

22nd Wind & Solar Integration Workshop

26–28 SEPT '23

COPENHAGEN
DENMARK



organized by **energynautics**



PRELIMINARY AGENDA AS OF 5 OCTOBER 2023

Important: This preliminary program is subject to changes. It is strongly recommended to check back regularly.

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| TUESDAY 26 SEPTEMBER 2023 | | | | WEDNESDAY 27 SEPTEMBER 2023 | | | | THURSDAY 28 SEPTEMBER 2023 | | | |
|---|---|--|---|--------------------------------|---|---|-------------------------------------|--|--|--|---|
| Wind & Solar Workshop Day 1 | | | | Wind & Solar Workshop Day 2 | | | | Wind & Solar Workshop Day 3 | | | |
| 09:00 – 11:00 | 07:30 – 09:00 REGISTRATION / FOYER S01/S09 | | | 09:00 – 10:45 | GLASSALEN | ROOM S01 | ROOM S09 | 09:00 – 10:45 | GLASSALEN | ROOM S01 | ROOM S09 |
| | OTICON | | | | SESSION 5A: GRID FORMING ASPECTS I | SESSION 5B: SYSTEM DESIGN ASPECTS | SESSION 5C STORAGE ASPECTS | | SESSION 9A: GRID FORMING ASPECTS IV | SESSION 9B: DISTRIBUTION GRID ASPECTS | SESSION 9C: DECARBONIZATION OF ENERGY SECTORS II |
| WELCOME & SESSION 1: KEYNOTE SESSION | | | | COFFEE BREAK (25 MIN) | | | | COFFEE BREAK (25 MIN) | | | |
| COFFEE BREAK & GROUP PHOTO (30 MIN) | | | | COFFEE BREAK (25 MIN) | | | | COFFEE BREAK (25 MIN) | | | |
| 11:30 – 13:10 | GLASSALEN | ROOM S01 | ROOM S09 | 11:10 – 13:00 | GLASSALEN | ROOM S01 | ROOM S09 | 11:10 – 13:00 | GLASSALEN | ROOM S01 | ROOM S09 |
| | SESSION 2A: ENERGY ISLANDS | SESSION 2B: GRID CODE ASPECTS | SESSION 2C: HYBRID POWER PLANTS – IEA WIND TASK 50 | | SESSION 6A: GRID FORMING AND HVDC | SESSION 6B: ELECTRICITY MARKET ISSUES | SESSION 6C HYBRID POWER PLANTS I | | SESSION 10A: REACTIVE POWER ASPECTS | SESSION 10B: POWER SYSTEM STUDIES II | SESSION 10C: HYBRID POWER PLANTS II |
| LUNCH 13:10 – 14:10 | | | | LUNCH 13:00 – 14:00 | | | | LUNCH 13:00 – 14:00 | | | |
| 14:10 – 15:50 | GLASSALEN | ROOM S01 | ROOM S09 | 14:00 – 15:40 | GLASSALEN | ROOM S01 | ROOM S09 | 14:00 – 15:45 | GLASSALEN | ROOM S01 | ROOM S09 |
| | SESSION 3A: COUNTRY EXPERIENCE | SESSION 3B: GRID CODE ISSUES AND VALIDATION I | SESSION 3C DECARBONIZATION OF ENERGY SECTORS I | | SESSION 7A: GRID FORMING ASPECTS II | SESSION 7B: POWER SYSTEM STUDIES I | SESSION 7C: HARMONIC ASPECTS | | SESSION 11A: FREQUENCY ASPECTS | SESSION 11B: POWER SYSTEM STUDIES III | SESSION 11C: RELIABILITY ASPECTS |
| COFFEE BREAK (30 MIN) | | | | COFFEE BREAK (30 MIN) | | | | SHORT COFFEE BREAK (15 MIN) | | | |
| 16:20 – 18:40 | GLASSALEN | ROOM S01 | ROOM S09 | 16:10 – 18:30 | GLASSALEN | ROOM S01 | ROOM S09 | GLASSALEN | | | |
| | SESSION 4A: GRID-FORMING INVERTERS – SPECIFICATIONS AND EXPERIENCE | SESSION 4B: FORECASTING | SESSION 4C HYDROGEN ASPECTS | | SESSION 8A: GRID FORMING ASPECTS III | SESSION 8B: GRID CODE ISSUES AND VALIDATION II | SESSION 8C: PyPSA-SESSION | SESSION 12: CLOSING SESSION – PODIUM DISCUSSION | | | |
| 19:00/19:30 | WORKSHOP NETWORKING EVENT – separately bookable – | | | 18:30 | POSTER RECEPTION & GET2GETHER | | | | | | |



To ask your question, select the session room you are currently in: A-Sessions, B-Sessions, C-Sessions

08:00 – 09:00 Registration

09:00 – 09:20 Welcome

09:20 – 11:00 SESSION 1 – KEYNOTE SESSION

> Session Chair Thomas Ackermann (Energynautics, Germany)

09:20 – 10:50 Presentations (18 min. each)

- **Future Electricity Systems / Technological Challenges (TBC)**
Peter Markussen (Energinet, Denmark)
- **Integration of Renewables in Danish Distribution Grids**
Jasmin Mehmedalic (Green Power Denmark, Denmark)
- **Wind Farm System Design Challenges - a Developer's Perspective**
Jesper Hjerrild (Senior Lead Power System Specialist, Ørsted, Denmark)
- **Weather-driven Energy: System integration challenges and prospects towards 2050**
Tuhfe Göçmen (DTU – Technical University of Denmark, Denmark | EERA JP Wind)
- **How to Validate the Performance of Wind and Solar Plants in Converter Dominated Power Systems?**
Poul Ejnar Sørensen (DTU – Technical University of Denmark, Denmark)

10:50 – 11:00 Discussions

11:00 – 11:30 COFFEE BREAK & GROUP PHOTO

11:30 – 13:10 SESSION 2A: ENERGY ISLANDS

> Session Chair Peter Markussen (Senior Director, Energinet, Denmark)

11:30 – 12:50 Presentations (20 min. each)

- **Embedding Offshore Energy Hubs in the European System**
A. Orths (Chief Engineer Energinet | Convener ENTSO-E ONDP [Offshore network development plans], Denmark)
- **Technical Design Considerations of Energy Islands**
P. J. Randewijk (Senior Engineer, Energinet, Denmark)
- **Interopera – Enabling Interoperability of Multi-Vendor HVDC Grid**
M. Ndreko (Electrical System Design, Tennet, Germany)
- **Hydrogen and Energy Islands**
J. Hethay (Senior Analyst, EA Energianalyse, Denmark)

12:50– 13:10 Discussions

11:30 – 13:10 **SESSION 2B: GRID CODE ASPECTS**

> **Session Chair** **Inga Skrypalle (Vestas Wind Systems, Denmark)**

11:30 – 12:50 **Presentations (20 min. each)**

- **European Network Codes - The next generation**
B. Schowe-von der Brelie (FGH Research Association (FGH e.V.), Germany), **M. S. Ali** (FGH GmbH, Germany) ([Submission-ID WISO23-160](#))
- **Requirements for Power-to-Gas Units**
R. Bogner (TenneT TSO, Germany), **J. Weidner** (50Hertz Transmission, Germany), **V. Schulz** (Amprion, Germany), **C. Schöll** (TransnetBW, Germany), **S. Jankovic** (TenneT TSO, Germany), **H. Popella** (Amprion, Germany) ([Submission-ID WISO23-063](#))
- **Power-to-X (PtX) Integration in Modern Power Systems: Exploring Grid Code Compliance and Technical Requirements in Denmark and the United Kingdom**
J. Riofrio, **S. You**, **T. Weckesser** (DTU – Technical University of Denmark, Denmark) ([Submission-ID WISO23-147](#))
- **The Practical Importance of Clear Grid Code Requirements and Stakeholder Involvement in the Context of Large-Scale Grid Integration of Wind Power In Sweden**
R. Ogiewa (B+S grid solutions, Germany) ([Submission-ID WISO23-057](#))

12:50– 13:10 **Discussions**

11:30 – 13:10 **SESSION 2C: HYBRID POWER PLANTS – IEA WIND TASK 50**

> **Session Chair** **Vahan Gevorgian (NREL, USA) + Kaushik Das (DTU – Technical University of Denmark, Denmark)**

11:30 – 12:50 **Presentations (18 min. each)**

- **IEA Wind Task 50 on Hybrid Power Plants – Introduction (10 min)**
K. Das (DTU, Denmark)
- **Grid Code Requirements for Connecting a Hybrid Power Plant - An overview of status and recommendations for future requirements**
B. Andresen, **C. T. Soegaard**, **M. M. Zamastil** (Aarhus University, Denmark) ([Submission-ID WISO23-041](#))
- **Demonstration of Hybrid Power Plant Operation at NREL**
V. Gevorgian (NREL, USA) ([Submission-ID WISO23-218](#))
- **Control of a Utility-scale Hybrid Power Plant: A practical perspective**
G. A. Raducu (Vattenfall, Denmark) ([Submission-ID WISO23-xyz](#))
- **Experiences from controlling a utility-scale Hybrid Power Plant**
L. Petersen (Vestas, Denmark) ([Submission-ID WISO23-xyz](#))

12:50– 13:10 **Discussions**

13:10 – 14:10 **LUNCH BREAK**

14:10 – 15:50 **SESSION 3A: COUNTRY EXPERIENCE**
 > Session Chair **Fernando Javier De Marco (DIgSILENT,Germany)**

- 14:10 – 15:30** **Presentations (20 min. each)**
- **Relationship Mapping of Global IBR Grid Integration Efforts**
P. Mckay (Canadian Renewable Energy Association, Canada) (Submission-ID WISO23-003)
 - **Enabling Technologies and Possible Transition of Japan's Power System After 2030.**
K. Ogimoto, Y. Iwafune, S. Segawa (The University of Tokyo, Japan), H. Azuma, A. Isonaga, S.Fukutome (J-POWER Business Service Corporation, Japan) (Submission-ID WISO23-095)
 - **Grid Strength Analysis for Integrating 30 GW of Offshore Wind Generation by 2030 in the U.S. Eastern Interconnection**
P. Sharma, L. Rese (NREL – National Renewable Energy Laboratory, USA), B. Wang (University of Texas, USA), B. Vyakaranam (PNNL – Pacific Northwest National Laboratory, USA), **S. Shah** (NREL – National Renewable Energy Laboratory, USA) (Submission-ID WISO23-180)
 - **Innovative Approach to Renewable Grid Development: the example of Hawaii**
T. Ackermann (Energyautics, Germany)
- 15:30 – 15:50** **Discussions**

14:10 – 15:50 **SESSION 3B: GRID CODE ISSUES AND VALIDATION I**
 > Session Chair **Poul Ejnar Sørensen (DTU – Technical University of Denmark, Denmark)**

- 14:10 – 15:30** **Presentations (20 min. each)**
- **Product Development Challenges for Grid Code Compliance**
M. Ali, B. Schowe-von Der Brelie, J. Doell, **E. Makki**, Y. Ayadi (FGH GmbH, Germany) (Submission-ID WISO23-162)
 - **EMT Model Validation of an Offshore Wind Power Plant with SGRE DD Wind Turbines under Real Power System Events**
G. M. Gomes Guerreiro (Siemens Gamesa Renewable Energy | DTU – Technical University of Denmark, Denmark), R. Sharma, F. Martin (Siemens Gamesa Renewable Energy, Denmark), G. Yang (DTU – Technical University of Denmark, Denmark) (Submission-ID WISO23-037)
 - **Mobil-Grid-Cop – A New Approach for Grid Compliance Testing of Multimegawatt Wind Turbines in Field**
F. Hans, G. Quistorf, E. Nippold, T. Jersch (Fraunhofer IWES, Germany), G. Chekavskyy, G. Bujak, P. Sobanski (ABB Corporate Technology Center, Poland), J. Eckerle (ABB Switzerland, Switzerland) (Submission-ID WISO23-039)
 - **Checking Grid Code Compliance of Generators Using Simulation Models in Different Countries**
D. Masendorf (Energyautics, Germany) (Submission-ID WISO23-1xx)
- 15:30 – 15:50** **Discussions**

14:10 – 15:50 **SESSION 3C: DECARBONIZATION OF ENERGY SECTORS I**
 > Session Chair **Nigel Schofield (University of Huddersfield, United Kingdom)**

- 14:10 – 15:30** **Presentations (20 min. each)**
- **What Does a Decarbonized Future Look Like?**
D. Lew (ESIG, USA) (Submission-ID WISO23-171)
 - **Developing Support Service to ENTSO-E: Including the impacts of climate change in the Pan-European Climate Database (PECD)**
M. Koivisto, P. Kanellas (DTU – Technical University of Denmark, Denmark), A. Troccoli, G. Aldrigo (Inside Climate Service, Italy), R. Amaro e Silva (Mines Paris - PSL University, France), B. T. Olsen, J. P. Murcia (DTU – Technical University of Denmark, Denmark), D. Angeloni, M. Borga, S. Campostrini, S. Cordeddu, L. Lusito (Inside Climate Service, Italy), Y.-M. Saint-Drenan (Mines Paris - PSL University, France), E. Restivo, M. Zaramella (Inside Climate Service, Italy) (Submission-ID WISO23-097)
 - **The Role of Storage in Mitigating Renewable Energy Curtailment under GB's Transition to Net Zero**
S. Pedder, **V. Duboviks** (GE Vernova Consulting Services, United Kingdom), A. Cook (GE Vernova Consulting Services, USA) (Submission-ID WISO23-035)
 - **The Role and Value of Interregional Transmission in a Decarbonized U.S. Electricity System**
P. Brown, T. Mai, D. Palchak (NREL – National Renewable Energy Laboratory, USA) (Submission-ID WISO23-213)
- 15:30 – 15:50** **Discussions**

15:50 – 16:20 COFFEE BREAK

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| 16:20 – 18:40 | SESSION 4A: GRID-FORMING INVERTERS – SPECIFICATIONS AND EXPERIENCE |
| > Session Chair | Julia Matevosyan (ESIG, USA) & Ben Kroposki (NREL, USA) |
| 16:20 – 18:20 | Presentations (20 min. each) |
| | <ul style="list-style-type: none">• Grid Forming Specifications N. Modi (AEMO, Australia) (Submission-ID WISO23-215)• High Share of IBR Task Force, focus on grid forming services and testing J. Matevosyan (ESIG, USA) (Submission-ID WISO23-013)• Recent Accomplishments of the UNIFI Consortium B. Kroposki (NREL, USA) (Submission-ID WISO23-210)• GB Grid Forming: Best Practice Guide and Revision of the GC0137 X. Zhou (NGESO, United Kingdom) (Submission-ID WISO23-211)• The Inclusion of Grid Forming Technical Requirement in the NC RfG and NC HVDC M. Ndreko (TenneT TSO / Convener of ENTSO-E Group of Connection Network Codes, Germany) (Submission-ID WISO23-212)• Grid Forming - a Regulatory View T. dos Santos (Bundesnetzagentur/Federal Network Agency, Germany) (Submission-ID WISO23-209) |
| 18:20– 18:40 | Discussions |

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| 16:20 – 18:40 | SESSION 4B: FORECASTING |
| > Session Chair | Hannele Holttinen (Recognis, Finland) |
| 16:20 – 18:20 | Presentations (20 min. each) |
| | <ul style="list-style-type: none">• Forecasting for the Weather Driven Energy System – The results of two IEA Wind workshops G. Giebel (DTU – Technical University of Denmark, Denmark), C. Draxl (NREL, USA), H. Frank (DWD – Deutscher Wetterdienst, Germany), J. Zack (MESO Inc, USA), C. Möhrlen (WEPROG, Denmark), G. Kariniotakis (Mines Paris, France), J. Browell (University of Glasgow, United Kingdom), R. Bessa (INESC TEC, Portugal), D. Lenaghan (UK National Grid ESO, United Kingdom) (Submission-ID WISO23-119)• IEA Wind Recommended Practice for the Implementation of Renewable Forecasting Solutions: hands-on examples for the use of the guideline C. Möhrlen (WEPROG, Denmark), J. Zack (MESO, USA), M. B. Bjerregård (DTU – Technical University of Denmark, Denmark) G. Giebel (DTU – Technical University of Denmark, Denmark) (Submission-ID WISO23-092)• Optimizing Wind Power Forecasting in Day-Ahead Markets: the best Meteorological Parameters for Maximum Energy Value I. Preto (Smartwatt, Portugal), A. Couto (LNEG – Laboratório Nacional de Energia e Geologia, Portugal), R. Faria (Smartwatt, Portugal), H. Algarvio (LNEG – Laboratório Nacional de Energia e Geologia, Portugal), T. Santos (Smartwatt, Portugal), A. Estanqueiro (LNEG – Laboratório Nacional de Energia e Geologia, Portugal) (Submission-ID WISO23-077)• EARS4WindEnergy - Next Level Wind Integration by Listening to The Wind C. Möhrlen (WEPROG, Denmark), J. Arnqvist (Uppsala University, Sweden), J. Jørgensen (WEPROG, Denmark), P. Hurtig, S.-O. Rodén, A. Gräsman (AQ Systems, Sweden), E. Dellwik (DTU – Technical University of Denmark, Denmark) (Submission-ID WISO23-091)• Analysis of the Residual Two-Layer Extrapolation Method for Aggregated Wind Power Estimation A. Herzog, A. Happ, A. Braun, M. Siefert (Fraunhofer IEE, Germany) (Submission-ID WISO23-055)• A Methodology to Improve the Predictability of Solar Energy Generation: Preliminary Evidence from Great Britain K. Forbes (Energy and Environmental Data Science, Ireland) (Submission-ID WISO23-022) |
| 18:20 – 18:40 | Discussions |

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| 16:20 – 18:20 | SESSION 4C: HYDROGEN ASPECTS |
| > Session Chair | Debra Lew (ESIG, USA) |
| 16:20 – 18:00 | Presentations (20 min. each) |
| | <ul style="list-style-type: none"> • Coordinated Development of Renewable Energy Sources and Electrolysers in Europe J.-M. Janin (RTE, France), S. Guillbrandsson (ENTSO-E, Belgium), D. Powell (ENTSOG, Belgium) (Submission-ID WISO23-020) • Integration of Hydrogen Infrastructure with the Public Power Grid: Importance of Standards Development and Power Quality Management J. Vervoort, N. Denecke, A. Goymann, M. Stein, K. Schalk, D. S. Stephan (Fraunhofer IWES, Germany), U. Werner (University of Applied Sciences Bremerhaven, Germany) (Submission-ID WISO23-167) • Hybrid Power Plants with Offshore Wind, Onshore PV, BESS and P2X Technologies A. Celna (Ørsted DTU – Technical University of Denmark, Denmark), K. Das (DTU – Technical University of Denmark, Denmark), M. P. S. Gryning, M. K. Bakhshizadeh (Ørsted, Denmark), P. E. Sørensen, A. D. Hansen (DTU – Technical University of Denmark, Denmark) (Submission-ID WISO23-169) • Control Strategies of Electrolyzers to Contribute Inertia and Fast Frequency Reserve in Context of a Megawatt-Scale Hydrogen Living-Lab T. Sauer, N. Schulz, B. Engel (TU Brunswick, Germany) (Submission-ID WISO23-033) • Synergy of Hydrogen Production in Active Distribution Networks A. Baviskar, M. Gupta, K. Das (DTU – Technical University of Denmark, Denmark) (Submission-ID WISO23-127) |
| 18:00 – 18:20 | Discussions |

WORKSHOP NETWORKING EVENT – SEPARATELY BOOKABLE –

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|--------------|---|
| 18:45 | Meeting at Registration Area in the DTU Meeting Center (ground floor) |
| 19:00 | Bus departure |
| 19:30 | Start of the Dinner |

09:00 – 10:45 SESSION 5A: GRID FORMING ASPECTS I

> Session Chair **Matthew Richwine (Telos Energy, USA)**

09:00 – 10:20 Presentations (20 min. each)

- **Grid Forming Wind: Is it Ready for Prime Time?**
V. Gevorgian, S. Shah, W. Yan (NREL, USA) ([Submission-ID WISO23-139](#))
- **Inertia Contribution of a Grid Forming DFIG Wind Turbine – Performance Considerations and Prototype Demonstration Results**
I. Vieto, **D. Howard**, S. Achilles (GE Vernova Consulting Services, USA) ([Submission-ID WISO23-122](#))
- **Testing Grid Forming Requirements – OEM Perspective on Grid Modelling for Existing and Upcoming Grid Connection Requirements**
J. Steinkohl (Vestas Wind Systems, Denmark) ([Submission-ID WISO23-043](#))
- **Performance Specification and Evaluation Criteria for Grid Forming Simulation Models**
D. Ramasubramanian, Q. Zhang (EPRI – Electric Power Research Institute, USA), B. Paz (Electric Power Research Institute Europe, Ireland), W. Wang (EPRI – Electric Power Research Institute, USA), R. Pabat-Stroe (EPRI – Electric Power Research Institute International, United Kingdom) ([Submission-ID WISO23-075](#))

10:20 – 10:45 Discussions

09:00 – 10:45 SESSION 5B: SYSTEM DESIGN ASPECTS

> Session Chair **Tom Brown (TU Berlin, Germany)**

09:00 – 10:20 Presentations (20 min. each)

- **Assessment of Potential Problems on the Behaviour of Protection Functions Due to the Massive Integration of Wind Sources in Transmission Networks**
M. Toro-Cárdenas (R&D Nester, Portugal), Y. Yu (CEPRI, China), R. Cartaxo (R&D Nester, Portugal), R. Pestana (REN, Portugal), X. Chao, N. Souza e Silva (R&D Nester, Portugal), C. Wang, G. Yang (CEPRI, China) ([Submission-ID WISO23-221](#))
- **Challenges and Opportunities in Delivering the 2030 Holistic Network Design (HND) for Offshore Wind Interconnection in Great Britain**
M. Syed, S. Cox, N. Riley, D. Abbot, M. Castro (WSP, United Kingdom) ([Submission-ID WISO23-214](#))
- **Impact of Renewable Power and Market Price Forecasts on the Operational Profitability of Hybrid Power Plants**
R. Zhu (DTU – Technical University of Denmark, Denmark), O. Lindberg (Uppsala University, Sweden), K. Das, P. E. Sørensen, A. D. Hansen (DTU – Technical University of Denmark, Denmark) ([Submission-ID WISO23-136](#))
- **Two-Stage Gaussian Process Regression (2sGPR) for the Generation of Surrogate Values in Meteorological Measurements**
G. Hein, D. E. Hollermann (Fraunhofer IEE, Germany) ([Submission-ID WISO23-058](#))

10:20 – 10:45 Discussions

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| 09:00 – 10:45 | SESSION 5C: STORAGE ASPECTS |
| > Session Chair | Tom Key (EPRI, USA) |
| 09:00 – 10:30 | Presentations (18 min. each) |
| | <ul style="list-style-type: none"> • Battery Energy Storage System Integration to the RTE Network: From EMT Studies to Site Validation O. Saad (Hydro-Québec, Canada), H. Honvo, A. Ajaja (EVLO Energy Storage, Canada), S. Dennetière, Y. Vernay (RTE, France) (Submission-ID WISO23-007) • Technical and Legal Analysis of the Grid-Serving Multi-Use of Battery Storage Systems for Prosumers H. Wagner, M. Lüdecke (TU Brunswick, Germany), A. Scheunert (TU Clausthal, Germany), C. Wegkamp, B. Engel (TU Brunswick, Germany), H. Weyer (TU Clausthal, Germany) (Submission-ID WISO23-023) • Selection of Energy Storage Parameters to Cover the Annual Demand in Cooperation with Wind and Photovoltaic Farms P. Kacejko, M. Wancerz (Lublin University of Technology, Poland) (Submission-ID WISO23-080) • A Decentralized Control Strategy of Battery Energy Storage Systems for Effective Power Sharing in LVDC Microgrid V. Nougain (GIZ, India), S. Gaurav (Aroleap Fitness, India), B. K. Panigrahi (Indian Institute of Technology, India) (Submission-ID WISO23-015) • Zoning Wheeling Charge System and Optimal Power Flow Utilizing Battery under the Mass Introduction of Photovoltaics J. Cui, Y. Ueda (Tokyo University of Science, Japan) (Submission-ID WISO23-186) |
| 10:30 – 10:45 | Discussions |

10:45 – 11:10 COFFEE BREAK

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| 11:10 – 13:00 | SESSION 6A: GRID FORMING AND HVDC |
| > Session Chair | Ben Kroposki (NREL, USA) |
| 11:10 – 12:40 | Presentations (18 min. each) |
| | <ul style="list-style-type: none"> • Comparison between HVAC-HVDC Solutions for Offshore Wind Plants Integration A. Bolzoni (Hitachi Energy Research, Switzerland), J. Pan (Hitachi Energy Research, USA), L. Zhang (Hitachi Energy Research, China), M. Larsson (Hitachi Energy Research, Switzerland), P. Holmberg, Y.-J. Hafner, P. Roy (Hitachi Energy, Sweden) (Submission-ID WISO23-011) • Grid-Forming Control Methods for Weakly Connected Offshore WPPs S. Ghimire (Siemens Gamesa Renewable Energy DTU – Technical University of Denmark, Denmark), K. V Kkuni (Siemens Gamesa Renewable Energy, Denmark), S. C. Jakobsen (Siemens Gamesa Renewable Energy DTU – Technical University of Denmark, Denmark), T. Knueppel, K. H. Jensen, E. Guest, (Siemens Gamesa Renewable Energy, Denmark), T. W. Rasmussen, G. Yang (DTU – Technical University of Denmark, Denmark) (Submission-ID WISO23-061) • Impedance-Based Damping Effect for the Inner Loop of Grid-Forming VSCs L. Zhao (Aalborg University, Denmark), X. Wang (Aalborg University, Denmark KTH – Royal Institute of Technology, Sweden), Z. Jin (Beijing Jiaotong University, China) (Submission-ID WISO23-113) • Methods for Identification of Dominant Oscillatory Modes of a Grid Forming Converter with Black-Box Models V. Costan (RTE, France), H. Saad (ACDC Transient, France), P. Rault (RTE, France) (Submission-ID WISO23-153) • Black Start of HVDC Links via Grid-Forming Wind Turbines: Sensitivity Analysis and Technical Requirements C. Klein, P. Düllmann, L. Osterkamp, N. Corte (IAEW RWTH Aachen, Germany), P. Ruffing (Amprion, Germany), S. M. Iftekharul Huq (Siemens Energy Global, Germany), A. Ahmedi (Total Energies OneTech, France), D. Yates (Carbon Trust, United Kingdom), W. Leterme (IAEW RWTH Aachen, Germany) (Submission-ID WISO23-026) |
| 12:40 – 13:00 | Discussions |

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| 11:10 – 13:00 | SESSION 6B: ELECTRICITY MARKET ISSUES: THE ROLE OF MARKET DESIGN IN RENEWABLE ENERGY INTEGRATION |
| > Session Chair | Sevgi Can Erensoy (Energynautics, Germany) |
| 11:10 – 12:30 | Presentations (20 min. each) |
| | <ul style="list-style-type: none"> • Importance of the Grid for Power Pricing: Moving from NTC to Flow-Based Market Coupling S. Messa (EnAppSys Montel Group, Germany) • Innovative Electricity Market Designs to Support a Transition to (Near) 100% Renewable Power System: First Results from H2020 TradeRES Project A. Estanqueiro (LNEG – Laboratório Nacional de Energia e Geologia, Portugal), G. Strbac, N. Chrysanthopoulos (Imperial College London, United Kingdom), G. Santos (Polytechnic of Porto, Portugal), S. Johanndeiter (EnBW, Germany), H. Algarvio (LNEG – Laboratório Nacional de Energia e Geologia, Portugal), H. Syse (bitYoga, Norway), E. Sperber (DLR, Germany), N. Wang (TNO, Netherlands), I. Jimenez (TU Delft, Netherlands), D. Qiu (Imperial College London, United Kingdom), Z. Vale (Polytechnic of Porto, Portugal), K. Nienhaus, J. Kochems, C. Schimeczek (DLR, Germany), J. Sijm (TNO, Netherlands), L. de Vries (TU Delft, Netherlands), F. Lopes, A. Couto (LNEG – Laboratório Nacional de Energia e Geologia, Portugal) (Submission-ID WISO23-156) • Requirements of Future European Balancing Markets: Insights into Imbalance Volumes and Generation Availability S. Yamujala, K. Das, M. Koivisto, M. Gupta, P. Kanellas (DTU – Technical University of Denmark, Denmark) (Submission-ID WISO23-118) • Who will Pay for Offshore Wind Integration? Impact of Bidding Zone Design P.-P. Schierhorn, A. Hösl, R. Alsayyed (Energynautics, Germany) |
| 12:30 – 13:00 | Discussions |

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| 11:10 – 13:00 | SESSION 6C: HYBRID POWER PLANTS I |
| > Session Chair | Gregor Giebel (DTU – Technical University of Denmark, Denmark) |
| 11:10 – 12:40 | Presentations (18 min. each) |
| | <ul style="list-style-type: none"> • Assessment of Hybrid Power Plant Operation Including P2H in Future Energy Markets M. Gupta, K. Das, M. Friis-Møller, J. P. Murcia León (DTU – Technical University of Denmark, Denmark) (Submission-ID WISO23-116) • Development of Microgrid Testbed for Real Desert Environment Testing and Evaluation: Project Experience M. Z. Che Wanik, A. Krama, A. A. Jabbar, A. Sanfilippo (Hamad Bin Khalifa University, Qatar), S. Satar (Hitachi Energy Qatar, Qatar) (Submission-ID WISO23-137) • Profitability of Hybrid Power Plants in Europe J. P. Murcia Leon, K. Das (DTU – Technical University of Denmark, Denmark) (Submission-ID WISO23-150) • The Challenges of a Real, Complex Hybrid Project H. Nøvik (Scatec, Norway), E. Krogh (TGS Prediktor, Norway), M. S. Stokke (OceanSun, Norway), E. S. Marstein (IFE, Norway), J. Kong (SINTEF, Norway), D. H. Ramos (SNAP Magat, Philippines) (Submission-ID WISO23-149) • A Performance Comparison Between the Isolated Hybrid Energy System With and Without Battery Energy Storage System F. Zhuang (SPIE Industrie, France), R. Amaro e Silva, H. Verbois (Mines Paris - PSL University, France), T. Carrière (Solaïs, France), B. Gschwind, Y.-M. Saint-Drenan, P. Blanc (Mines Paris - PSL University, France) (Submission-ID WISO23-050) |
| 12:40 – 13:00 | Discussions |

13:00 – 14:00 LUNCH BREAK

14:00 – 15:40 **SESSION 7A: GRID FORMING ASPECTS II**
 > Session Chair **Rossano Musca (University of Palermo, Italy)**

- 14:00 – 15:20** **Presentations (20 min. each)**
- **Grid-Forming Distributed Energy Resources: Value in High Renewable Penetration and Weak Grid Scenarios**
 A. Venkataramanan, W. Wang, D. Ramasubramanian, **A. Huque**, T. Key (EPRI – Electric Power Research Institute, USA), A. Mehrizi-Sani (Virginia Polytechnic Institute and State University, USA) ([Submission-ID WISO23-067](#))
 - **Limitations of Current Norms to Predict Reliable Islanding Detection by Example of Two Detection Methods for Grid-Forming Inverters**
B. O. Winter (TU Brunswick, Germany), J. Schwung (envice, Germany), N. Schulz, B. Engel (TU Brunswick, Germany) ([Submission-ID WISO23-154](#))
 - **Converter-Driven Small Signal Stability and Interaction Analysis for Grid-Following Converters using EMT and Phasor Simulations**
C. Eckel, J. C. Kamma, C. Becker (Hamburg University of Technology, Germany) ([Submission-ID WISO23-141](#))
 - **Controllability of Grid Forming Wind Power Plant Converters Under Fault Ride Through**
Q. Wu, M. Hoffmann (TU Brunswick | Vattenfall, Germany), H. Khazraj, J. Zúñiga, (Vattenfall, Germany), S. Sethi (Vattenfall, Sweden), M. Kurrat (TU Brunswick, Germany) ([Submission-ID WISO23-124](#))
- 15:20 – 15:40** **Discussions**

14:00 – 15:40 **SESSION 7B: POWER SYSTEM STUDIES I**
 > Session Chair **Deepak Ramasubramanian (EPRI, USA)**

- 14:00 – 15:20** **Presentations (20 min. each)**
- **Power System Stability Analysis & Planning Using Impedance-Based Methods**
M. P. Richwine (Telos Energy, USA), N. W. Miller (HickoryLedge, USA), A. Siler (Telos Energy, USA), T. Jung, P. Dalton (Midcontinent Independent System Operator, USA) ([Submission-ID WISO23-24](#))
 - **Improving Voltage Stability in Weak Grids with Synchronous Condensers**
S. Carey, H. Bahmani (Durham University, United Kingdom) ([Submission-ID WISO23-009](#))
 - **A High Fault Current Synchronous Condenser for Support of Renewable Grids**
N. Schofield, F. Alhabill, N. Zhao (University of Huddersfield, United Kingdom) ([Submission-ID WISO23-172](#))
 - **Stabilization of Local Grids**
 A. Gerdemann, C. Hardt, **A. Falk**, S. Scheurich (SMA Solar Technology, Germany) ([Submission-ID WISO23-146](#))
- 15:20 – 15:40** **Discussions**

14:00 – 15:40 **SESSION 7C: HARMONIC ASPECTS**
 > Session Chair **Eckehard Tröster (Energynautics, Germany)**

- 14:00 – 15:20** **Presentations (20 min. each)**
- **Evolution of Harmonic Distortion in a Cablified Grid Island after Separation from the Meshed Transmission Grid – A Case Study from Denmark**
V. Akhmatov, T. Jakobsen, T. N. Nielsen (Energinet, Denmark), B. S. Bukh (Energinet | Aalborg University, Denmark), M. Sørensen, B. C. Gellert (Energinet, Denmark) ([Submission-ID WISO23-014](#))
 - **Active Filtering Trial to Reduce Harmonic Voltage Distortion in an Offshore Wind Power Plant**
Ł. Kocewiak (Ørsted, Denmark), E. Guest (Siemens Gamesa, Denmark), M. K. Bakhshizadeh Dowlatabadi (Ørsted, Denmark), T. Siepker (Siemens Gamesa, Denmark) ([Submission-ID WISO23-132](#))
 - **Impacts of Inverter-Based Resources on Directional Elements During Asymmetrical Faults**
Y. Li, H. Wu (Aalborg University, Denmark), X. Wang (KTH – Royal Institute of Technology, Sweden) ([Submission-ID WISO23-111](#))
 - **Power Hardware-in-the-Loop Generator Emulation for Component-Level Converter Test Bench**
 J. Wendt, P. Borowski, **G. Quistorf**, T. Jersch (Fraunhofer IWES, Germany) ([Submission-ID WISO23-069](#))
- 15:20 – 15:40** **Discussions**

15:40 – 16:10 COFFEE BREAK

16:10 – 18:30 SESSION 8A: GRID FORMING ASPECTS III

> Session Chair Jens Fortmann (University of Applied Sciences – HTW Berlin, Germany)

16:10 – 18:10 Presentations (20 min. each)

- **Operation of GFM and GFL Inverters With Synchronous Condenser**
V. Gevorgian, S. Shah, P. Koralewicz, W. Yan, R. Wallen, E. Mendiola, R. Lachance (NREL – National Renewable Energy Laboratory, USA) (Submission-ID WISO23-138)
- **Damping-Enhanced Schemes and Wide-Synchronization Control for Grid-Forming Converters**
R. Musca (University of Palermo, Italy), H. Just (50Hertz, Germany) (Submission-ID WISO23-028)
- **On the Effect of Inner Control Loops of Grid-Forming Converters on the Power Quality of Power Systems**
B. Weise (DIgSILENT, Germany) (Submission-ID WISO23-120)
- **Grid-Forming Synchronverter-based Control Method with Current Limiting Method for Grid-Side Converters of Type 4 Wind Power Plants**
P. Weber, W. Schulze (KIT – Karlsruhe Institute of Technology, Germany), P. Pawlowski (KIT – Karlsruhe Institute of Technology | Beckhoff Automation, Germany), M. Suriyah, T. Leibfried (KIT – Karlsruhe Institute of Technology, Germany) (Submission-ID WISO23-081)
- **Effects of Grid Forming Technologies on Wind Turbine Mechanics during Black-Start Operation**
G. Navarro-Martínez, J. Martínez-Turegano, R. Blasco-Gimenez (Polytechnical University of Valencia, Spain) (Submission-ID WISO23-166)
- **Torsional Vibration Analysis of Grid-Forming PMSG Wind Turbine**
S. Liu (DNV, Netherlands | Aalborg University, Denmark), H. Wu, X. Wang (Aalborg University, Denmark), A. Avazov, X. Guillaud (University of Lille, France), T. Bosma, G. Sauba (DNV, Denmark) (Submission-ID WISO23-018)

18:10 – 18:30 Discussions

16:10 – 18:30 SESSION 8B: GRID CODE ISSUES AND VALIDATION II

> Session Chair Michael Nørtoft Frydensbjerg (Vattenfall Vindkraft, Denmark)

16:10 – 18:05 Presentations (20 min. each)

- **Improved Framework for Dynamic Performance Evaluation of Inverter-Based Resources**
D. Howard, E. Gursoy, I. Vieto, S. Achilles (GE Vernova Consulting Services, USA) (Submission-ID WISO23-159)
- **Grid Connection Testing of Wind Energy Converters with Medium Voltage Generator and Grid Emulators on a Multi-Megawatt Power Hardware-in-the-Loop Test Rig**
M. Neshati (Siemens Gamesa Renewable Energy, Denmark), S. Azarian (Siemens Gamesa Renewable Energy, Germany), O. Curran (Siemens Gamesa Renewable Energy, Ireland), R. R. Pillai, J. Due (Siemens Gamesa Renewable Energy, Denmark), E. Guest (Siemens Gamesa Renewable Energy, Australia), N. M. A. Freire (Siemens Gamesa Renewable Energy, Denmark), T. Dreyer (Siemens Gamesa Renewable Energy, Germany), F. Martin (Siemens Gamesa Renewable Energy, Denmark) (Submission-ID WISO23-128)
- **Common Provisions of Compliance Simulations for Grid Integration of Power Park Modules (Ppms)**
M. Ali, B. Schowe-von Der Brelie, J. Doell, E. Makki, Y. Ayadi, J. Richter (FGH GmbH, Germany) (Submission-ID WISO23-161)
- **Compliance Criteria to Assess RMS Model Accuracy for Wind Power Plants Based on IEC 61400-27-2**
C. Cardozo, A. Guironnet (RTE R&D, France), J. L. Marín (Grupo AIA, Spain), T. Prevost, G. Torresan (RTE R&D, France) (Submission-ID WISO23-047)
- **Virtualization of Wind Turbine Testing – From System-Level to Component-Level Testing using Power Hardware-in-the-Loop Systems**
M. Basler, A. Frehn, S. Moritz, Y. Kannan, A. Monti, D. Abel, H. Vallery (RWTH Aachen, Germany) (Submission-ID WISO23-053)
- **Generic Vector Jump Model of the FRT-Tester based on Autotransformer Cut-In**
R. Klosse (EESYST Energie Elektrische Systemtechnik, Germany), S. Tentzerakis, S. R. Jan, J. Dirksen (UL International, Germany) (Submission-ID WISO23-045)

18:10 – 18:30 Discussions

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| 16:10 – 18:30 | SESSION 8C: PyPSA-SESSION |
| > Session Chair | Peter-Philipp Schierhorn (Energynautics, Germany) |
| 16:10 – 18:10 | Presentations (20 min. each) |
| | <ul style="list-style-type: none"> • Offshore Wind Integration in the North Sea: The Benefits of an Offshore Grid P. Glaum, F. Neumann, T. Brown (TU Berlin, Germany) (Submission-ID WISO23-021) • Ultra-Long-Duration Energy Storage Anywhere: Methanol with Carbon Cycling T. Brown, J. Hampf (TU Berlin, Germany) (Submission-ID WISO23-170) • Temporal Regulation of Green Hydrogen Production from Electrolysis E. Zeyen, I. Riepin, T. Brown (TU Berlin, Germany) (Submission-ID WISO23-142) • Distributed Photovoltaics Provides Key Benefits for a Highly Renewable European Energy System P. Rahdan (Aarhus University, Denmark), E. Zeyen (TU Berlin, Germany), C. Gallego-Castillo (Polytechnical University of Madrid, Spain), M. Victoria (Aarhus University, Denmark) (Submission-ID WISO23-176) • Robustness of Sector-Coupled Energy Systems to Combined Weather Effects E. K. Gøtske, G. B. Andresen, M. Victoria (Aarhus University, Denmark) (Submission-ID WISO23-177) • Near-Optimal Analysis of Biomass Usage to Achieve Negative Emissions in the European Energy System M. Millinger, F. Hedenus, L. Reichenberg (Chalmers University of Technology, Sweden), E. Zeyen, F. Neumann (TU Berlin, Germany), G. Berndes (Chalmers University of Technology, Sweden) (Submission-ID WISO23-182) |
| 18:10– 18:30 | Discussions |

18:30 POSTER RECEPTION & GET2GETHER (CANTEEN)

09:00 – 10:40 SESSION 9A: GRID FORMING ASPECTS IV

> Session Chair **Bernd Engel (elenia–TU Brunswick, Germany)**

09:00 – 10:20 Presentations (20 min. each)

- **Grid Strength Assurance in the Energy Transition: Optimal Placement of Grid-Forming Inverters**
F. De Marco, J. Gómez (DlG SILENT, Germany) ([Submission-ID WISO23-070](#))
- **Analysis of the Influence of Grid Forming Control on Power System Oscillations**
L. Cai (University of Rostock, Germany), **X. Meng** (SPIC Central Research Institute, China), **U. Karaagac** (Hong Kong Polytechnic University, Hong Kong) ([Submission-ID WISO23-030](#))
- **Reactive Current Profile of Grid-Forming Wind Power Plant Under Symmetrical Faults**
F. Zhao (Aalborg University, Denmark), **X. Wang** (KTH – Royal Institute of Technology, Sweden), **H. Wu**, **Y. Wu**, **T. Zhu** (Aalborg University, Denmark), **Y. Sun** (Shell Global Solution International, Netherlands) ([Submission-ID WISO23-034](#))
- **The Influence of Grid-Forming Loads on Transient Stability**
N. Wiese (University of Kassel, Germany), **B. Karadag** (Statkraft Germany, Germany), **M. Braun** (University of Kassel | Fraunhofer IEE, Germany) ([Submission-ID WISO23-106](#))

10:20 – 10:40 Discussions

09:00 – 10:45 SESSION 9B: DISTRIBUTION GRID ASPECTS

> Session Chair **Leonard Hülsmann (Energynautics, Germany)**

09:00 – 10:30 Presentations (18 min. each)

- **DER Active Power Management**
T. Key, **B. Seal**, **A. Huque** (EPRI, USA) ([Submission-ID WISO23-086](#))
- **Development Approach of a Volt-Var Control for Inverter-Coupled Renewable Energy Plants Using Deep Reinforcement Learning**
J. Türk, **M. Schuster**, **H. Köppe**, **B. Engel** (TU Brunswick, Germany) ([Submission-ID WISO23-187](#))
- **Challenges of Renewable Energy Integration to Weak Grids**
F. Shahnazian, **K. Das** (DTU – Technical University of Denmark, Denmark), **R. Yan** (University of Queensland, Australia), **P. Sørensen** (DTU – Technical University of Denmark, Denmark) ([Submission-ID WISO23-056](#))
- **Uncertainty Analysis in Distribution Grids: A Literature Review and Proposed Procedure for a Quasi-Dynamic Co-simulation**
S. Fayed (University of Applied Sciences Emden/Leer, Germany), **F. Peñaherrera**, **A. Nieße** (OFFIS Institute for Information Technology | Carl von Ossietzky University of Oldenburg, Germany), **J. Rolink** (University of Applied Sciences Emden/Leer, Germany) ([Submission-ID WISO23-178](#))
- **PV Self-Consumption Derived from Highly Granular Field Data and the Influence of Temporal Resolution**
C. Stegner (ZAE Bayern, Germany) ([Submission-ID WISO23-017](#))

10:30 – 10:45 Discussions

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| 09:00 – 10:40 | SESSION 9C: DECARBONIZATION OF ENERGY SECTORS II |
| > Session Chair | Hannele Holttinen (Recognis, Finland) |
| 09:00 – 10:20 | Presentations (20 min. each) |
| | <ul style="list-style-type: none"> • Comparing Methods for Soft-Coupling Energy System Models M. Berg Rosendal, R. Bramstoft (DTU – Technical University of Denmark, Denmark), J.-M. Janin (RTE R&D, France), M. Münster (DTU – Technical University of Denmark, Denmark) (Submission-ID WISO23-126) • Fees in Seabed Lease Agreements A. S. Laido, T. Hansen, L. Kitzing (DTU – Technical University of Denmark, Denmark) (Submission-ID WISO23-105) • Adapting Resource Adequacy Assessment for Decarbonized Power Systems J. C. Martín Hinojar, E. Lannoye, I. Danti Lopez (EPRI Europe, Ireland), A. Tuohy, G. De Mijolla (EPRI, USA) (Submission-ID WISO23-073) • Latest Wind and Solar Curtailment Information: statistics and future estimations in various countries/areas Y. Yasuda (Kyoto University, Japan), D. Flynn (University College Dublin, Ireland), E. Gómez-Lázaro (University of Castilla-La Mancha, Spain), H. Holttinen (Recognis, Finland), S. Martin Martinez (University of Castilla-La Mancha, Spain) (Submission-ID WISO23-143) |
| 10:20 – 10:40 | Discussions |

10:40 – 11:10 COFFEE BREAK

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| 11:10 – 13:00 | SESSION 10A: REACTIVE POWER ASPECTS |
| > Session Chair | Hans Abildgaard (Better Energy, Denmark) |
| 11:10 – 12:40 | Presentations (18 min. each) |
| | <ul style="list-style-type: none"> • Reactive Power Management with Decentralized Renewable Energy Sources A. Altayara, D. Mende, H. Wang, D. S. Stock (Fraunhofer IEE, Germany), M. Kraczy (formerly Fraunhofer IEE, Germany), C. Bucher (BFH – Bern University of Applied Sciences, Switzerland), M. McGranaghan, A. Keane (EPRI – Electric Power Research Institute, USA), G. Adinolfi, G. Graditi (ENEA – National Agency for New Technologies, Italy), R. Bründlinger (AIT – Austrian Institute of Technology, Austria), Y. Ogasawara, E. Omine (NEDO – New Energy and Industrial Technology Development Organization, Japan), Y. Ueda (Tokyo University of Science, Japan), G. Heilscher, S. Chen (THU – Ulm University of Applied Sciences, Germany) (Submission-ID WISO23-155) • Nighttime Reactive Power Support from Solar PV Inverters A. Huque, C. Brewster, A. Magerko, T. Key (EPRI – Electric Power Research Institute, USA) (Submission-ID WISO23-107) • Characterization and Utilization of Offshore Wind Power Plant Reactive Power Profiles C. Stauffer, D. Roop, A. Jenkins (Mitsubishi Electric Power Products, USA) (Submission-ID WISO23-012) • Development of a Pricing Model for the Reactive Power Supply via STATCOM Capability of a Real PV Power Plant S. Eichner (Fraunhofer ISE, Germany), M. Schuster, H. Köppe (TU Brunswick, Germany), F. Sass (50Hertz Transmission, Germany), R. Grab (Fraunhofer ISE, Germany) (Submission-ID WISO23-002) • Improving Power System Efficiency: A Case Study on Optimized Reactive Power Management in High-Voltage Grids H. Köppe, M. Schuster, B. Engel (TU Brunswick, Germany) (Submission-ID WISO23-184) |
| 12:40 – 13:00 | Discussions |

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| 11:10 – 12:50 | SESSION 10B: POWER SYSTEM STUDIES II |
| > Session Chair | Corinna Möhrten (WEPROG, Denmark) |
| 11:10 – 12:30 | Presentations (20 min. each) |
| | <ul style="list-style-type: none"> • Improving Renewable Energy Integration with Distributionally Robust Stochastic Optimal Power Flow I. Habou Laouali, A. Egorov, M. Cardenas, Â. Casaleiro (R&D Nester, Portugal), H. Yuan (CEPRI – China Electric Power Research Institute, China), N. Pinho da Silva (R&D Nester, Portugal) (Submission-ID WISO23-062) • Control Strategies for Power Oscillation Damping Using STATCOM Systems and Advanced Filtering L. M. Helmich, C. Eckel, J.-P. Heckel, C. Becker (Hamburg University of Technology, Germany), T. Hennig (Amprion, Germany) (Submission-ID WISO23-145) • Dynamic Grid Study of Onshore Wind Plants Depending on Validated Technical Guideline TG4 Models A. Salman, F. A. Hans, S. Eichner (Fraunhof ISE, Germany) (Submission-ID WISO23-008) • Using Real World Data to Analyse Self-Consumption and Self-Sufficiency of Residential PV Systems With and Without Storage F. Alhabill, N. Schofield (University of Huddersfield, United Kingdom), G. Andrews (Leeds Solar, United Kingdom) (Submission-ID WISO23-175) |
| 12:30 – 12:50 | Discussions |

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| 11:10 – 12:50 | SESSION 10C: HYBRID POWER PLANTS II |
| > Session Chair | Eckard Quitmann (Enercon, Germany) |
| 11:10 – 12:30 | Presentations (20 min. each) |
| | <ul style="list-style-type: none"> • A Comprehensive Review about the Control Architecture of Co-Located Utility-Scale Hybrid Power Plants: State-of-the-Art and Future Directions S. Pouraltafi-kheljan (DTU – Technical University of Denmark, Denmark), M. El-Sied, M. A. Rahmani (TotalEnergies, France), K. Das, P. E. Sørensen (DTU – Technical University of Denmark, Denmark) (Submission-ID WISO23-168) • Evaluation and Comparison of Regulating Reserve Requirements for an Isolated Hybrid Diesel/Wind/Pumped-Storage Power System with a High Wind Power Penetration D. Fernández-Muñoz, J. I. Pérez-Díaz (Polytechnical University of Madrid – UPM, Spain) (Submission-ID WISO23-185) • Opportunities of Battery Energy Storage in Stand-Alone and Co-Located Hybrid Power Plant in Distribution Grid A. Baviskar, K. Das, A. D. Hansen (DTU – Technical University of Denmark, Denmark), A. Anand (TUM – Technical University of Munich, Germany) (Submission-ID WISO23-032) • Investigating the Economic Potential of Retrofitting Swedish Onshore Wind Power Plants into Wind-PV Hybrid Power Plants Ø. S. Klyve (IFE – Institute for Energy Technology, Norway University of Oslo, Norway), O. Lindberg (Uppsala University, Sweden), V. Oikkonen, M. M. Nygård (IFE – Institute for Energy Technology, Norway) (Submission-ID WISO23-060) |
| 12:30 – 12:50 | Discussions |

12:50 – 14:00 LUNCH BREAK

14:00 – 15:45 **SESSION 11A: FREQUENCY ASPECTS**
 > Session Chair **Nicholas Miller (HICKORYLEDGE, USA)**

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| 14:00 – 15:30 | Presentations (18 min. each) |
| | <ul style="list-style-type: none"> • Regional Real-Time PV Spinning Reserve Estimator V. Gevorgian, M. Cai (NREL, USA) (Submission-ID WISO23-140) • A Unified Analytical Method to Quantify Three Types of Fast Frequency Response from Inverter-based Resources S. Dong (NREL – National Renewable Energy Laboratory, USA), X. Fang (Mississippi State University, USA), J. Tan (NREL – National Renewable Energy Laboratory, USA), N. Gao (NREL – National Renewable Energy Laboratory University of Denver, USA), X. Cui (Stanford University, USA) A. Hoke (NREL – National Renewable Energy Laboratory, USA) (Submission-ID WISO23-163) • Application of Residential Prosumer Flexibility for Frequency Control – Analysis and Simulative Investigation Considering Control Power and Inertia C. Wegkamp, M. Ferk, J. Grobler, B. Engel (TU Brunswick, Germany) (Submission-ID WISO23-174) • Economic Estimations of a PV Park Combined with Stationary Battery Storage Operation on Day-Ahead and Frequency Regulation Markets M. Koubar, O. Lindberg (Uppsala University, Sweden), P. Huang (Dalarna University, Sweden), J. Munkhammar, (Uppsala University, Sweden) (Submission-ID WISO23-027) • Primary Frequency Control of a Hybrid AC-DC Transmission Grid with Integration of Grid-Forming Converters S. Choudhury, D. D. Vega Florez, X. Xiao, J. Hanson (TU Darmstadt, Germany) (Submission-ID WISO23-135) |
| 15:30 – 15:45 | Discussions |

14:00 – 15:40 **SESSION 11B: POWER SYSTEM STUDIES III**
 > Session Chair **Leonard Hülsmann (Energynautics, Germany)**

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| 14:00 – 15:20 | Presentations (20 min. each) |
| | <ul style="list-style-type: none"> • Grand Challenges Grid – Research Needs for Future Grid Support of Wind Power Plants H. Holttinen (Recognis Oy, Finland), M. O'Malley, F. R. Najafabadi (Imperial College, United Kingdom), N. Cutululis (DTU – Technical University of Denmark, Denmark), X. Wang (KTH – Royal Institute of Technology, Sweden), V. Gevorgian, J. King (NREL – National Renewable Energy Laboratory, USA), J. C. Smith (ESIG, USA) (Submission-ID WISO23-144) • Experimental Validation of a Dynamic Virtual Power Plant Control Concept Based on Multiple Converter Power Hardware-in-the-Loop Test Bench M. Andrejewski (University of Applied Sciences – HTW Berlin, Germany), V. Häberle (ETH Zurich, Switzerland), N. Goldschmidt (University of Applied Sciences – HTW Berlin, Germany), F. Dörfler (ETH Zurich, Switzerland), H. Schulte (University of Applied Sciences – HTW Berlin, Germany) (Submission-ID WISO23-025) • Power Oscillations and Voltage Control Properties P. H. Nielsen, L. Petersen (Vestas Wind Systems, Denmark) (Submission-ID WISO23-042) • Emerging Technologies in Design and Testing of Protection Relays for Transmission System Connected to Inverter Based Resources N. Rezaei (Aarhus University, Denmark) (Submission-ID WISO23-148) |
| 15:20 – 15:40 | Discussions |

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| 14:00 – 15:40 | SESSION 11C: RELIABILITY ASPECTS |
| > Session Chair | Peter-Philipp Schierhorn (Energynautics, Germany) |
| 14:00 – 15:20 | Presentations (20 min. each) |
| | <ul style="list-style-type: none"> • Can an island transition from total oil and gas dependence to 100% wind and solar power within 15 years? D. G. Quirk (DTU – Technical University of Denmark, Denmark), P. A. Østergaard, H. Lund, F. Camara, F. Da Silva, (Aalborg University, Denmark), J. D. Boucher, R. Peake (Energy and Sustainability Centre Isle of Man, Isle of Man) (Submission-ID WISO23-134) • Supervisory Optimal Control with Information Flow for Wind and Solar Resilient Integration onto an Electric Power Grid J. Young (OptimoJoe, USA), D. G. Wilson (Sandia National Laboratories, USA), R. D. Robinett III, W. Weaver (Michigan Technological University, USA) (Submission-ID WISO23-123) • Cross-Border Balancing Cooperation as a Support Mechanism for Clean Energy Transition in South East Europe D. Vlaisavljevic, I. Mihajlovic Vlaisavljevic (Electricity Coordinating Center, Serbia) (Submission-ID WISO23-114) • Ensuring the Reliability of GFM BESS During Major Outages: A Key Issue to Facilitate the Green Transition in French Islanded Power Systems J. His , J. Freytes (EDF R&D, France) (Submission-ID WISO23-217) |
| 15:20 – 15:40 | Discussions |

15:40 – 16:00 SHORT BREAK

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| 16:00 – 17:00 | SESSION 12 – CLOSING SESSION – PANEL DISCUSSION |
| > Session Chair | Antje Orths (Energinet, Denmark) |
| 16:00 – 16:45 | <p>Huge Offshore RES Ambitions - How to get it done?</p> <p>Panelists:</p> <ul style="list-style-type: none"> - Tusitha Abeyasekara (Vestas, Denmark) - Mikkel Gryning (Ørsted, Denmark) - Phil McKay ((Canadian Renewable Energy Association, Canada) |
| 16:45– 17:00 | Closure |

POSTER PRESENTATIONS

- **Very Short-Term Scenario-Based Probabilistic Forecasting of PV Park Power Production**
J. Munkhammar, O. Lindberg, M.Koubar (Uppsala University, Sweden) (Submission-ID WISO23-031)
- **Local Energy System Sizing with Wind, PV, and Hydrogen**
G. Pangalos, A. Luxa, P. Royer (Fraunhofer IWES, Germany) (Submission-ID WISO23-046)
- **Application of HVDC System to Remote Island Microgrid for Utilization of Renewable Energy Sources and Reduction of Diesel Generators**
R. Iwabuchi, N. Tatsuhito (Tokyo City University, Japan) (Submission-ID WISO23-049)
- **Analysis of Short-Circuit Current Contribution at Offshore Platform in a HVDC-OWF System**
J. Michel (RTE, France), H. Saad (ACDC Transient | RTE International, France), P. Rault, Y. Vernay, M. Schudel (RTE, France) (Submission-ID WISO23-072)
- **Limiting Imbalance Settlement Costs from Variable Renewable Energy Sources in the Nordics: Internal Balancing vs. Balancing Market Participation**
Ø. S. Klyve (IFE – Institute for Energy Technology, Norway), G. Klæboe (NTNU – Norwegian University of Science and Technology, Norway), M. M. Nygård, E. S. Marstein (IFE – Institute for Energy Technology, Norway), (Submission-ID WISO23-076)
- **Efficacy Analysis of Legacy Dual-Blinder-Based Power Swing Detection Scheme in Grid-Forming VSC-Based Power Systems**
Y. Xiong, H. Wu, X. Wang (Aalborg University, Denmark) (Submission-ID WISO23-109)
- **Internalizing Energy Storage Losses into the Electricity Market**
S. Minotsu, J. Baba (The University of Tokyo, Japan) (Submission-ID WISO23-164)
- **Environmentally Friendly Solar Energy: Potential of Utilizing Field Margins in Rural Areas for Photovoltaic Systems in Combination with Wildflower Strips**
K. Wunder (University of Applied Sciences Emden/Leer, Germany), H. Foth (Jade University of Applied Sciences, Germany), J. Rolink (University of Applied Sciences Emden/Leer, Germany), M. Kayser (University of Vechta | University of Göttingen, Germany) (Submission-ID WISO23-179)
- **Investment-Based Optimisation of Energy Storage Design Parameters in a Grid-Connected Hybrid Renewable Energy System**
S. Farah (Aarhus University, Denmark) (Submission-ID WISO23-224)
- **NEST Facilities – A new Energy Transition Testing and Research Infrastructure in Denmark**
G. Giebel, P. Sørensen, P.M. Jakobsen DTU – Technical University of Denmark), A. Bentien, S.L. Sahlin (University of Aarhus), J. Guerrero, J.C. Vasquez, T. Lundgaard (University of Aalborg) (Submission-ID WISO23-233)

**WANT TO GET INVOLVED IN THE DISCUSSION?
SEND YOUR QUESTIONS TO THE SESSION CHAIR VIA SLIDO**



To ask your question, select the session room you are currently in:
A-Sessions or B-Sessions or C-Sessions

WORKSHOP SCHEDULE



Tickets to be booked separately

25 September

13:00 – 17:30



Tickets to be booked separately

25 September

13:00 – 18:30

Workshop Day 1

26 September

09:00 – 18:40



Tickets to be booked separately

26 September

19:00/19:30 – 21:30
Seaside Tolboden

Workshop Day 2

27 September

09:00 – 18:30



Tickets to be booked separately

27 September

Meeting Time 13:45
Registration Area in the DTU Meeting Center

Wind & Solar Poster Reception & Networking

(complimentary)

27 September

18:30 – 21:00
Main Canteen

Workshop Day 3

28 September

09:00 – 17:00



Tickets to be booked separately

28 September

Meeting Time 13:45
Registration Area in the DTU Meeting Center



Tickets to be booked separately

29 September

09:00 – 15:00
Bus stops at 08:45 Zleep Hotel Lyngby, 08:55 DTU, 09:05 Scandic Eremitage Hotel, 09:30 Gentofte Hotel
