

11th International Workshop

on Large-Scale Integration of Wind Power into Power Systems
as well as on Transmission Networks for Offshore Wind Power Plants

13 - 15 November 2012 Lisbon, Portugal 

PROGRAM

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Mo, 12 Nov		Tuesday, 13 Nov			Wednesday, 14 Nov			Thursday, 15 Nov					
Tutorials		Wind Workshop Day 1			Wind Workshop Day 2			Wind Workshop Day 3					
		8:00 – 12:00	Foyer -1			8:30 – 10:40	Room Alfama	Room Castelo I/II	Room Castelo VIII/IX	8:30 – 10:40	Room Alfama	Room Castelo I/II	Room Castelo VIII/IX
			Registration				SESSION 3a: Grid Integration Experience I	SESSION 3b: Modelling I	SESSION 3c: Offshore Transmission Systems		SESSION 7a: Grid Integration Experience II	SESSION 7b: Means for Power Balancing	SESSION 7c: Harmonic Issues
							Coffee Break (40min)				Coffee Break (40min)		
		8:00 – 12:00	Room Castelo IV			11:20 – 13:00	Room Alfama	Room Castelo I/II	Room Castelo VIII/IX	11:20 – 13:00	Room Alfama	Room Castelo I/II	Room Castelo VIII/IX
			Wind Tutorials II				SESSION 4a: Wind Power Integration in REN's Grid – Part 1	SESSION 4b: HVDC Technology I	SESSION 4c: Integrating Issues and Solutions I		SESSION 8a: Offshore Wind Power Plants	SESSION 8b: Wind Forecasting III	SESSION 8c: Frequency/ Inertia Response
			Lunch (12:00-14:00)				Lunch (1h)				Lunch (1h)		
14:00 – 15:45	Room Castelo IV	14:00 – 15:30	Room Alfama			14:00 – 15:40	Room Alfama	Room Castelo I/II	Room Castelo VIII/IX	14:00 – 15:40	Room Alfama	Room Castelo I/II	Room Castelo VIII/IX
	Wind Tutorials I		Welcome & Session 1: Keynote Session				SESSION 5a: Wind Power Integration in REN's Grid – Part 2	SESSION 5b: Wind Forecasting II	SESSION 5c: Integrating Issues and Solutions II		SESSION 9a: HVDC Technology II	SESSION 9b: Grid Code Issues	SESSION 9c: Modelling II
	Break (30min)		Coffee Break (45min)				Coffee Break (35min)				Coffee Break (20min)		
16:15 – 18:00	Room Castelo IV	16:15 – 18:30	Room Alfama	Room Castelo I/II	Room Castelo VIII/IX	16:15 – 18:30	Room Alfama	Room Castelo I/II	Room Castelo VIII/IX	16:00 – 17:00	Room Alfama		
	Wind Tutorials I		SESSION 2a: ENTSO-E Network Code Discussion	SESSION 2b: Wind & Solar Integration: Planning & Operation Issues	SESSION 2c: Wind Forecasting I		SESSION 6a: Grid Integration Studies	SESSION 6b: Reactive Power Support Issues	SESSION 6c: Market Issues		SESSION 10: Podiums Discussions		
		18:30	Poster Session & Reception (1.5h)			20:00	Wind Dinner (3h)						



TUESDAY 13 NOVEMBER 2012

08:00 – 12:00	Registration
12:00 – 14:00	Lunch
14:00 – 14:10	Welcome and structure of the workshop: Thomas Ackermann

14:10 – 15:30	SESSION 1: KEYNOTE SESSION
> Session Chair	T. Ackermann (Energynautics, Germany)
14:10 – 15:10	Presentations (20 min. each)
	<ul style="list-style-type: none">▶ Keynote R. Cartaxo (CEO/Chairman REN)▶ The Impact of Electric Mobility in Allowing a Safe Increase of the Penetration of Wind Power in the Iberian System J. A. Peças Lopes, M. Rosa, P. Almeida (University of Porto, Portugal) WIW12-1_2▶ From Lessons Learned to Future Opportunities T. Ponce de Leão (LNEG, Portugal)▶ Operating Spanish and Portuguese Power Grid with Significant Wind: Dynamics and Control Challenges Bikash C. Pal (Imperial College London, UK) / J. P. S. Catalão (University of Beira Interior, Portugal)
15:10 – 15:30	Discussions

15:30 – 16:15 **Coffee Break**

16:15 – 18:30	SESSION 2A: ENTSO-E NETWORK CODE DISCUSSION
> Session Chair	Paul Gardner (GL Garrad Hassan, United Kingdom)
16:15 – 17:55	Presentations (20 min. each)
	<ul style="list-style-type: none">▶ Asymmetrical Current Injection Addressed by ENTSO-E Draft Network Code - Requirements & Development of Technology for WEC V. Diedrichs, H. Lorenzen (University of Applied Sciences Wilhelmshaven, Germany), I. Mackensen, S. Gertjegerdes (Enercon, Germany) WIW12-032▶ Paper: Current Development of the ENTSO-E NC RfG in the Light of European Wind Integration J. Duddy, F. Martin, I. Skrypalle, F. Van Hulle, S. Wachtel (EWEA WG GCR)▶ Mandatory Grid Code Requirements Versus Ancillary Services (EWEA WG GCR) S. Wachtel (GE Wind, Germany)▶ Critical Technical Aspects for Wind Power in the ENTSO-E NC RfG (EWEA WG GCR) I. Skrypalle (REpower Systems, Germany)▶ Harmonisation: the Way Forward (EWEA WG GCR) F. van Hulle (EWEA, Belgium)▶ The ENTSO-E NC RfG, common interpretations and the way towards implementation R. Pfeiffer (Amprion, Germany)
17:55 – 18:30	Discussions

16:15 – 18:30	SESSION 2B: WIND AND SOLAR INTEGRATION: PLANNING/OPERATION ISSUES
> Session Chair	Charles Smith (UVIG, USA)
16:15 – 17:57	Presentations (17 min. each)
	<ul style="list-style-type: none"> ▶ The Western Wind and Solar Integration Study - Phase 2 D. Lew, G. Brinkman, E. Ibanez, B.-M. Hodge (NREL, USA), J. King (RePPAE, USA) WIW12-152 ▶ Markets to Facilitate Wind and Solar Energy Integration in the Bulk Power Supply: An IEA Task 25 Collaboration M. Milligan (NREL, USA), H. Holttinen (VTT, Finland), L. Söder (Royal Institut of Technology/KTH, Sweden), C. Clark (U.S. Department of Energy, USA), I. Pineda (EWEA, Belgium) WIW12-149 ▶ Impact of High Wind Penetration on an Island Power Supply System W. Kuijpers, G. Dekker, R. de Groot (KEMA, the Netherlands), J. Hodgson (Water- en Energiebedrijf Aruba, Aruba) WIW12-238 ▶ Stochastic Methods for Planning and Operating Power Systems with Large Amounts of Wind and Solar Power M. Milligan (NREL, USA), P. Donohoo (Massachusetts Institute of Technology, USA) M. O'Malley (University College Dublin, Ireland) WIW12-150 ▶ Provision of Regulating Reserve from Wind Power: Economic Benefits and Steady State System Operation Implications A. Tuohy (EPRI, USA), E. Ela (NREL, USA), D. Brooks (EPRI, USA), B. Kirby (Kirby Consult, USA) WIW12-043 ▶ Wind and Solar Portfolios and their Impact on Predictability: German Case Study 2010-2011 V. Speth (University of St Gallen, Switzerland) WIW12-049
17:57 – 18:30	Discussions

16:15 – 18:30	SESSION 2C: WIND FORECASTING I
> Session Chair	TBA
16:15 – 17:55	Presentations (20 min. each)
	<ul style="list-style-type: none"> ▶ The Wind Forecasting Improvement Project: Description and Results from the Southern Study Region J. Freedman (AWS Truepower, USA), S. Benjamin, J. Wilczak, M. Marquis (National Oceanic and Atmospheric Administration, USA), C. Clark, J. Cline (US Department of Energy), J. Zack, J. Manobianco (MESO, USA), I. Flores (Electric Reliability Council of Texas, USA), J. Schroeder, B. Ancell (Texas Tech University, USA), K. Brewster (Oklahoma University, USA), S. Basu (North Carolina State University, USA), K. Orwig (NREL, USA), V. Banunaryanan (ICF International, USA) WIW12-143 ▶ Enhanced Short-Term Wind Power Forecasting and Value to Utility Operations: The Wind Forecasting Improvement Project (WFIP) K. Orwig (NREL, USA), C. Clark, J. Cline (US Department of Energy, USA), S. Benjamin, J. Wilczak, M. Marquis (National Oceanic and Atmospheric Administration, USA), C. Finley (WindLogics, USA), A. Stern (National Weather Service, USA), J. Freedman (AWS Truepower, USA) WIW12-084 ▶ Wind Power Forecasting Error Distributions: An International Comparison B.-M. Hodge (NREL, USA), H. Holttinen, S. Sillanpää (VTT, Finland), E. Gómez-Lázaro (University of Castilla-La Mancha, Spain), R. Scharff, L. Söder (Royal Institut of Technology/KTH, Sweden), X. G. Larsén, G. Giebel (DTU Wind, Denmark), D. Flynn (University College Dublin, Ireland), D. Lew, M. Milligan (NREL, USA), J. Dobschinski (Fraunhofer IWES, Germany) WIW12-125 ▶ Variability and Smoothing Effect of Wind Power Production Compared to Load Variability in the Nordic Countries H. Holttinen, S. Rissanen (VTT, Finland), G. Giebel, X. G. Larsén (DTU Wind, Denmark), A.-L. Løvholm, E. Berge (Kjeller Vindteknikk, Norway) WIW12-214 ▶ An Application and Verification of Ensemble Forecasting on Wind Power to Assess Operational Risk Indicators in Power Grids S. Alessandrini, E. Ciapessoni, D. Cirio, A. Pitto, S. Sperati (RSE, Italy), P. Pinson (DTU, Denmark) WIW12-136
17:55 – 18:30	Discussions

18:30 - 20:00 **Poster Session & Reception**

WEDNESDAY 14 NOVEMBER 2012

08:30 – 10:40	SESSION 3A: GRID INTEGRATION EXPERIENCE I
> Session Chair	Hannele Holttinen (VTT, Finland)
08:30 – 10:10	Presentations (18 min. each)
	<ul style="list-style-type: none">▶ The Connection Studies for 1200 MW Wind Power Integration in Portugal N. Taveira, Â. Mendonça, E. Quitmann (Enercon, Germany), C. L. Moreira, B. Silva (INESC Porto, Portugal), J. Moreira (REN, Portugal), C. Pereira da Silva (ENEOP, Portugal) WIW12-222▶ System Integration of Renewable Energies from the Perspective of the Transmission System Operator C. Schulz (TenneT TSO, Germany) WIW12-021▶ Analysing High Wind Shutdown on the Power System of Ireland P. Coughlan, J. O'Sullivan, N. Kamaluddin, F. McLoughlin (Eirgrid, Ireland) WIW12-006▶ Ensuring Grid Code Harmonic Compliance of Wind Farms D. M. Joseph, P. Haigh, J. McCullagh (National Grid, United Kingdom) WIW12-188▶ Integration of Wind Power Plants into the Electric System - The Brazilian Experience F. Arteiro, P. Gomes (ONS, Brazil) WIW12-231
10:10 – 10:40	Discussions

09:00 – 10:40	SESSION 3B: MODELLING I
> Session Chair	Ana Estanqueiro (LNEG, Portugal)
09:00 – 10:20	Presentations (20 min. each)
	<ul style="list-style-type: none">▶ Progress in IEC 61400-27. Electrical simulation models for wind power generation P. Sørensen (DTU Wind, Denmark), B. Andresen (Siemens Wind Power, Denmark), J. Fortmann (REpower Systems, Germany), P. Pourbeik (EPRI, USA) WIW12-207▶ Implementation of IEC Generic Type 1 Model using RTDS S. T. Cha, Q. Wu, H. Zhao, J. Østergaard, I. Margaris, P. Sørensen, (DTU, Denmark) WIW12-041▶ Implementation of IEC Standard Models for Power System Stability Studies I. Margaris, A. Hansen (DTU Wind, Denmark), J. Bech, B. Andresen (Siemens Wind Power, Denmark), P. Sørensen (DTU Wind, Denmark) WIW12-106▶ Adaptive Control of Grid-Connected Inverters Based on Online Grid Impedance Measurements M. Cespedes, J. Sun (Rensselaer Polytechnic Institute, USA) WIW12-201
10:20 – 10:40	Discussions

08:30 – 10:40	SESSION 3C: OFFSHORE TRANSMISSION SYSTEMS
> Session Chair	Markus Pöller (Germany)
08:30 – 10:10	Presentations (20 min. each)
	<ul style="list-style-type: none">▶ Analyzing the Deployment of Large Amounts of Offshore Wind to Design an Offshore Transmission Grid in the United States E. Ibanez, T. Mai, L. Coles (NREL, USA) WIW12-140▶ Wind Turbines and Transmission Systems for Offshore Wind Projects Currently in Planning Stages A. Madariaga, J. L. Martín, I. Martínez de Alegría, I. Zamora (University of the Basque Country [UPV/EHU], Spain), S. Ceballos (Tecnalia Reseach & Innovation, Spain) WIW12-112▶ New Grid-Planning and Certification Approaches for the Large-Scale Offshore-Wind Farm Grid-Connection Systems C. Heising, R. Bartelt (Avastion, Germany), M. Koochack Zadeh, T. J. Lebioda, J. Jung (TenneT Offshore, Germany) WIW12-234▶ Harmonic Amplification of the 576 MW Gwynt-y-Môr Offshore Wind Power Plant A. J. Hernandez Manchola (Siemens, Germany), S. Wijesinghe (RWE Innogy, United Kingdom), A. Shafiu (Siemens, United Kingdom), WIW12-019▶ Sensitivity of Nodal Admittances in an Offshore Wind Power Plant to Parametric Variations in the Collection Grid V. Kersiulis, A. Holdyk, J. Holbøll (DTU, Denmark), I. Arana (DONG Energy, Denmark) WIW12-069

10:10 – 10:40	Discussions
10:40 – 11:20	Coffee Break
11:20 – 13:00	SESSION 4A: WIND POWER INTEGRATION IN REN'S GRID: PART 1: INTEGRATION PROCEDURES
> Session Chair	Medeiros Pinto (REN, Portugal)
11:20 – 12:40	Presentations (20 min. each)
	<ul style="list-style-type: none"> ▶ Reinforcement of Portuguese Transmission Network Capacity to Receive New Renewable Power Production T. Rodrigues, F. Batista, A. Pitarma (REN, Portugal) ▶ Wind Power Forecast Rui Pestana, A. R. Trancoso (REN, Portugal), J. D. Domingos (Technical University of Lisbon, Portugal) ▶ Wind Power Integration and its Impact on the Portuguese Transmission Grid Protection System J. E. Afonso, A. Q. dos Santos (REN, Portugal) ▶ Impact of Wind Power Integration in the Portuguese System Operation F. Ribeiro (REN, Portugal)
12:40 – 13:00	Discussions

11:20 – 13:00	SESSION 4B: HVDC TECHNOLOGY I
> Session Chair	TBA
11:20 – 12:45	Presentations (17 min. each)
	<ul style="list-style-type: none"> ▶ Enhancing the Reliability of AC Transmission Networks by Using a Long Distance HVDC Link M. Fleckenstein, A. Wasserrab, G. Balzer, C. Neumann (Technical University of Darmstadt, Germany) WIW12-062 ▶ Integration of Wind Power in Germany's Transmission Grid by using HVDC Links A. Wasserrab, M. Fleckenstein, G. Balzer (Technical University of Darmstadt, Germany) WIW12-107 ▶ Simulation of the Large-Scale Offshore-Wind Farms Including HVDC-Grid Connections Using the Simulation Tool VIAvento R. Bartelt, C. Heising, B. Ni (Avasition, Germany), M. Koochack Zadeh, T.J. Lebioda, J. Jung (TenneT Offshore, Germany) WIW12-235 ▶ Barriers and Solutions for AC Low Voltage Fault Ride-through on Multi-terminal HVDC Grids B. Silva, C. Moreira, H. Leite, J. A. Peças Lopes (INESC TEC, Portugal) WIW12-118 ▶ Analysis of Control Alternatives for Offshore Wind Farms Connected through a VSC-HVDC Link E. Belenguer, R. Vidal, H. Beltrán (University Jaume I, Spain), R. Blasco-Giménez (Politechnical University of Valencia, Spain) WIW12-070
12:45 – 13:00	Discussions

11:20 – 13:00	SESSION 4C: INTEGRATING ISSUES AND SOLUTIONS I
> Session Chair	Eckehard Tröster (Energynautics, Germany)
11:20 – 12:40	Presentations (20 min. each)
	<ul style="list-style-type: none"> ▶ Integration of Wind Power into Existing Transmission Network by Dynamic Overhead Line Rating J. Fu, D. J. Morrow, S. M. Abdelkader (Queen's University Belfast, United Kingdom) WIW12-209 ▶ Challenges, Experiences and Possible Solutions in Transmission System Operation with Large Wind Integration Z. Liu, L. van der Sluis (Delft University of Technology, the Netherlands), W. Winter, H. Paeschke (TenneT TSO, Germany), R. Becker, C. Weber (University of Duisburg-Essen, Germany), J. Eickmann, C. Schroeders (RWTH Aachen, Germany), F. Oldewurtel, L. Roald, T. Krause (ETH Zurich, Switzerland), M. Rogge, P. Gilsdorf (Amprion, Germany), P. Wajant (TransnetBW, Germany) WIW12-104 ▶ Small Signal Stability Impact of Large Wind Penetration in UK Power System L. Kunjumammed, B. C. Pal (Imperial College London, United Kingdom), K. Anaparthi (GE Global Research, Germany), S. Kuenzel (Imperial College London, United Kingdom) WIW12-022 ▶ Operation of Wind Power Plants in High Impedance Grids - Loss of stability control for maximizing wind power vs. power quality V. Diedrichs (University of Applied Sciences Wilhelmshaven, Germany), A. Beekmann, K. Busker, S. Nikolai, F. Kentler (Enercon, Germany) WIW12-029
12:40 – 13:00	Discussions

13:00 – 14:00 Lunch

14:00 – 15:40	SESSION 5A: WIND POWER INTEGRATION IN REN'S GRID: PART 2: INNOVATIONS
> Session Chair	Rui Pestana (REN, Portugal)
14:00 – 15:20	Presentations (20 min. each)
	<ul style="list-style-type: none">▶ Multi-TSO Cross Border Balancing Mechanism M. L. Llorens (REE, Spain), P. Pereira (REN, Portugal), L. Apoyan (RTE, France), L. Moreno, P. Junco, J. Arenillas, J. I. de la Fuente (REE, Spain), C. Chabanne, G. Barbieri (RTE, France) WIW12-5a_1▶ Integrating Renewable Energy Sources in the Portuguese Power System - New Generation Adequacy Indicators N. Martins, J. Santos, M. Damas (REN, Portugal) WIW12-5a_2▶ Connection of the First Pump - Storage Variable Speed Machines in Portugal: TSO Main Requirements M. Matos Fernandes (REN, Portugal) WIW12-5a_3▶ Application of FACTS Devices to Improve System Security P. N. Pereira Barbeiro, C. L. Moreira, J. A. Peças Lopes (INESC Porto, Portugal), A. Reis Rodrigues, J. Moreira, N. Rosado (REN, Portugal) WIW12-5a_4
15:20 – 15:40	Discussions

14:00 – 15:40	SESSION 5B: WIND FORECASTING II
> Session Chair	J. P. S. Catalão (University of Beira Interior, Portugal)
14:00 – 15:20	Presentations (20 min. each)
	<ul style="list-style-type: none">▶ Icing Warnings in Wind Power Predictions - Practical Experiences for Sites in the U.S. J. Schmelter, U. Focken, M. Lange (energy & meteo systems, Germany) WIW12-116▶ Spatio-temporal Correction of Probabilistic Wind Power Forecasts J. Tastu, P. Pinson, H. Madsen (DTU, Denmark) WIW12-089▶ Spatial-Temporal Analysis of Wind Power Forecast Errors for West-Coast Norway P. Preede Revheim, H.-G. Beyer (University of Agder, Norway) WIW12-094▶ Real-time Energy Resources Scheduling Considering Short-term and Very Short-term Wind Forecast M. Silva, T. Sousa, H. Morais, Z. Vale (GECAD Polytechnic of Porto, Portugal) WIW12-159
15:20 – 15:40	Discussions

14:00 – 15:40	SESSION 5C: INTEGRATING ISSUES AND SOLUTIONS II
> Session Chair	TBA
14:00 – 15:20	Presentations (20 min. each)
	<ul style="list-style-type: none">▶ Influence of the Fluctuating Increasing Wind and Solar Power Input into the Electrical Power Grid onto the Thermal Power Plant Operation E. Hassel, S. Meinke, J. Nocke, M. Hübel, C. Ziems, H. Weber (University of Rostock, Germany) WIW12-017▶ Wind Integration in Japan: Current Status and Future Challenges Y. Yasuda (Kansai University, Japan), J. Kondoh (National Institute of Advanced Industrial Science and Technology, Japan), T. Tsuji, T. Oyama (Yokohama National University, Japan) WIW12-187▶ Generation System Adequacy in Europe: Application of a Multi-area Reliability Calculation B. Hasche, M. Wattiau, K. Grave, R. Kuwahata (Ecofys, Germany) WIW12-142▶ A Probabilistic Approach to Quantifying the Contribution of Variable Generation and Transmission to System Reliability E. Ibanez, M. Milligan (NREL, USA) WIW12-124
15:20 – 15:40	Discussions

15:40 – 16:15 Coffee Break

16:15 – 18:30	SESSION 6A: GRID INTEGRATION STUDIES
> Session Chair	TBA
16:15 – 17:55	Presentations (20 min. each)
	<ul style="list-style-type: none"> ▶ Task 25 - Recommendations for Wind Integration Studies H. Holttinen (VTT, Finland) M. O'Malley, J. Dillon, D. Flynn (University College Dublin, Ireland), M. Milligan (NREL, USA), L. Söder (Royal Institut of Technology/KTH, Sweden), A.Orths, H.Abildgaard (Energinet.dk, Denmark), J. C. Smith (UVIG, USA), F. Van Hulle (EWEA, Belgium) WIW12-101 ▶ System-wide Impacts of High Penetrations of Wind Power Affecting Power System Planning, Operation, and Security R. Kuwahata (Energynautics/Ecofys, Germany), T. Ackermann (Energynautics, Germany) WIW12-224 ▶ Methodologies for Studying System-wide Impacts of Wind Power on Transmission System Planning, Operation and Security T. Ackermann (Energynautics, Germany), R. Kuwahata (Ecofys, Germany) WIW12-225 ▶ Dynamic Studies for Wind Farm Connections to the Irish Power System T. Gallery, C. McCarthy, J. McGuckin, S. Grimes (Eirgrid, Ireland) WIW12-024 ▶ Impact of Wind Generation in the Technical Operation of the Systems with High Penetration of Wind J. M. Rivier de Abbad, P. Ostos Nieto (Iberdrola Renewables, Spain) WIW12-202
17:55 – 18:30	Discussions

16:15 – 18:30	SESSION 6B: REACTIVE POWER SUPPORT ISSUES
> Session Chair	Math Bollen (Luleå University of Technology, Sweden)
16:15 – 18:09	Presentations (19 min. each)
	<ul style="list-style-type: none"> ▶ Coordinated Voltage Control for Multiple Wind Plants in Eastern Wyoming: Analysis, Field Experience and Validation N. Miller, J. MacDowell, G. Chmiel, R. Konopinski, D. Gautam (GE Energy, USA), G. Laughter, D. Hagen (PacifiCorp, USA) WIW12-227 ▶ On Wind Power Plant Voltage Control Response Characteristics from the Perspective of Planning of Stability Restricted Transmission Network A. Harjula, T. Rauhala (Fingrid Oyj, Finland), B. C. Pal (Imperial College London, United Kingdom), A.-J. Nikkilä (Fingrid Oyj, Finland), L. P. Kunjumammed (Imperial College London, United Kingdom) WIW12-095 ▶ Coordinated Reactive Power Control Meet Québec's Interconnection Requirements for Wind Power Plants S. El Itani, M. Dernbach (REpower Systems, Germany), S. Williams, M. Bishop (S&C Electric Company, USA) WIW12-129 ▶ Dynamic Voltage Support of Decentralized Power Generators - Effects, Benefits and Risks S. Ledwon, F. Kalverkamp, J. Langstädtler, B. Schowe-von der Brelie (FGH, Germany) WIW12-068 ▶ Use of a Deadband in Reactive Power Control Requirements for Wind Turbines in European Grid Codes J. Fortmann (REpower Systems, Germany), I. Erlich (University of Duisburg-Essen, Germany) WIW12-205 ▶ Unit Commitment Considering Regional Synchronous Reactive Power Requirements: Costs and Effects P. Cuffe (University College Dublin, Ireland), A. Tuohy (EPRI, USA), E. Lannoye, A. Keane (University College Dublin, Ireland) WIW12-204
18:09 – 18:30	Discussions

16:15 – 18:30	SESSION 6C: MARKET ISSUES
> Session Chair	TBA
16:15 – 18:14	Presentations (17 min. each)
	<ul style="list-style-type: none"> ▶ A Comparison Between Intraday Market and Capacity Market to Deal with Wind Power Forecasting Errors W. de Boer, G. Dekker, J. Frunt, M. Duvoort (DNV-KEMA, the Netherlands), A. Jokic (Faculty of Mechanical Engineering and Naval Architecture, Croatia) WIW12-031 ▶ Impact of Control Reserve Provision of Wind Farms on Regulating Power Costs and Balancing Energy Prices M. Jansen, M. Speckmann, R. Schwinn (Fraunhofer IWES, Germany) WIW12-102 ▶ Analysing the Effects of Future Generation and Grid Investments on the Spanish Power Market, with Large Scale Wind Integration, Using PLEXOS for Power Systems P. Panagiotakopoulou (Energy Exemplar [Europe], United Kingdom) WIW12-073 ▶ Power System Economic Loading with Emergency Reserve Provision from Wind X. Tang, B. Fox, K. Li (Queen's University Belfast, United Kingdom) WIW12-020 ▶ The Impact of Different Wind and Solar Portfolios on Spot Market Prices - A Market Model V. Speth (University of St Gallen, Switzerland), A. Klein (University of Applied Sciences Mannheim, Germany) WIW12-090 ▶ EU PowerNet -A Business Model for a Cooperative to Overcome National Legacy in Electricity Infrastructure Investment - A Proposal to Organise Knowledge, Decision Making and Investment Management W. Dik (Delft University of Technology, the Netherlands), S. Hoonhout, F. Rusting (EU PowerNet, the Netherlands), C. A. de Feyter (2thepoint Consultants, the Netherlands) WIW12-228 ▶ Economic Comparison of Technical Options to Increase Power System Flexibility J. Kiviluoma, E. Rinne, N. Heliö (VTT, Finland) WIW12-098
18:14 – 18:30	Discussions

20:00 CONFERENCE DINNER WIND INTEGRATION WORKSHOP

THURSDAY 15 NOVEMBER 2012

08:30 – 10:40	SESSION 7A: GRID INTEGRATION EXPERIENCE II
> Session Chair	Nicholas W. Miller (GE Energy, USA)
08:30 – 10:10	Presentations (20 min. each)
	<ul style="list-style-type: none"> ▶ Impacts of Renewable Generation on Fossil Fuel Unit Cycling: Costs and Emissions G. Brinkman, D. Lew (NREL, USA), N. Kumar, S. Lefton (Intertek-APTECH, USA), S. Venkataraman, G. Jordan (GE Energy, USA) WIW12-132 ▶ Forecast of the Installed Capacity for Renewable Energy Installations and its Influence on the Grid Extensions in the State of Brandenburg H. Schwarz, K. Pfeiffer (Brandenburg University of Technology, Germany), J. Zeidler (MITNETZ Strom, Germany), S. Schulz (50Hertz Transmission, Germany), S. Dorendorf (E.ON edis, Germany) WIW12-050 ▶ Pushing the Distribution System to its Limits and Beyond: A Case Study on Wind Integration in Germany E. Tröster, S. Langanke (Energynautics, Germany), B. Betz (EWR Netz, Germany) WIW12-226 ▶ Voltage Stability at Hydropower Stations Influenced by Close-located Wind Farms E. Lidström, D. Wall, J. Persson (Vattenfall R&D, Sweden), U. Lundin (Uppsala University, Sweden) WIW12-030 ▶ Renewable Generation Dispatch Optimization Technology and Decision Support System under Non-market Environment P. Li, Y. Huang, C. Liu (China Electric Power Research Institute, China) WIW12-088
10:10 – 10:40	Discussions

08:30 – 10:40	SESSION 7B: MEANS FOR POWER BALANCING
> Session Chair	Markus Fischer (Enercon, Germany)
08:30 – 10:18	Presentations (18 min. each)
	<ul style="list-style-type: none"> ▶ Emulated Inertial Response from Wind Turbines: The Case for Bespoke Power System Optimisation L. Ruttledge, D. Flynn (University College Dublin, Ireland) WIW12-121 ▶ Contribution of Energy Storage for Large-scale Integration of Variable Generation A. Estanqueiro (LNEG, Portugal), A. Årdal (SINTEF, Norway), C. O'Dwyer, D. Flynn (University College Dublin, Ireland), D. Huertas-Hernando (SINTEF, Norway), D. Lew (NREL, USA), E. Gómez-Lázaro (University of Castilla-La Mancha, Spain), E. Carlini (Terna, Italy), E. Solvang (SINTEF, Norway), E. Ela (NREL, USA), J. Kiviluoma (VTT, Finland), L. Rodrigues (LNEG, Portugal), M. Amelin (Royal Institut of Technology/KTH, Sweden) WIW12-177 ▶ Winning End Users Active Support to Demand Side Response J. Osorio (REN, Portugal), A. Estanqueiro (LNEG, Portugal) WIW12-147 ▶ Consideration of the Load-Frequency Control and Performance of the Continental European Power System during Large Imbalances J.E.S. de Haan, M. Aliano (Eindhoven University of Technology, the Netherlands), J. Frunt (DNV KEMA, the Netherlands), W. Kling (Eindhoven University of Technology, the Netherlands) WIW12-110 ▶ Managing the Variability of Supply in the European Power System with High Wind Energy Penetration J. Corbett, D. Carroll, H. Laurie (Mainstream Renewable Power, Ireland), B. Hurley (Wind Site Evaluation, Ireland), A. M. Foley (Queen's University Belfast, United Kingdom) WIW12-169 ▶ Control, Regulation and Storage Systems to Optimize the Integration of Wind Power M. Gascó (University of Alicante, Spain), A. Ríos (European University of Madrid, Spain) WIW12-053
10:18 – 10:40	Discussions

08:30 – 10:40	SESSION 7C: HARMONIC ISSUES
> Session Chair	Brendan Fox (Queen's University Belfast, United Kingdom)
08:30 – 10:18	Presentations (18 min. each)
	<ul style="list-style-type: none"> ▶ Propagation of Harmonic Emission from the Turbines through the Collection Grid to the Public Grid U. Axelsson, A. Holm (Vattenfall R&D, Sweden), M. Bollen, K. Yang (Luleå University of Technology, Sweden) WIW12-163 ▶ Harmonic Model of the Network Bridge Power Converter for Wind Turbine Harmonic Studies P. Brogan, N. Goldenbaum (Siemens Wind Power, United Kingdom) WIW12-197 ▶ Harmonic Analysis in a Distribution System with Wind Generation using DFIG J. Mirzaei (Monenco Consulting Engineering, Iran) WIW12-186 ▶ Application of Transfer Function Based Harmonic Study Method to an Offshore Wind Farm Y. Chen, M. Bollen (STRI AB, Sweden), M. Martins (Alstom Wind, Spain) WIW12-119 ▶ Harmonic Analysis of Wind Turbines Including Measurements, Data Analysis, Modelling L. H. Kocewiak (DONG Energy, Denmark), N. Goldenbaum (Siemens Wind Power, United Kingdom) WIW12-120 ▶ Type-III Wind Power Plant Harmonic Emissions - Field measurements and aggregation guidelines for adequate representation of harmonics C. Larose, R. Gagnon (IREQ/Hydro-Québec, Canada), P. Prud'Homme, M. Fecteau, M. Asmine (Hydro-Québec, Canada) WIW12-040
10:18 – 10:40	Discussions

10:40 – 11:20 Coffee Break

11:20 – 13:00	SESSION 8A: OFFSHORE WIND POWER PLANTS
> Session Chair	Michael Nørtoft Frydensbjerg (Siemens Wind Power, Denmark)
11:20 – 12:40	Presentations (20 min. each)
	<ul style="list-style-type: none"> ▶ Wind Power Plants Inertial Response Capability Considering Wake Effect S. Kuenzel, L. P. Kunjumuhammed, B. C. Pal (Imperial College London, United Kingdom), I. Erlich (University of Duisburg-Essen, Germany) WIW12-023 ▶ Off-Shore Wind Power Plant Modelling Precision and Efficiency in Electromagnetic Transient Simulation Programs U. Karaagac, H. Saad, J. Mahseredjian (Polytechnical School of Montreal, Canada), S. Jensen, L. Cai (REpower, Germany) WIW12-154 ▶ Future of Offshore Wind - Pilot Installation of a 2MW WindFloat® System A. Weinstein, C. A. Cermelli (Principle Power, USA) WIW12-223 ▶ Spreadsheet Based Methodology to Assess Offshore Wind Capacity Factors in Project Planning Stage A. Madariaga, J. L. Martín, I. Martínez de Alegría (University of the Basque Country [UPV/EHU], Spain), S. Ceballos (Tecnalia Research & Innovation, Spain), O. Anaya-Lara (Strathclyde University, United Kingdom) WIW12-158
12:40 – 13:00	Discussions

11:20 – 13:00	SESSION 8B: WIND FORECASTING III
> Session Chair	Hans-Peter Waldl (Overspeed, Germany)
11:20 – 12:40	Presentations (16 min. each)
	<ul style="list-style-type: none"> ▶ Portfolio Effect of Wind Power Plants Based on Wind Regime Dependency: Portugal Case-Study N. F. Jorge, C. Trivino, J. M. Marco (GL Garrad Ibérica, Portugal) WIW12-039 ▶ Wind Power Forecasting Error Frequency Analyses for Operational Power System Studies A. R. Florita, B.-M. Hodge, M. Milligan (NREL, USA) WIW12-077 ▶ Economic Evaluation of Short-Term Wind Power Forecasts in ERCOT: Preliminary Results K. Orwig (NREL, USA), V. Banunarayanan, S. Nasir (ICF International, USA), B.-M. Hodge, G. Brinkman, E. Ela, M. Milligan (NREL, USA), J. Freedman (AWS Truepower, USA) WIW12-087 ▶ Common Characterization of Variability and Forecast Errors of Variable Energy Sources and their Mitigation Using Reserves in Power System Integration Studies N. Menemenlis, M. Huneault (IREQ/Hydro-Québec, Canada), A. Robitaille (Hydro-Québec, Canada), H. Holttinen (VTT, Finland) WIW12-215 ▶ Use of Offsite Data to Improve Short Term Ramp Forecasting A. Suzuki (GL Garrad Hassan, United Kingdom), P. Shaw, C. Collier (GL Garrad Hassan, USA), J. Parkes (GL Garrad Hassan, United Kingdom), L. Landberg (GL Garrad Hassan, Denmark) WIW12-016
12:40 – 13:00	Discussions

11:20 – 13:00	SESSION 8C: FREQUENCY/INERTIA RESPONSE
> Session Chair	Poul Ejnar Sørensen (DTU Wind, Denmark)
11:20 – 12:40	Presentations (16 min. each)
	<ul style="list-style-type: none"> ▶ Ancillary Services for the European Grid with High Shares of Wind and Solar Power F. Van Hulle (EWEA, Belgium), H. Holttinen, J. Kiviluoma (VTT, Finland) N. Cutululis (DTU, Denmark) WIW12-217 ▶ Assessment and Implementation of Inertial Response from Variable Speed Wind Turbines G. Xu, L. Xu, J. Morrow (Queen's University Belfast, United Kingdom) WIW12-193 ▶ Delivering Combined Droop and Inertial Response from Wind Plant to the GB Power System L. Wu, D. Infield (University of Strathclyde, United Kingdom) WIW12-180 ▶ Real-time System-wide Inertia Estimation in Power Systems with High Wind Penetration Levels M. R. Bank Tavakoli, M. Power, L. Ruttledge, D. Flynn (University College Dublin, Ireland) WIW12-076 ▶ Frequency Controlling Wind Power - Modelling of Control Strategies M. Wang-Hansen, R. Josefsson, H. Mehmedovic (ÅF, Sweden) WIW12-078
12:40 – 13:00	Discussions

13:00 – 14:00 Lunch

14:00 – 15:40	SESSION 9A: HVDC TECHNOLOGY II
> Session Chair	TBA
14:00 – 15:20	Presentations (20 min. each)
	<ul style="list-style-type: none">▶ Power-electronic Asset Characteristics for HVDC-connected Offshore Grids C. Heising, D. Meyer, R. Bartelt (Avasition, Germany), M. Koochack Zadeh, T. J. Lebioda, J. Jung (TenneT Offshore, Germany) WIW12-233▶ Investigation of Steady State Operation and Dynamic Performance of a MMC Based HVDC Link E. N. Abildgaard, Ø. A. Rui (Statnett, Norway), M. Molinas (Norwegian University of Science and Technology, Norway) WIW12-018▶ Reliability Analysis of HVDC Grid Combined with Power Flow Simulation Y. Yang, T. Langeland, J. Solvik (DNV, Norway), E. Stewart (DNV KEMA, USA) WIW12-138▶ Examination of Fault Ride-Through Methods for Off-Shore Wind Farms Connected to the Grid through VSC-Based HVDC Transmission U. Karaagac, J. Mahseredjian, H. Saad (Polytechnical School of Montreal, Canada), S. Jensen, L. Cai (REpower, Germany) WIW12-153
15:20 – 15:40	Discussions

14:00 – 15:40	SESSION 9B: GRID CODE ISSUES
> Session Chair	TBA
14:00 – 15:20	Presentations (16 min. each)
	<ul style="list-style-type: none">▶ 50/60 Hz Grid Code Test and Verification Experience Z. Fan (GermanischerLloyd, Germany), J. Meggers (GL Garrad Hassan, Germany), T. Wehrend, T. Gehlhaar (Germanischer Lloyd, Germany) WIW12-237▶ FGW's Experiences with and Solutions for the Integration of Renewables into the German Grid J. Rauch (FGW, Germany), J. Möller (M.O.E., Germany) WIW12-203▶ Transient Control of Grid-connected Converters for Wind Turbines to Fulfill Future Grid Codes D. Tong, X. Yuan, J. Hu (Huazhong University of Science and Technology, China) WIW12-047▶ Flexible Fault Ride Through of DFIG Wind Turbines with DC-Chopper Solution C. Wessels, M. Laubrock, U. Bellgardt (Nordex Energy, Germany), A. Genius (Woodward Kempen, Germany) WIW12-027▶ The Influence of Reactive Current on Wind Farm LVRT Behavior Q. Li, M. Zhang, J. He, S. Qin (China Electric Power Research Institute, China) WIW12-083
15:20 – 15:40	Discussions

14:00 – 15:40	SESSION 9C: MODELLING II
> Session Chair	Jens Fortmann (REpower Systems, Germany)
14:00 – 15:00	Presentations (20 min. each)
	<ul style="list-style-type: none">▶ Generic Simplified Simulation Model for DFIG with Active Crowbar F. Jiménez Buendía (Gamesa, Spain), B. Barrasa Gordo (Assystem Iberia, Spain) WIW12-196▶ A Wide-Band Equivalent Model for the Full-Converter Based (Type-4) Wind Power Plant D. N. Hussein, R. Iravani (University of Toronto, Canada) IW12-108▶ Power System Modelling at the Interplay of Markets, Control and Engineering J. Frunt, G. Dekker, W. de Boer, M. Duvoort (DNV KEMA, the Netherlands) WIW12-161
15:00 – 15:40	Discussions

15:40 – 16:00 Coffee Break

16:00 – 17:00	SESSION 10: PODIUM DISCUSSIONS/CLOSING SESSION
> Session Chair	TBA
16:00 – 16:10	▶ Topic: TBA
16:10 – 17:55	▶ Podium discussions: Participants: Paul Gardner (GL Garrad Hassan, United Kingdom) et al.
16:55 – 17:00	▶ Closing Remarks

POSTER PRESENTATIONS

- ▶ **ACE-netting Between Germany, Western Denmark, the Netherlands and Switzerland**
J.E.S. de Haan, A. Virag, I. Lampropoulos (Eindhoven University of Technology, the Netherlands), J. Frunt (DNV KEMA, the Netherlands), W. Kling (Eindhoven University of Technology, the Netherlands) **WIW12-005**
- ▶ **Grid Integration Aspects within Wind Farm Projects**
R. van de Sandt, H. Bußmann (Fichtner, Germany) **WIW12-007**
- ▶ **Schematic Network Based on German Power System to Support Research Projects**
F. Florez, T. Degner (Fraunhofer IWES, Germany), S. Mesa (XM TSO, Colombia) **WIW12-009**
- ▶ **Virtual Power Players Dealing With Excessive Wind Power Situations Using Real Time Pricing**
P. Faria, Z. Vale, H. Morais (GECAD Polytechnic of Porto, Portugal) **WIW12-034**
- ▶ **Small-Signal Stability Analysis of DC-Link Voltage Control System Affected by Synchronization Control in a Wind Turbine Connected to Weak Grid**
Y. Huang, X. Yuan, J. Hu (Huazhong University of Science and Technology, China) **WIW12-036**
- ▶ **Comparing Two Statistical Local Wind Power Forecasting Methodologies**
A. Arnoldt, M. Agsten, P. Bretschneider (Fraunhofer IOSB-AST, Germany) **WIW12-051**
- ▶ **Regulation of the Wind Power Production: Contribution of the Electric Vehicles and Other Energy Storage Systems**
C. B. Mateus, A. Estanqueiro (LNEG, Portugal) **WIW12-052**
- ▶ **Wind Energy Management for Smart Grids with Storage Systems**
M. Gascó (University of Alicante, Spain), A. Rios (European University of Madrid, Spain) **WIW12-055**
- ▶ **Grid Integration Study of a Wind Farm in a 220 kV Grid**
E. Teixeira, C. Alvarez-Ortega (Energy to Quality, Spain) **WIW12-064**
- ▶ **Wind Turbines for Bridge Structures and for Built-Environment Wind Turbines**
L. Åkesson (SP Technical Research Institute of Sweden, Sweden) **WIW12-067**
- ▶ **Examining the Variability of Wind Power Output in the Regulation Timeframe**
B.-M. Hodge, S. Shedd, A. Florita (NREL, USA) **WIW12-079**
- ▶ **Modelling Wind Speed Parameters for Computer Generation of Wind Speed in Flanders**
M. Gay, M. Van Dessel (Lessius Mechelen, Belgium), J. Driesen (KULeuven, Belgium) **WIW12-091**
- ▶ **Evaluation of Different Operational Strategies for Lithium Ion Battery Systems Connected to a Wind Turbine for Primary Frequency Regulation and Wind Power Forecast Accuracy Improvement**
M. Świerczyński, D. I. Stroe, A. I. Stan, R. Teodorescu, S. J. Andreasen (Aalborg University, Denmark) **WIW12-092**
- ▶ **Offshore Grid Transmission Planning Using Approximated HVDC Power Flows**
S. Shariat Torbaghan, B. G. Rawn, M. Gibescu, M. van der Meijden (TU Delft, the Netherlands) **WIW12-099**
- ▶ **Artificial Intelligence to Predict Short-term Wind Speed**
T. Pinto, J. Soares, S. Ramos, Z. Vale (Polytechnic of Porto, Portugal) **WIW12-111**
- ▶ **Evaluation of Planetary Boundary Layer Parameterizations in the WRF Model for Wind Energy Applications at Ceará State, Brazil**
C. Melo, P. Carvalho (DEE - UFC, Brazil), J. Leal Júnior (FÍSICA - UECE, Brazil) **WIW12-114**
- ▶ **Maximising Value of Wind Power Allocation: A Multi-objective Optimisation Approach**
L. Reichenberg, J. Goop, F. Johnsson, M. Odenberger (Chalmers University of Technology, Sweden) **WIW12-126**

- ▶ **An Introduction to Variable-Energy-Resource Integration Analysis**
E. Toolson (Energy Exemplar LLC, USA) **WIW12-134**
- ▶ **Design of Efficient and Reliable Cluster Collection Systems**
J. Pan, S. Bala (ABB Corporate Research, USA), O. Apeldoorn, S. Ebner (ABB, Switzerland), M. Reza (ABB Corporate Research, Sweden),
Stephan Ebner (ABB Switzerland) **WIW12-151**
- ▶ **Investigating the Benefits of Loss Minimization in Wind Farms by Optimal Control**
A. Timbus, C. Franke (ABB Corporate Research, Switzerland), C. Băncăanu, I. Vrânceanu, R. Teodorescu, A. Adamczyk (Aalborg University,
Denmark) **WIW12-165**
- ▶ **A Simplified Approach to Detect Undervoltage Tripping of Wind Generators**
L. Sigrist, L. Rouco (Comillas University Madrid, Spain) **WIW12-170**
- ▶ **Assessment of a Methodology for Transmission Expansion Planning around the North Sea**
S. Jaehnert, H. Farahmand, S. Völler, O. Wolfgang, D. Huertas-Hernando (SINTEF, Norway) **WIW12-175**
- ▶ **Transmission Infrastructure Development Criteria for Interconnecting Large Scale Wind Generation**
V. Banunarayanan, K. Collison, K. Kumaraswamy, (ICF International, USA) **WIW12-184**
- ▶ **Variation Management through Spatial Distribution of Wind Power Capacity**
L. Göransson, L. Reichenberg, F. Johnsson (Chalmers University of Technology, Sweden) **WIW12-190**
- ▶ **Pressure Coefficient Evolutions on the Blades of a Savonius Rotor**
A. Chauvin, S. Guignard (Laboratoire IUSTI, France), B. Kamoun (Laboratory of Applied Physics, Tunisia) **WIW12-192**