

# 16<sup>th</sup> Wind Integration Workshop

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

25 - 27 October 2017

Berlin, Germany



## PROGRAM

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WEDNESDAY 25 OCTOBER 2016			THURSDAY 26 OCTOBER 2016			FRIDAY 27 OCTOBER 2016				
Wind Workshop Day 1			Wind Workshop Day 2			Wind Workshop Day 3				
			09:00 – 11:00	ALEXANDER 1 SESSION 3A: HARMONICS I	ALEXANDER 2 SESSION 3B: ANCILLARY SERVICES	ALEXANDER 3 SESSION 3C: OFFSHORE WIND INTEGRATION	09:00 – 10:40	ALEXANDER 1 SESSION 7A: HARMONICS II	ALEXANDER 2 SESSION 7B: INERTIA ISSUES II	ALEXANDER 3 SESSION 7C: INTEGRATION EXAMPLES
				COFFEE BREAK (30MIN)				COFFEE BREAK (30MIN)		
9:00 – 13:00	FOYER		11:30 – 13:00	ALEXANDER 1 SESSION 4A: COMPLIANCE TESTING	ALEXANDER 2 SESSION 4B: SOUTH AUSTRALIA BLACK-OUT EVENT	ALEXANDER 3 SESSION 4C: INTERNATIONAL STUDIES	11:10 – 13:00	ALEXANDER 1 SESSION 8A: GERMAN SINTEG PROJECTS	ALEXANDER 2 SESSION 8B: GRID INTEGRATION STUDIES II	ALEXANDER 3 SESSION 8C: GRID OPERATION TOOLS
	REGISTRATION			LUNCH 13:00 – 14:00				LUNCH 13:00 – 14:00		
	LUNCH 11:30 – 13:00			LUNCH 13:00 – 14:00				LUNCH 13:00 – 14:00		
13:00 – 15:10	ALEXANDER 1 – 3 WELCOME & SESSION 1: KEYNOTE SESSION		14:00 – 15:45	ALEXANDER 1 SESSION 5A: MARKET & REGULATORY ISSUES	ALEXANDER 2 SESSION 5B: GRID INTEGRATION STUDIES	ALEXANDER 3 SESSION 5C: MODELLING	14:00 – 15:15	ALEXANDER 1 SESSION 9A: WIND POWER DEVELOPMENTS	ALEXANDER 2 SESSION 9B: FREQUENCY ISSUES	
	COFFEE BREAK (30MIN)			COFFEE BREAK (30 MIN)				SHORT BREAK (15 MIN)		
15:40 – 18:00	ALEXANDER 1 SESSION 2A: ENTSO-E	ALEXANDER 2 SESSION 2B: RECOMMENDED PRACTICES FOR INTEGRATION STUDIES	16:15 – 18:20	ALEXANDER 1 SESSION 6A: FORECASTING	ALEXANDER 2 SESSION 6B: INERTIA ISSUES I	ALEXANDER 3 SESSION 6C: GRID CODE ISSUES	15:30 – 16:30	ALEXANDER 1 – 2 SESSION 10: CLOSING SESSION – PODIUM DISCUSSION		
19:00	SOLAR & WIND DINNER		18:20	POSTER RECEPTION & NETWORKING						

## WEDNESDAY, 25 OCTOBER 2017

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**09:00 – 13:00 Registration**

**11:30 – 13:00 Lunch**

**13:00 – 13:10 Welcome**

<b>13:10 – 15:10</b>	<b>SESSION 1 – KEYNOTE SESSION</b>
<b>&gt; Session Chair</b>	<b>T. Ackermann (Energynautics, Germany)</b>
<b>13:10 – 14:50</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"><li>• <b>Grid Stresstest</b> Carsten Siebels (Tennet, Germany) (Submission-ID WIW17-315)</li><li>• <b>North Sea Wind Power of the Future</b> Mart van der Meijden (Tennet, Netherlands) (Submission-ID WIW17-316)</li><li>• <b>Presentation 3</b> TBA</li><li>• <b>Social Acceptance is the Achilles' Heel of the Energy Transition</b> Lex Hartman (Tennet, Germany) (Submission-ID WIW17-317)</li><li>• <b>Presentation 5</b> TBA</li></ul>
<b>14:50 – 15:10</b>	<b>Discussions</b>

**15:10 – 15:40 Coffee Break**

<b>15:40 – 17:40</b>	<b>SESSION 2A – ENTSO-E: SYSTEM CHALLENGES &amp; SOLUTIONS TO MOVE TOWARDS 100% RES PENETRATION</b>
<b>&gt; Session Chair</b>	<b>Name (Company, Country)</b>
<b>15:40 – 17:00</b>	<b>Presentations (20 min each)</b>
	<ul style="list-style-type: none"><li>• <b>Present status of European wide guidance from ENTSO-E on HPoPEIPS</b> J. Jahn (Tennet, Germany)</li><li>• <b>Implications of High Penetration of Power Electronic Interfaced Sources on Power System Analysis</b> B. Weise (DigSILENT, Germany) (Submission-ID WIW17-319)</li><li>• <b>Wind Industry input on issues in dealing with High Penetration challenges</b> Wind Europe / P. Christensen (Vestas, Denmark)</li><li>• <b>Possible ways forward for Solar PV contribution to coping with impact of High Penetration</b> T. Buelo (SMA, Germany)</li></ul>
<b>17:00 – 17:40</b>	<b>Discussion:</b> <b>HOW SHOULD THE INDUSTRY MOVE FORWARD WITH THE EXPECTED HIGH PENETRATION CHALLENGE?</b>

<b>15:40 – 18:00</b>	<b>SESSION 2B – IEA TASK 14 AND TASK 25: RECOMMENDED PRACTICES FOR WIND /PV INTEGRATION STUDIES</b>
<b>&gt; Session Chair</b>	<b>Name (Company, Country)</b>
<b>15:40 – 17:40</b>	<b>Presentations (30 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>IEA Manual : Getting Wind and Solar to the Grid</b> S. Mueller (International Energy Agency, France) (Submission-ID WIW17-301)</li> <li>• <b>Recommended Practices for wind/PV integration studies</b> H. Holttinen (VTT, Finland), R. Bründlinger (AIT, Austria) (Submission-ID WIW17-209)</li> <li>• <b>IEA PVPS Recommended Practices for Wind/PV Integration Studies – Focus on PV Integration</b> R. Bründlinger, Ch. Mayr (AIT, Austria) (Submission-ID WIW17-000)</li> <li>• <b>Transmission Grid and System Dynamics: Recommended Practices for Wind/PV Integration Studies</b> D. Flynn (University College Dublin, Ireland), H. Holttinen (VTT, Finland) (Submission-ID WIW17-283)</li> </ul>
<b>17:40 – 18:00</b>	<b>Discussions</b>

<b>15:40 – 18:00</b>	<b>SESSION 2C – HVDC ISSUES</b>
<b>&gt; Session Chair</b>	<b>Name (Company, Country)</b>
<b>15:40 – 17:40</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>Interaction study between VSC-HVDC converters and DFIG-based WPPs connected to the AC network</b> E. Prieto-Araujo, E. Sánchez-Sánchez, S. Galceran-Arellano, O. Gomis-Bellmunt (CITCEA-UPC, Spain) (Submission-ID WIW17-43)</li> <li>• <b>Auxiliary power supply in a FixReF controlled offshore wind farm with diode rectifier HVDC transmission</b> C. Neumann, H.-G. Eckel (University of Rostock, Germany) (Submission-ID WIW17-172)</li> <li>• <b>Offshore Wind Farms and HVDC Grids Modeling as a Feedback Control System for Stability Analysis</b> A. Bidadfar, O. Saborío-Romano, M. Altin, Ö. Göksu (DTU Wind, Denmark) (Submission-ID WIW17-144)</li> <li>• <b>Harmonic resonance interactions in HVDC-connected Offshore Wind Power Plants</b> M. Cheah-Mane (CITCEA-UPC, Spain), L. Sainz, Luis, (UPC, Spain), E. Prieto-Araujo, O. Gomis-Bellmunt (CITCEA-UPC, Spain) (Submission-ID WIW17-44)</li> <li>• <b>Harmonic Stability and Interactions in Meshed Hybrid HVDC/AC Dominated Power Systems</b> A. Agbemuko (Energy Research Institute of Catalonia (IREC), Spain   Polytechnical University of Catalonia, Spain), J. L. Dominguez-Garcia (Energy Research Institute of Catalonia (IREC), Spain), O. Gomis-Bellmunt (Polytechnical University of Catalonia, Spain) (Submission-ID WIW17-38)</li> <li>• <b>ANFIS Based HVDC Transmission System with Large Scale Integrated Wind Power in the Egyptian Power Grid</b> H. Aboelsoud (Yokohama National University, Japan) (Submission-ID WIW17-95)</li> </ul>
<b>17:40 – 18:00</b>	<b>Discussions</b>

**19:00 – 22:30            WORKSHOP DINNER (Bus departure 18:30)**

## THURSDAY, 26 OCTOBER 2017

09:00 – 11:00	SESSION 3A – HARMONICS I
> Session Chair	Name (Company, Country)
<b>09:00 – 10:40</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"> <li> <b>Impedance Modeling and Simulation of Wind Turbines for Power System Harmonic Analysis</b>            J. Sun (Rensselaer Polytechnic Institute, USA), C. Buchhagen, M. Greve (TenneT Offshore, Germany) (Submission-ID WIW17-210)         </li> <li> <b>Large scale Investigation of Harmonic Summation in Wind- and PV-Power Plants</b>            F. Ackermann (Fraunhofer-ISE, Germany), F. Santjer (UL International (DEWI), Germany), I. Athamna, (FGW e.V, Germany), K. K�uch (WindGuard Certification, Germany), K. Malekian (Technical University of Chemnitz, Germany), A. Adloff (WRD Wobben Research and Development, Germany), G. Kaatz, D. Schulz (Helmut Schmidt University, Germany), A. Bitz, N. Schaefer (Fraunhofer IWES, Germany), B. Fricke (M.O.E., Germany), M. El Ghouti (DNV-GL, Germany) (Submission-ID WIW17-211)         </li> <li> <b>Harmonic emission of wind turbines and PV inverters, investigations in harmonic phase angles and grid impedances</b>            F. Santjer, S. Tentzerakis, K. Nolopp, M. Baerschneider, R. Foreman (UL International, Germany), K. Malekian, F. Safargholi (Technical University of Chemnitz, Germany), S. Adloff (WRD Wobben Research and Development, Germany), I. Athamna, M. Muehlberg (FGW, Germany), M. F. Meyer, M. Jordan (Helmut Schmidt University, Germany), F. Ackermann (Fraunhofer ISE, Germany), D. Schulz (Helmut Schmidt University, Germany) (Submission-ID WIW17-147)         </li> <li> <b>Wind Power Plant Transmission System Modelling for Harmonic Propagation and Small-signal Stability Analysis</b>            Ł. Kocewiak (DONG Energy Wind Power, Denmark), B. Gustavsen (SINTEF Energy Research, Norway) (Submission-ID WIW17-229)         </li> <li> <b>Sideband-Harmonic Instability of Paralleled Inverters with Asynchronous Carriers</b>            X. Wang, F. Blaabjerg (Aalborg University, Denmark) (Submission-ID WIW17-145)         </li> </ul>
<b>10:40 – 11:00</b>	<b>Discussions</b>

09:00 – 11:00	SESSION 3B – ANCILLARY SERVICES AND MARKETS
> Session Chair	Name (Company, Country)
<b>09:00 – 10:40</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"> <li> <b>Designing electricity market mechanisms for frequency control ancillary services, for efficient large-scale integration of variable renewable generation and battery technologies into power systems.</b>            S. Wallace (SW Advisory, Australia   HARD software, Australia), T. George (DlG SILENT PACIFIC, Australia), H. Mackenzie (HARD software, Australia), K. Summers (Pacific Hydro, Australia), J. Dyson (Greenview Strategic Consulting, Australia) (Submission-ID WIW17-150)         </li> <li> <b>Ancillary services provision with wind power plants in Spain and its coordination with congestion management</b>            M. Sanchez Llorente, R. Fernandez-Alonso, M. de la Torre Rodriguez, J. Bola Merino (REE – Red El�ctrica de Espa�a, Spain) (Submission-ID WIW17-103)         </li> <li> <b>Enel Green Power experience in the integration of Energy Storage Systems with Wind and Solar power plants for providing ancillary services</b>            L. Lanuzza, F. Bizzarri, A. De Cristofaro, L. Rambaldi, D. Consoli, A. Tizzarini, F. Fioretti (Enel Green Power, Italy) (Submission-ID WIW17-194)         </li> <li> <b>Short term forecasting of wind power plant generation for system stability and provision of ancillary services</b>            H. Mackenzie, J. Dyson (Dispatch Solutions, Australia) (Submission-ID WIW17-87)         </li> <li> <b>Review of regulated Ancillary Service Market in India</b>            S. Sharma (GIZ India, India), A. Nandy (Solar Energy Corporation of India, India) (Submission-ID WIW17-183)         </li> </ul>
<b>10:40 – 11:00</b>	<b>Discussions</b>

09:00 – 11:00	SESSION 3C – OFFSHORE WIND INTEGRATION
> Session Chair	Name (Company, Country)
<b>09:00 – 10:40</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>Standard hub@sea (66kV)</b> M. Kuijpers (Tennet, Netherlands) (<a href="#">Submission-ID WIW17-329</a>)</li> <li>• <b>Fault ride-through of unbalanced AC grid faults in HVDC-connected offshore wind power plants</b> K. Schönleber (GE Renewable Energy, Spain), E. Prieto Araujo, O. Gomis-Bellmunt (CITCEA-UPC, Spain) (<a href="#">Submission-ID WIW17-117</a>)</li> <li>• <b>Harmonic Active Filtering and Impedance-based Stability Analysis in Large Offshore Wind Farm</b> D. Dhua, G. Yang, Z. Zhang, (Technical University of Denmark, Denmark), Ł. Kocewiak, A. Timofejevs (DONG Energy Wind Power, Denmark) (<a href="#">Submission-ID WIW17-162</a>)</li> <li>• <b>Parameterization and Dynamic Analysis of Coordinated Voltage Control for Offshore Wind Power Integration</b> Q. Wu (Technical University of Denmark, Denmark), V. Akhmatov (Energinet.dk, Denmark), A. Kotosonias, J. M. Røge (Technical University of Denmark, Denmark) (<a href="#">Submission-ID WIW17-83</a>)</li> <li>• <b>Black Start and Island Operation Capabilities of Wind Power Plants</b> Ö. Göksu, O. Saborío-Romano, N. Cutululis, P. Sørensen (DTU Wind Energy, Denmark) (<a href="#">Submission-ID WIW17-243</a>)</li> </ul>
<b>10:40 – 11:00</b>	<b>Discussions</b>

## 11:00 – 11:30 Coffee Break

11:30 – 13:00	SESSION 4A – COMPLIANCE TESTING
> Session Chair	Name (Company, Country)
<b>11:30 – 12:30</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>Overview of actual development and discussions of electrical certification of wind turbines on test benches</b> C. Mehler, M. Neshati (Fraunhofer IWES, Germany) (<a href="#">Submission-ID WIW17-199</a>)</li> <li>• <b>Input Bandwidth Requirement for Accurate Flicker Measurements in Wind Turbines during Switching Operations</b> K. Redondo, I. Azcarate, J. J. Gutierrez, P. Saiz, L. A. Leturiondo (University of the Basque Country (UPV/EHU), Spain) (<a href="#">Submission-ID WIW17-113</a>)</li> <li>• <b>A Test-bed System for Validation of Ancillary Services of Wind Farms under Realistic Conditions</b> A. Kisser, M. Engel, H. Schulte (University of Applied Sciences (HTW) Berlin, Germany) (<a href="#">Submission-ID WIW17-94</a>)</li> </ul>
<b>12:30 – 13:00</b>	<b>Discussions</b>

11:30 – 13:00	SESSION 4B – REVIEW OF THE SOUTH AUSTRALIA BLACK-OUT
> Session Chair	Name (Company, Country)
<b>11:30 – 12:30</b>	<b>Presentations</b>
	<ul style="list-style-type: none"> <li>• <b>Analysis of the South Australian Black-out (40 mins)</b> Babak Badrzadeh (AEMO, Australia) (<a href="#">Submission-ID WIW17-327</a>)</li> <li>• <b>Frequency Control Ancillary Service Market and Wind Integration – Lessons Learnt from South Australia (30mins)</b> K. Summers, R. Jennings (Pacific Hydro Pty, Australia   Engineers Australia, Australia), J. Peters (Pacific Hydro Pty, Australia) (<a href="#">Submission-ID WIW17-262</a>)</li> <li>• <b>Presentation 3: TBA (30 mins)</b> Name (Company, Country), Name (Company, Country), ... <a href="#">WIW17-000</a></li> </ul>
<b>12:30 – 13:00</b>	<b>Discussions</b>

11:30 – 13:00	SESSION 4C – INTERNATIONAL STUDIES
> Session Chair	Name (Company, Country)
11:30 – 12:30	Presentations (20 min. each)
	<ul style="list-style-type: none"> <li>• <b>Analysing future energy systems with high shares of variable renewables: a South African case study</b> B. Zimmermann (Fraunhofer IWES, Germany), C. Mushwana (CSIR, South Africa), S. Bofinger (Fraunhofer IWES, Germany), T. Bischof-Niemz (CSIR, South Africa) (Submission-ID WIW17-25)</li> <li>• <b>Quantifying the benefits of wind power diversity in New Zealand</b> A. Wood (University of Canterbury, New Zealand) (Submission-ID WIW17-5)</li> <li>• <b>Evaluating the Impacts of Priority Dispatch Rule of Renewable Energy Curtailment in Japan</b> T. Wakeyama (Renewable energy institute, Japan) (Submission-ID WIW17-178)</li> </ul>
17:15 – 18:00	Discussions

### 13:00 – 14:00 LUNCH BREAK

14:00 – 15:50	SESSION 5A – MARKET, ECONOMIC & REGULATORY ISSUES
> Session Chair	Name (Company, Country)
14:00 – 15:30	Presentations (18 min. each)
	<ul style="list-style-type: none"> <li>• <b>The Effect of Wind Generation on Wholesale Electricity Prices in Ireland</b> R. Kernan, X. Liu, S. McLoone, B. Fox (Queen's University Belfast, United Kingdom) (Submission-ID WIW17-27)</li> <li>• <b>Smart markets as an efficient concept to address network congestion in regions with high penetration levels of wind power</b> M. Doering (Ecofys, Germany), M.-L. Arlt (University of Freiburg/Lawrence Berkeley National Lab, Germany), C. Nabe (Ecofys, Germany), S. Ropenus (Agora Energiewende, Germany), K. Burges (Ecofys, Germany) (Submission-ID WIW17-274)</li> <li>• <b>Increased integration of non-synchronous generation into the Australian National Electricity Market</b> J. Eggleston (Australian Energy Market Commission, Australia) (Submission-ID WIW17-133)</li> <li>• <b>Simulation analysis of wind power integration in isolated grids: a case study</b> J. Radcliffe, Y. Ding (University of Birmingham, United Kingdom) (Submission-ID WIW17-89)</li> <li>• <b>German Paradox demystified: why is need for balancing reserves reducing despite increasing VRE penetration?</b> R. Kuwahata (Elia Grid International, Germany) (Submission-ID WIW17-19)</li> </ul>
15:30 – 15:50	Discussions

14:00 – 15:45	SESSION 5B – GRID INTEGRATION STUDIES
> Session Chair	Name (Company, Country)
<b>14:00 – 15:20</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>Comparison of integration studies of 30-40 percent energy share from variable renewable sources</b> L. Söder (KTH, Sweden), M. Milligan (NREL, USA), A. Orths (Energinet.dk, Denmark), C. Pelling (Forschungsstelle, für Energiewirtschaft, Germany), J. Kiviluoma (VTT, Finland), V. Silva (EDF, France), M. Lopez-Botet Zulueta (EDF, France), D. Flynn (University College Dublin, Ireland), B. O'Neill (NREL, USA) (Submission-ID WIW17-49)</li> <li>• <b>U.S. Interconnections Seam Study and the North American Renewable Integration Study</b> J. Novacheck, G. Brinkman, A. Bloom (National Renewable Energy Laboratory, USA) (Submission-ID WIW17-132)</li> <li>• <b>Reducing Power System Expansion Problems via Variable Parameterization</b> B. U. Schyska (University of Oldenburg, Germany), P. Pinson (Technical University of Denmark, Denmark), A. Kies (Frankfurt Institute for Advanced Studies, Germany), L. von Bremen (University of Oldenburg, Germany) (Submission-ID WIW17-196)</li> <li>• <b>Improving the Reactive Power Balance between a German MV and HV Grid through Coordinated Reactive Power Provision by Wind Power Plants</b> L. Hülsmann, E. Tröster (Energynautics, Germany) (Submission-ID WIW17-250)</li> </ul>
<b>15:20 – 15:45</b>	<b>Discussions</b>

14:00 – 15:45	SESSION 5C – MODELLING
> Session Chair	Name (Company, Country)
<b>14:00 – 15:20</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>Generalized Reduced Order Modeling of AC-DC-AC Converters with Application to Fault Diagnosis</b> N. Goldschmidt, S. Betker, H. Schulte (University of Applied Sciences (HTW) Berlin, Germany) (Submission-ID WIW17-275)</li> <li>• <b>Practical Experiences in Developing and Using a Wind Turbine Model according to IEC 61400-27-1</b> D. Masendorf, E. Tröster (Energynautics, Germany) (Submission-ID WIW17-255)</li> <li>• <b>Control Hardware-in-the-Loop Simulation for Turbine Impedance Modeling and Verification</b> G. Li (China Electric Power Research Institute, China), J. Sun (Rensselaer Polytechnic Institute, USA) (Submission-ID WIW17-280)</li> <li>• <b>Co-simulation and dynamic model exchange with applications to offshore wind projects</b> M. Cvetkovic (TU Delft, Netherlands) (Submission-ID WIW17-149)</li> </ul>
<b>15:20 – 15:45</b>	<b>Discussions</b>

**15:45 – 16:15 COFFEE BREAK**



16:15 – 18:30	SESSION 6A – FORECASTING
> Session Chair	Name (Company, Country)
<b>16:15 – 18:21</b>	<b>Presentations (18 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>IEA Wind Task 36 Forecasting</b> G. Giebel (DTU Wind Energy, Denmark), J. Cline (Department of Energy, USA), H. Frank (Deutscher Wetterdienst, Germany), W. Shaw (Pacific Northwest National Laboratory, USA), B.-M. Hodge (National Renewable Energy Laboratory, USA), P. Pinson, J. Messner (DTU Elektro, Denmark), C. Draxl (National Renewable Energy Laboratory, USA), G. Kariniotakis (MINES ParisTech, France), C. Möhrlen (WEPROG, Denmark) (<a href="#">Submission-ID WIW17-202</a>)</li> <li>• <b>Impact of Targeted Measurements and Advanced Machine Learning Techniques on 0-3 Hr Ahead Rapid Update Wind Generation Forecasts in the Tehachapi Wind Resource Area</b> J. Zack (AWS Truepower, USA) (<a href="#">Submission-ID WIW17-259</a>)</li> <li>• <b>Forecasting Available Wind Power for Grid Regions</b> A. Zien, O. Steinert, J. Rosenkranz, U. Focken, M. Lange (energy &amp; meteo systems, Germany) (<a href="#">Submission-ID WIW17-268</a>)</li> <li>• <b>WIND POWER FORECASTING IN BRAZIL</b> A. Barros, C. Machado, H. Camargo, P. Nascimento (Brazilian Power System Operator – ONS, Brazil) (<a href="#">Submission-ID WIW17-134</a>)</li> <li>• <b>Nordic Wind Power Forecasts: Overview and Analysis of Accuracy, Error Distributions and Correlations</b> L. Herre, T. Matusevicius, L. Söder (KTH Royal Institute of Technology, Sweden) (<a href="#">Submission-ID WIW17-124</a>)</li> <li>• <b>Uncertainty Forecasting Practices for the Next Generation Power System</b> C. Möhrlen (WEPROG, Germany), R. Bessa (INESC TEC, Portugal), J. Jørgensen (WEPROG, Denmark), G. Giebel (DTU, Denmark) (<a href="#">Submission-ID WIW17-288</a>)</li> <li>• <b>Breakthrough Accuracy of Shorter-Term Power Forecasting Using Deep Learning</b> W. Wadman, Y. Kim, G. Maniachari, A. Deng (Utopus Insights, USA) (<a href="#">Submission-ID WIW17-282</a>)</li> </ul>
<b>18:21 – 18:30</b>	<b>Discussions</b>

16:15 – 18:20	SESSION 6B – INERTIA ISSUES I
> Session Chair	Name (Company, Country)
<b>16:15 – 18:03</b>	<b>Presentations (18 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>A Survey on Inertia Related Challenges and Mitigation Measures</b> E. Ørum (Energinet, Denmark), M. Kuivaniemi, L. Haarla, M. Laasonen (Fingrid Oyj, Finland), A. Jerkø, I. Stenkløv (Statnett, Norway), F. Wik, R. Eriksson, N. Modig, K. Elkington (Svenska kraftnät, Sweden), P. Schavemaker (E-Bridge Consulting, Netherlands) (<a href="#">Submission-ID WIW17-92</a>)</li> <li>• <b>Grid Frequency Extreme Event Analysis and Modeling</b> A. Florita (National Renewable Energy Laboratory, USA) (<a href="#">Submission-ID WIW17-11</a>)</li> <li>• <b>ERCOT Future Synchronous Inertia Projections</b> J. Matevosyan, C. Anderson, W. Li (ERCOT, USA) (<a href="#">Submission-ID WIW17-206</a>)</li> <li>• <b>Emergency Islanding Scenario with df/dt-based Inertia Emulation, different Load Types and additional Load Control</b> T. Rump (University of Rostock, Germany), D. Duckwitz, C. Glöckler (Fraunhofer IWES, Germany), H.-G. Eckel (University of Rostock, Germany) (<a href="#">Submission-ID WIW17-69</a>)</li> <li>• <b>Impact of Large Scale Integration of Wind Inertia on Power System Frequency Stability</b> R. Denninger, P. Dubucq, G. Ackermann (Hamburg University of Technology, Germany) (<a href="#">Submission-ID WIW17-50</a>)</li> <li>• <b>Transient Energy Sources to Support Renewable Energy Conversion Systems</b> N. Schofield (University of Huddersfield, United Kingdom) (<a href="#">Submission-ID WIW17-281</a>)</li> </ul>
<b>18:03 – 18:20</b>	<b>Discussions</b>

16:15 – 18:20	SESSION 6C – GRID CODE ISSUES
> Session Chair	Name (Company, Country)
<b>16:15 – 17:55</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>The underestimated relevance of Wind Turbine Fault Ride Through – Review of International Requirements, Current Performances and Future Capabilities</b> R. Ogiewa (ENERCON, Sweden), M. Fischer (ENERCON Canada, Canada), I. Mackensen, S. Nikolai (WRD Wobben Research and Development, Germany) (<a href="#">Submission-ID WIW17-65</a>)</li> <li>• <b>Weak Grid Frequency Ride Through Capability Assessment - Project Experience with Bonaire Island Grid</b> Y. Sun (DNV GL Energy, Netherlands   Technical University Eindhoven, Netherlands), W. Kuijpers (DNV GL Energy, Netherlands), E. deJong (DNV GL Energy, Netherlands   Technical University Eindhoven, Netherlands), S. Cobben (Alliander, Netherlands   Technical University Eindhoven, Netherlands), V. Cuk (Technical University Eindhoven, Netherlands) (<a href="#">Submission-ID WIW17-91</a>)</li> <li>• <b>On the inability of the short-circuit current calculation standard IEC 60909-0:2016 to reflect German grid code requirements in the negative sequence for power station units with full size converters</b> B. Weise, M. Zhao, N. Wilson, S. Weigel (DigiSILENT, Germany) (<a href="#">Submission-ID WIW17-15</a>)</li> <li>• <b>Setting Standards – Perspectives for Future Energy Grids</b> S. Kosslers (DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik in DIN und VDE, Germany) (<a href="#">Submission-ID WIW17-231</a>)</li> <li>• <b>Development of a Generic Future Grid Code regarding Wind Power in Europe</b> T. K. Vrana (SINTEF Energi, Norway), L. Trills (IREC, Spain), A. Attya (University of Strathclyde, United Kingdom) (<a href="#">Submission-ID WIW17-13</a>)</li> </ul>
<b>17:55 – 18:20</b>	<b>Discussions</b>

**18:20                      POSTER SESSION & NETWORKING**

09:00 – 10:40	SESSION 7A – HARMONIS II
> Session Chair	Name (Company, Country)
<b>09:00 – 10:30</b>	<b>Presentations (18 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>Comparison of Harmonic Requirements of International Grid Codes and their Measurements and Assessment of Harmonic Studies for Wind Power Plants</b> L. Shuai, F. Martin, I. Szczesny, R. Nielsen (Siemens Wind Power, Denmark), T. Dreyer (Siemens Wind Power, Germany) (Submission-ID WIW17-192)</li> <li>• <b>Using prevailing angle of harmonics to distinguish between background noise and emission from a turbine</b> L. S. Christensen, J. G. Nielsen, T. Lund (Vestas Wind Systems, Denmark) (Submission-ID WIW17-173)</li> <li>• <b>Evaluating the influence of the grid's background distortion on the wind turbine's harmonic emission</b> M. El Ghouti (DNV GL, Germany) (Submission-ID WIW17-109)</li> <li>• <b>Statistical Estimation of Harmonic Emissions by Wind Power Plants</b> E. Guest (Technical University of Denmark, Denmark   Siemens Wind Power, Denmark), K. Jensen (Siemens Wind Power, Denmark), T. Rasmussen (Technical University of Denmark, Denmark) (Submission-ID WIW17-16)</li> <li>• <b>On Aggregation Requirements for Harmonic Stability Analysis in Wind Power Plants</b> M. K. Bakhshizadeh, Ł. Kocewiak (DONG Energy Wind Power, Denmark), C. L. Bak (Aalborg University, Denmark), J. Hjerrild (DONG Energy Wind Power, Denmark), F. Blaabjerg (Aalborg University, Denmark) (Submission-ID WIW17-215)</li> </ul>
<b>10:30 – 10:40</b>	<b>Discussions</b>

09:00 – 10:40	SESSION 7B – INERTIA ISSUES II
> Session Chair	Name (Company, Country)
<b>09:00 – 10:30</b>	<b>Presentations (18 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>Optimization of inertial response from wind power plants in power systems with high wind power penetration</b> J. Kuhlmann, M. Altin, A. Hansen (DTU Wind Energy, Denmark) (Submission-ID WIW17-46)</li> <li>• <b>Wind Farm Level Testing of Inertial Response with Optimized Recovery Behavior</b> P. Godin (ENERCON Canada, Canada), S. Engelken (WRD, Germany), M. Fischer (ENERCON Canada, Canada) (Submission-ID WIW17-131)</li> <li>• <b>Limitations for the continuous provision of synthetic inertia with wind turbines</b> A. Gloe, C. Jauch (Flensburg University of Applied Sciences, Germany), B. Craciun, J. Winkelmann (Suzlon Energy, Germany) (Submission-ID WIW17-143)</li> <li>• <b>Field Experience with Synchronous Wind Turbines in New Zealand and Scotland: instances of fault current contributing to system stability, and an instance of inertia alongside inertia-less turbines.</b> G. Henderson (Windflow Technology, New Zealand) (Submission-ID WIW17-213)</li> <li>• <b>Investigation of the frequency response of an all converter-based generation power grid using a stochastic simulation framework</b> D. Ramasubramanian, E. Farantatos, A. Tuohy (EPRI - Electric Power Research Institute, USA), V. Vittal (Arizona State University, USA) (Submission-ID WIW17-115)</li> </ul>
<b>10:30 – 10:40</b>	<b>Discussions</b>

09:00 – 10:40	SESSION 7C – INTEGRATION EXAMPLES
> Session Chair	Name (Company, Country)
<b>09:00 – 10:20</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"> <li> <b>Integrating Energy Storage Solutions into Wind Power Plants: the Faroe Islands Case Study</b>  D. McMullin, E. Quitmann (ENERCON, Germany), T. Nielsen (Elfelagið SEV, Faeroe Islands), B. Lenz, J. Anderlohr, D. Gamboa (ENERCON, Germany) (<a href="#">Submission-ID WIW17-140</a>) </li> <li> <b>Modular Multilevel Converter with Energy Storage System for Grid Support Services in Wind Farms - Computational Simulations and Preliminary Laboratory Results</b>  P. Carlos, P. Castro, A. Neto, J. Ferreira (EDP - NEW R&amp;D, Portugal), S. Rodriguez (GPTech, Spain), B. Silva, J. Aguiar (INESC TEC, Portugal) (<a href="#">Submission-ID WIW17-122</a>) </li> <li> <b>Integrating High Shares of Variable Renewable Energy in Costa Rica</b>  P.-P. Schierhorn, T. Ackermann (Energynautics, Germany), F. Fernandez (DigSILENT, Germany), C. Echevarría Barbero, J. R. Paredes, C. Tagwerker (Inter-American Development Bank IDB, USA/Costa Rica) (<a href="#">Submission-ID WIW17-xxx</a>) </li> <li> <b>Enhancing the Value of Wind and PV Generation through Optimal Aggregation</b>  A.R. Machado, J. Duque, A. Couto, A. Estanqueiro (LNEG, Portugal) (<a href="#">Submission-ID WIW17-239</a>) </li> </ul>
<b>10:20 – 10:40</b>	<b>Discussions</b>

## 10:40 – 11:10 Coffee Break

11:10 – 13:00	SESSION 8A – GERMAN SINTEG PROJECTS
> Session Chair	Name (Company, Country)
<b>11:10 – 12:40</b>	<b>Presentations</b>
	<ul style="list-style-type: none"> <li> <b>Overview of SINTEG projects Germany</b>  M. Kurt (Tennet, Germany) (40 min.) </li> <li> <b>DESIGNETZ – Toolbox Energy-Transition – From Individual Solutions Towards an Efficient System for the Future</b>  E. Wagner, T. Wiedemann (Designetz/Westnetz, Germany) (20 min.) </li> <li> <b>WindNODE – 50 Hertz (to be confirmed) 20 minuten</b> </li> </ul>
<b>12:40 – 13:00</b>	<b>Discussions</b>

<b>11:10 – 13:00</b>	<b>SESSION 8B – GRID INTEGRATION STUDIES II</b>
> Session Chair	Name (Company, Country)
<b>11:10 – 12:40</b>	<b>Presentations (18 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>A quantitative method for evaluation of variation management strategies for integration of variable renewable electricity</b> V. Johansson, L. Thorson, L. Göransson (Chalmers University of Technology, Sweden) (Submission-ID WIW17-179)</li> <li>• <b>Novel node selection approach for continent-wide power system studies using spatio-temporal clustering</b> M. Krutova (University of Oldenburg, Germany   Denmark Technical University, Denmark) (Submission-ID WIW17-271)</li> <li>• <b>Experimental assessment of power quality and stability in a converter dominated electrical grids</b> L. Reguera Castillo, A. Roscoe (University of Strathclyde, United Kingdom) (Submission-ID WIW17-12)</li> <li>• <b>Following the demand using strategical wind and solar complementarity – the case of Portugal</b> A.Couto, J. Silva, A. Estanqueiro (LNEG, Portugal) (Submission-ID WIW17-291)</li> <li>• <b>Impact of Climate Change on a Future Highly Renewable European Power System</b> M. Schlott, A. Kies, T. Brown, D. Schlachtberger, J. Hoersch, S. Schramm (Frankfurt Institute for Advanced Studies, Germany), M. Martin Greiner (Aarhus University, Denmark) (Submission-ID WIW17-184)</li> </ul>
<b>12:40 – 13:00</b>	<b>Discussions</b>

<b>11:10 – 13:00</b>	<b>SESSION 8C – GRID OPERATION TOOLS</b>
> Session Chair	Name (Company, Country)
<b>11:10 – 12:30</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>Demand Side Response in Multi-Energy Sustainable Systems to Support Power System Stability</b> J. L. Rueda Torres (Delft University of Technology, Netherlands), M.A.M.M. van der Meijden (Delft University of Technology, Netherlands   TenneT TSO, Netherlands) (Submission-ID WIW17-182)</li> <li>• <b>Can benchmarks and trials help develop new operation tool for balancing wind power ?</b> C. Möhrle (WEPROG, Germany), J. Messner (DTU, Denmark), J. Jørgensen (WEPROG, Denmark) (Submission-ID WIW17-292)</li> <li>• <b>Active Power Control for Mitigation of Short-term Fluctuation of Wind Power</b> C. T. Urabe, T. Saito, K. Kataoka, T. Ikegami, K. Ogimoto (University of Tokyo, Japan) (Submission-ID WIW17-96)</li> <li>• <b>Loss-Reduced Reactive Power Control Strategies for Transmission System Support with Renewable Energy Sources</b> R. Grab (Fraunhofer ISE, Germany), H. Köppe (Technical University Brunswick, Germany), S. Rogalla (Fraunhofer ISE, Germany), B. Engel (Technical University Brunswick, Germany) (Submission-ID WIW17-77)</li> </ul>
<b>12:30 – 13:00</b>	<b>Discussions</b>

## 13:00 – 14:00 LUNCH BREAK

<b>14:00 – 15:15</b>	<b>SESSION 9A – WIND POWER DEVELOPMENTS</b>
> Session Chair	Name (Company, Country)
<b>14:00 – 15:00</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>Implementation of current signature analysis to monitor DFIG wind turbines</b> E. Artigao, A. Honrubia-Escribano, E. Gomez-Lazaro (University of Castilla - La Mancha, Spain) (Submission-ID WIW17-86)</li> <li>• <b>Limit Voltage Dips &amp; Inrush Currents When Energizing Power Transformers—Controlled Switching of 3-Pole Operated MV Switchgears &amp; HV CBs—Theory and Case Study</b> P. Taillefer, L. Poutrain (Vizimax, Canada) (Submission-ID WIW17-260)</li> <li>• <b>The Evolving Role of Simulation and Data Analytics in Wind Power System Development and Operation</b> G. Dudgeon (MathWorks, USA), G. Schrabberger (MathWorks GmbH, Germany) (Submission-ID WIW17-123)</li> </ul>
<b>15:00 – 15:15</b>	<b>Discussions</b>

<b>14:00 – 15:15</b>	<b>SESSION 9B – FREQUENCY ISSUES</b>
> Session Chair	Name (Company, Country)
<b>14:00 – 15:00</b>	<b>Presentations (20 min. each)</b>
	<ul style="list-style-type: none"> <li>• <b>A Statistical Method for Aggregated Wind Power Plants to Provide Secondary Frequency Control</b> J. Hu, C. Ziras, H. W. Bindner (Technical University of Denmark, Denmark), X. Han (National Development and Reform Commission, China) (<a href="#">Submission-ID WIW17-52</a>)</li> <li>• <b>Frequency Support from OWPPs connected to HVDC via Diode Rectifiers</b> O. Saborío-Romano, A. Bidadfar, Ö. Göksu, M. Altin, N. A. Cutululis, P. E. Sørensen ( Technical University of Denmark, Denmark) (<a href="#">Submission-ID WIW17-40</a>)</li> <li>• <b>Coordinated Frequency Control by Inertial Response of Wind Power and Electric Vehicles in Japanese Power System</b> J. Qi, T. Tsuji (Yokohama National University, Japan) (<a href="#">Submission-ID WIW17-205</a>)</li> </ul>
<b>15:00 – 15:15</b>	<b>Discussions</b>

**15:15 – 15:30    SHORT BREAK**

<b>15:30 – 16:30</b>	<b>SESSION 10 – CLOSING SESSION</b>
> Session Chair	Name (Company, Country)
<b>15:30 – 15:40</b>	<b>Presentations (10 min. each)</b>
	<p><b>Topics addressed:</b></p> <ul style="list-style-type: none"> <li>- TBA</li> </ul> <p><b>Panelists:</b></p> <ul style="list-style-type: none"> <li>- TBA</li> </ul>
<b>15:40 – 16:30</b>	<b>Discussions</b>

## POSTER PRESENTATIONS

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- **A feasibility study about Loss Standardization Technique based on practical Wind Farm operation**  
S. Jung (Hanbat National University, South Korea [ROK]) ([Submission-ID WIW17-39](#))
- **The Provision of Synthetic Inertia by Wind Turbine Generators: An Analysis of the Energy Yield and Costs**  
H. Thiesen (Flensburg University of Applied Sciences, Germany), J. Viebeg (University of Rostock, Germany), A. Gloe, C. Jauch (Flensburg University of Applied Sciences, Germany) ([Submission-ID WIW17-59](#))
- **Basic investigations on substation-free offshore wind power plant for HVDC system composed of series-connected wind turbine generators and current-source thyristor inverter**  
S. Nishikata, F. Tatsuta (Tokyo Dinki University, Japan) ([Submission-ID WIW17-64](#))
- **Some Engineering Cases on Facilitating CHP Flexibility to Promote Wind Power Integration by Means of Peak Regulation Ancillary Service Market in the Northeast China Grid**  
H. Zhang, Y. Liu, J. Zhang, J. Zhang, S. Du, Z. Li, Q. Li (Northeast China Grid Company, China) ([Submission-ID WIW17-67](#))
- **Implementation of a standard type 1 wind turbine model in different power system analysis tools**  
A. Lorenzo-Bonache, R. Villena-Ruiz, A. Honrubia-Escribano, E. Gómez-Lázaro, E. Artigao-Andicoberry (University of Castilla-La Mancha, Spain) ([Submission-ID WIW17-106](#))
- **Design and Tuning Methodology of Active Power Controller in Wind Power Plants**  
C. Ionita (Aalborg University, Denmark), A. George Raducu (Vattenfall, Denmark), F. Iov (Aalborg University, Denmark) ([Submission-ID WIW17-128](#))
- **Assessment of Energy Production and Damage on Wind Turbines in Complex Terrain**  
Y. Otake, N. Kusuno, M. Kimura (Hitachi, Japan) ([Submission-ID WIW17-141](#))
- **Supplemental Power System Frequency Control by DC Voltage Control of Converter Driven Wind Generator**  
T. Fujinoki, Y. Ota, T. Nakajima (Tokyo City University, Japan) ([Submission-ID WIW17-159](#))
- **Assessment of the option wind power to heat with respect to meteorological conditions in different regions in Europe**  
H. G. Beyer (University of the Faeroe Islands, Faeroe Islands) ([Submission-ID WIW17-164](#))
- **Short-Circuit Current Calculation Considering Voltage Dependent Current Control of Full-Size Converters**  
B. Niersbach, D. Batorowicz, J. Hanson (Technical University Darmstadt, Germany) ([Submission-ID WIW17-174](#))
- **Assessment of on site solar and wind energy at a manufacturing facility in Ireland**  
A. Sgobba, C. Meskill (Trinity College Dublin, Ireland) ([Submission-ID WIW17-193](#))
- **Concert – Control and uncertainties in real-time power curves of offshore wind power plants**  
G. Giebel, T. Göcmen, J. Kazda, N. Cutululis, T. Larsen, C. Galinos (DTU Wind Energy, Denmark) ([Submission-ID WIW17-203](#))
- **Frequency Regulation with Balancing Market for Secondary and Tertiary Control in Power Systems with Wind Power Integration**  
B. Jie, T. Tsuji (Yokohama National University, Japan), K. Uchida (Waseda University, Japan) ([Submission-ID WIW17-208](#))
- **Strategy for Sizing Secondary Reserve in Grids with Increasing Shares of VG**  
D. Radu, N. Martensen, P.-P. Schierhorn (Energynautics, Germany) ([Submission-ID WIW17-224](#))
- **Survey of a light-weight permanent magnet synchronous generator for high power wind applications**  
J. Steffen (Fraunhofer IWES, Germany) ([Submission-ID WIW17-237](#))
- **Optimal Control of Wind Turbines in Active Distribution Networks during Network Maintenance**  
K. Das, A. A. Hansen (DTU Wind Energy, Denmark) ([Submission-ID WIW17-277](#))
- **An AVC Strategy Adopted to Distributed Wind Power**  
Q. Liu, W. Mao, Y. Gao, Y. Zhao (North China Electric Power University, China) ([Submission-ID WIW17-294](#))
- **The value of Wind: A system-planning perspective**  
T. Bischof-Niemz, J.G. Wright, J. Calitz (Council for Scientific and Industrial Research (CSIR), South Africa) ([Submission-ID WIW17-309](#))
- **Evaluating the Capacity Factor and Fapacity Credit of Wind and PV Generation in Germany**  
H. Aghaie (AIT Austrian Institute of Technology, Austria) ([Submission-ID WIW17-330](#))