmark)
11:00 - 13:00  Session 6c: Wind Power and Storage
11:00 – 12:20  Presentations (20 minutes each):

- **A Full Renewable Power Supply Scenario for Europe: The Weather Determines Storage and Transport**, L. von Bremen (IWES/ISET, Germany), M. Greiner (Siemens, Germany), K. Knorr (IWES/ISET, Germany), C. Hoffmann (Siemens, Germany), S. Bofinger, B. Lange (IWES/ISET, Germany)

- **Wide-Area Energy Storage and Management System to Balance Intermittent Resources in the Bonneville Power Administration and California ISO Control Areas**, Y. V. Makarov, B. Yang, J. G. DeSteese (Pacific Northwest National Laboratory, USA), P. Nyeng (DTU, Denmark), C. H. Miller (Pacific Northwest National Laboratory, USA), J. Ma, S. Lu, V.V. Viswanathan, D.J. Hammerstrom (Pacific Northwest National Laboratory, USA), B. McManus, J. H. Pease (Bonneville Power Administration, USA), C. Loutan, G. Rosenblum (California ISO, USA)

- **Grid Scale Energy Storage in Salt Caverns**, Fritz Crotogino, Sabine Donadei, (KBB Underground Technologies, Germany)

- **Operational Experience with Virtual Power Plants - Efficient Integration of Small Scale Generation and Medium Scale Demand into the Power System**, U. Focken, T. Klose (energy & meteo systems, Germany), W. Krause (EWE, Germany)

12:20 – 13:00  Discussions, discussion leader: Alain Forcione (Institut de recherche d’Hydro-Québec – IREQ, Canada)

13:00 - 14:00  Lunch

14:00 - 15:40  Session 7a: Power System Balancing
14:00 – 15:20  Presentations (20 minutes each):

- **Assessing the Value of Regulation Resources Based on Their Time Response Characteristics**, Y. V. Makarov, J. Ma, S. Lu, T.B. Nguyen (Pacific Northwest National Laboratory, USA), C. Loutan, G. Rosenblum, S. Chowdhury (California ISO, USA), J.H. Eto (Lawrence Berkeley National Laboratory, USA), M. Gravely, M. Brown (California Energy Commission, USA)

- **Balancing with 6000 MW off shore Wind Energy in The Netherlands; an analysis of the flexibility of production**, W. de Boer, W. van der Veen (KEMA, The Netherlands)

- **Wind Power in the North Sea: Smoothing Effects and Penetration Rates in a 2020 Scenario**, N. Brodersen, K. Burges (Ecofys, Germany), O. Hohmeyer (Flensburg University, Germany)

- **Self-Regulating Wind Power: Matching Generation at Load**, R. Dackiw, S. V. Pasupulati, J. Soto (Oak Creek Energy Systems, USA)

15:20 – 15:40  Discussions, discussion leader: Julija. Matevosyan (Parsons Brinckerhoff, United Kingdom)

14:00 - 15:40  Session 7b: Wind Turbine Performance Analysis
14:00 – 15:20  Presentations (20 minutes each):

- **Small-Signal Stability Analysis of Full-Load Converter Interfaced Wind Turbines**, T. Knüppel (Siemens Wind Power, DTU, Denmark), V. Akhmatov, J. N. Nielsen, K. H. Jensen (Siemens Wind Power, Denmark), A. Dixon (National Grid, UK), J. Østergaard (DTU, Denmark)

- **Harmonic Analysis of Offshore Wind Farms with Full Converter Wind Turbines**, Ł. H. Kocewiak, J. H. Hjerrild (DONG Energy, Denmark), C. Leth Bak (Aalborg University, Denmark)
- Investigating Power Control in Autonomous Power Systems with Increasing Wind Power Penetration, I. D. Margaris (NTUA, Greece), A. D. Hansen, P. Sørensen (Risø-DTU, Denmark), N. Hatzigiorgiou (NTUA, PPC, Greece)

- Voltage Dips Ride-Through Capability: Model Validation of a Resistance-Commutated Rotor Wind Turbine Generator from In-Field Testing Results, M. A. Martinez Guillén, M. Paz Comech, J. Ruiz Guillén, E. Giraut Ruso, M. García-Gracia (C.P.S. University of Zaragoza, Spain)

15:20 – 15:40 Discussions, discussion leader: Stephan Wachtel (Enercon, Germany)

14:00 - 15:40 Session 7c: Modeling and Offshore Transformer

14:00 – 15:20 Presentations (20 minutes each):

- Dynamic Simulations of Wind Farms with Standardized Test Routines in PSS®NETOMAC, G. Duschl-Graw (Beuth University of Applied Sciences, Germany), D. Pannhorst (Ingenieurbüro Pannhorst, Germany), O. Ruhle (Siemens, Germany)

- Aggregated Models of a Large Wind Farm Consisting of Variable Speed Wind Turbines for Power System Stability Studies, A. Perdana, O. Carlson (Chalmers University of Technology, Sweden)

- Transformers for Offshore Wind Platforms: Expected Problems and Possible Approaches, B. Valov (ISET/ Fraunhofer-IWES, Germany)

- Wind Turbine Transformer Admittance Characterization Based on Online Time-domain Measurements and Preliminary Results from Measurements done in two Transformers using a SFRA, I. Arana (DONG Energy, Denmark), J. Holbøll (DTU, Denmark), T. Sørensen (DONG Energy, Denmark), A. H. Nielsen (DTU, Denmark)

15:20 – 15:40 Discussions, discussion leader: Jens Fortmann, REpower, Germany

15:40 - 16:00 Coffee break & Poster Session

16:00 - 17:00 Session 8: Podium Discussions

16:00 – 16:10 UK wind integration experience; Paul Gardner, Garrad Hassan, UK

16:10 – 17:00 Podium discussions:

- Participants: details to be announced

  Discussion leader: Paul Gardner, Garrad Hassan, UK

17:00 – 17:05 Closing remarks

Friday 16 October 2009

Field Trip
Posters

**Modeling and Power System Stability of VSC-HVDC Systems for Grid-Connection of Large Offshore Windfarms**, Y. Xue (Vestas China, CHINA), V. Akhmatov (Technical University of Denmark, Denmark)

**Determination of the phenomena involved when de-energising transformers for wind-farms: modelling, residual fluxes calculation and validation by on site tests**, M. Rioual (EDF, France, Jean-C. Reveret (SUDRIA, France)

**Stochastic Unit Commitment Considering Uncertain Wind Production in an Isolated System**, K. Dietrich, J.-M. Latorre, L. Olmos, A. Ramos, I. Pérez-Arriaga (Comillas University, Spain)

**Grid Connection-Oriented Modelling and Simulation of Frequency Response and Inertial Behaviour for Full Converter Wind Turbines**, G. Taylor, D. D. Banham-Hall (Brunel University, UK), C. Smith (Converteam UK, UK), M.R. Irving (Brunel University, UK)

**Pumped Heat Energy Storage of Electricity**, J. Ruer (SAIPEM-SA, France)

**A Methodology for Calculating Harmonic Emissions from a Wind farm Connected to an External Grid Defined by Impedance plots**, D. T. Johnsen (DONG Energy, Denmark)

**Improvement in Reactive Power Consumption of Line Commutated HVDC Converters for Integration of Offshore Wind-Power**, M. Jafar, M. Molinas (Norwegian University of Science & Technology Trondheim, Norway)

**Possibilities and Analysis of Integration of Large-Scale Offshore Wind Parks into Estonian Power System**, J. Kilter (Tallinn University of Technology, Estonia), O. Tšernobrovkin, M. Landsberg (Elener, Estonia), H. Agabus (Nelja Energia, Estonia), I. Palu (Tallinn University of Technology, Estonia)

**Coordinated Parallel and Series Flexible AC Transmission Systems (FACTS) to Support a Power Grid with a Large Amount of Wind Power**, M. Mora-Cantallops, O. Gomis-Bellmunt, A. Sumper, J. Rull-Duran (Politecnical University of Catalunya, Spain)

**Battery Applications as a Backup of Large Offshore Wind Farms**, A. Danesh Shakib, G. Balzer (Technical University of Darmstadt, Germany), E. Spahić (ABB, Germany)

**Optimal Location of Shunt FACTS Devices in a Power System with High Wind Feeding**, A. Danesh Shakib, G. Balzer (Technical University of Darmstadt, Germany)

**An optimal model for balancing fluctuating power of large wind parks**, H. Tammoja, I. Palu (Tallinn University of Technology, Estonia), H. Agabus (Nelja Energia, Estonia), M. Keel, R. Oidram (Tallinn University of Technology, Estonia)

**Operating experience with interharmonic emissions from wind farms**, D. Hodson, R. Balanathan, S. Ogten, Pei Zhang (Suzlon Energy Australia, Australia)

**A Dynamical Approach to Wind Power Generation**, P. Milan, M. Wächter (ForWind - University of Oldenburg, Germany), J. Gottschall (Risø DTU, Denmark), J. Peinke (University of Oldenburg, Germany)

**Power Curves for Wind Energy Converters using LiDAR Measurements**, M. Wächter (ForWind - University of Oldenburg, Germany), A. Rettenmeier (University of Stuttgart, Germany), J. Peinke (ForWind - University of Oldenburg, Germany)

**A Small-Signal Voltage Stability Analysis of DFIG Wind Generation**, E. Vittal, M. O'Malley, A. Keane (University College Dublin, Ireland)

**Developing a type-III wind turbine model for stability studies of the Hydro-Quebec network**, C.-E. Langlois, D. Lefebvre (Hydro-Québec, Canada), L. Dube (DEI Technology, Canada), R. Gagnon (Hydro-Québec – IREQ, Canada)

**Regulation Techniques for Smoothing Active Power in Aggregated Wind Farms Distributed within Spain**, S. Martín-Martínez, A. Viguera-Rodríguez, E. Gómez-Lázaro (University of Castilla-La Mancha, Spain)

**STATCOM and Energy Storage in Grid Integration of Wind Farms**, S. S. Gjerde, T. M. Undeland (Norwegian University of Science and Technology, Norway)
Wind Power Integration and the Application of Storages, E. Spahić (ABB, Germany), S. K. Kondiparthy (BARD Engineering, Germany), A. Danesh Shakib (Technical University of Darmstadt, Germany), T. Benz (ABB, Germany), G. Balzer (Technical University of Darmstadt, Germany)

Minimising Transmission Reactive Support Required by High Penetration of Distributed Wind Power Generation, L. F. Ochoa (University of Edinburgh, UK), A. Keane (University College Dublin, Ireland), C. Dent, G. P. Harrison (University of Edinburgh, UK)

A Data-Driven Analysis of Wind Integration Challenges in America’s Pacific Northwest, M. Goggin (American Wind Energy Association, USA)

Consequences of the New Balancing Regulation on Renewables in Scandinavian Market - Case of the Havøygavlen Wind Park, N. Keseric, S. Trollnes, K. K. Haglerød (StatoilHydro, Norway)

Variability Forecasts for Wind Farms Using High Resolution Initial Conditions, C. Draxl, C. Vincent, A. Hahmann, G. Giebel (Risø DTU, Denmark), P. Pinson (DTU, Denmark)

Adding Forecasts to the IEC 61400-25 Communication Standard, G. Giebel, O. Gehrke (Risø DTU, Denmark)