



DIGITAL PROCEEDINGS – TABLE OF CONTENTS

Session 1 – KEYNOTE SESSION

09:15 – 11:00 | 15 October 2019 | Redwood B/C | Session Chair: Thomas Ackermann (Energynautics, Germany)

- **Accommodation of Solar Rooftop Photovoltaic on ESB Networks**
S. Pukhrem, A. Walsh (ESB Networks, Ireland) (Submission-ID SIW19-67)
- **System Services – An Investors Perspective**
P. Harte (Ireland)
- **Innovative System Services for Facilitating Integration of High Levels of Wind Generation**
N. Delaney (EirGrid Plc., Ireland) (Submission-ID SIW19-105)
- **Status of Power System Transformation: The Energy Transition to Boost System Flexibility**
P. Vithayasrichareon (IEA, France)
- **TBA**
Roger Henderson (Northern Ireland Electricity (NIE) Networks, Northern Ireland)

SESSION 2A: FORECASTING

11:40 – 13:00 | 15 October 2019 | Redwood A | Session Chair: Jonathon Dyson (Greenview Strategic Consulting, Australia)

- **Probabilistic Semi-Dynamical Nowcasts of Solar Radiation Globally via Freemium Web API Distribution**
H. Jack, N. Engerer, J. Luffman (Solcast, Australia) (Submission-ID SIW19-244)
- **PV Power Forecast Comparison of Physical and Machine Learning Models**
K. Winter, D. Beinert, S. Vogt, R. Fritz (Fraunhofer IEE, Germany) (Submission-ID SIW19-123)
- **Optimized Regional Photovoltaic Forecast Model: Forecasting Actual Feed-In Considering Self-Consumption**
R. Fritz, G. Good, S. Vogt, K. Winter (Fraunhofer IEE, Germany) (Submission-ID SIW19-243)

SESSION 2B: BALANCING AND ANCILLARY SERVICE

11:40 – 13:00 | 15 October 2019 | Redwood B | Session Chair: J. Charles Smith (ESIG, USA)

- **Electricity Balancing Capacity, Emissions, and Cost Comparison of Three Storage-Based Local Energy Systems for Variable Power Generation**
S. W. Monie, A. M. Nilsson, M. Åberg (Uppsala University, Sweden) (Submission-ID SIW19-219)
- **Integration of Flexibility into an Energy System with High Shares of Solar PV – Contributions from the Project C/sells**
M. Hinterstocker, K. Ganz, T. Kern, P. Dossow, S. von Roon (FfE, Germany) (Submission-ID SIW19-30)
- **The Value of a New East-West Facing Single Axis PV Tracker Setup**
P. Nørgaard, P. Behrendorff Poulsen, N. Riedel (Technical University of Denmark, Denmark), J. Vedde (European Energy, Denmark) (Submission-ID SIW19-61)

SESSION 2C: DISTRIBUTION GRID ASPECTS I

11:40 – 13:00 | 15 October 2019 | Redwood C | Session Chair: Eckeard Tröster (Energynautics, Germany)

- **Centralised vs Autonomous Control of Distribution Systems to Increase PV Hosting Capacity**
A. O'Connell (Electric Power Research Institute, Ireland), J. Smith (Electric Power Research Institute, United States) (Submission-ID SIW19-118)
- **Shading Losses for Different Types of Residential PV Inverter Systems and its City-Wide Impact on PV Potential**
N. Etherden, M. Aboukrat, V. Cebollada (Vattenfall R&D, Sweden), D. Lingfors (Uppsala University, Sweden), B. O. Karlsson (University of Gävle, Sweden) (Submission-ID SIW19-185)
- **Estimating the Impacts of Single Phase Electric Vehicle Charging and Photovoltaic Installations on an Unbalanced 3-Phase Distribution Grid**
M. Shepero, U. Ramadhani, J. Munkhammar, J. Widén (Uppsala University, Sweden) (Submission-ID SIW19-68)

SESSION 3A POWER SYSTEM STUDIES I

14:00 – 15:40 | 15 October 2019 | Redwood A | Session Chair: Babak Badrzadeh (AEMO, Australia)

- **Interaction Analysis of Large-Scale PV Power Plants Considering Communication Delays and Operational Points**
J. Montero-Cassinello, M. Cheah-Mané, E. Prieto-Araujo, O. Gomis-Bellmunt (CITCEA-UPC, Spain) (Submission-ID SIW19-104)
- **Solar Power Plant Harmonic Emission – Design and Commissioning Case Study**
J. Leung, D. Chong, T. George (DgSILENT Pacific, Australia) (Submission-ID SIW19-182)
- **Evaluating Fast Frequency Control Strategies for Solar PV and Battery Storage within an Inverter-Dominated Power System**
A. U. N. Ibn Saif, R. Li, D. Flynn (University College Dublin, Ireland) (Submission-ID SIW19-144)
- **Provision of Frequency Control by Multi-Inverter Photovoltaic Power Plants based on Real-Time Estimation of Maximum Available Power**
A. Rossé, G. Delille (Électricité de France (EDF), France), C. Shu (EDF Renewables, France), L. Arnaud (EDF Store & Forecast, France) (Submission-ID SIW19-52)

SESSION 3B: STORAGE ASPECTS

14:00 – 15:40 | 15 October 2019 | Redwood B | Session Chair: Paul Gardner (Paul Gardner Energy Consulting, United Kingdom)

- **Upgrade of a Grid-Connected Storage Solution with Grid-Forming Function**
C. Cardozo, G. Denis, T. Prevost, (RTE R&D, France), M. Zubiaga, J. J. Valera (Ingeteam, Spain), Y. Vernay (RTE CNER, France) (Submission-ID SIW19-205)
- **Optimized Positioning for Storage Systems in an LVDC Traction Grid with Non-Receptive Power Sources and Photovoltaic Systems**
M. Salih, **D. Baumeister**, M. Wazifehdust, M. Koch, P. Steinbusch, M. Zdrallek (University of Wuppertal, Germany), S. Mour (SWS Netze Solingen, Germany), C. Troullier (Stadtwerke Solingen, Germany) (Submission-ID SIW19-159)
- **A Study on Sizing of Substation for PV Generators with Optimized Operation of BESS**
Y. Yoo (Korea University, Republic of South Korea), S. Jung (National Hanbat University, Republic of South Korea), H. Moon, G. Jang (Korea University, Republic of South Korea) (Submission-ID SIW19-176)
- **Enabling Rising Penetration and Added Value of Photovoltaic Generation by Implementation of Advanced Storage Systems (Erigeneia)**
M. Florides, K. Oureilidis, V. Efthymiou, G. E. Georghiou (University of Cyprus (UCY), Cyprus), B. Kubicek, J. Kathan, S. Ubermasser (Austrian Institute of Technology (AIT), Austria), I. Ilcic (Cybrotech, United Kingdom), P. Rechberger, H. Heigel (Fronius International, Austria), A. Violaris, I. Papageorgiou (Electricity Authority of Cyprus (EAC), Cyprus), K. C. Bayindir (Ankara Yildirim Beyazit University, Turkey), A. Kilic, G. Batar, A. Bayramoglu (ADM Elektrik Dagitim, Turkey), S. Baykal, A. Terciyarli (T4E Technology for Efficiency, Turkey) (Submission-ID SIW19-179)

SESSION 3C: MARKET ASPECTS

14:00 – 15:40 | 15 October 2019 | Redwood C | Session Chair: Peerapat Vithayasrichareon (IEA, France)

- **Field Test to Demonstrate a Smart Market Platform via Smart Meter Infrastructure**
T. Estermann, S. Köppl, A. Bruckmeier, D. Wohlschlager (Forschungsstelle für Energiewirtschaft / Research Center for Energy Economics (FFE), Germany) (Submission-ID SIW19-80)
- **Solving the Challenges of Successfully Delivering BESS Projects in Competitive Electricity Markets**
H. Mackenzie (HARD software, Australia) (Submission-ID SIW19-164)
- **Rooftop PV Business Models in India and Brazil - A Comparative Analysis**
J. Thakur (KTH Royal Institute of Technology, Sweden), H. Batista (UFMG Federal University de Minas Gerais, Brazil), S. Silveira (KTH Royal Institute of Technology, Stockholm, Sweden), W. Uturbey (UFMG Federal University de Minas Gerais, Brazil) (Submission-ID SIW19-111)
- **Investment in Solar and Wind Generation in Australia – Lessons Learned**
J. Eggleston, T. Nelson, T. Walker, G. Williams (Australian Energy Market Commission (AEMC), Australia) (Submission-ID SIW19-18)

SESSION 4A: POWER SYSTEM STUDIES II

16:10 – 18:00 | 15 October 2019 | Redwood A | Session Chair: Carmen Cardozo (RTE, France)

- **Validation of Solar Power Plant Dynamic Model Using Commissioning Test Measurements**
D. Chong, J. Leung, T. Bertes, L. Mardira (DigSILENT Pacific, Australia) (Submission-ID SIW19-181)
 - **General Flexibility Model Analysis for Mass PV Deployment**
K. Ogimoto, J. Gari daSilva Fonseca Junior, K. Kataoka (The University of Tokyo, Japan), H. Azuma, A. Isonaga (JP Business Service, Japan) (Submission-ID SIW19-253)
 - **Modelling of 100% Renewable Energy in Australia**
B. Lu, A. Blakers, M. Stocks, C. Cheng, A. Nadolny (Australian National University, Australia) (Submission-ID SIW19-245)
 - **Next Generation Utility Scale PV- and Storage Systems: New Steps towards a 100% Renewable Generation**
T. Bülo, A. Knobloch, C. Hardt, A. Falk, O. Schömann, L. Grebe (SMA Solar Technology, Germany) (Submission-ID SIW19-261)
- Poster Flash Talk (5 min.):**
- **On the Utilization of Cross-Regional Interconnector and Pumped Hydro Energy Storage for the Further Introduction of Solar PV in Japan**
S. Ichimura (Renewable Energy Institute, Japan) (Submission-ID SIW19-230)

SESSION 4B: HYBRID POWER PLANTS/SYSTEMS

16:10 – 18:00 | 15 October 2019 | Redwood B | Session Chair: Julian Eggleston (Australian Energy Market Commission (AEMC), Australia)

- **Status of Hybrid Power Systems – Summary of Hybrid Power System Workshop**
T. Ackermann (Energynautics, Germany)
- **Implementation of Utility Scale Hybrids – Experience in the Australian NEM**
J. Dyson (Greenview Strategic Consulting, Australia) (Submission-ID SIW19-264)
- **Aspects of System Sizing for Complete Autonomy of Islands Grids, Discussed by Using the Example of PV-Integration into the Faroe Islands**
H. G. Beyer (University of the Faroe Islands, Faeroe Islands) (Submission-ID SIW19-147)
- **High Penetration of PV in Tropical Island Systems: Experiences from Indonesia**
P.-P. Schierhorn, A. Vieira Turnell, D. Masendorf, T. Ackermann (Energynautics, Germany)

SESSION 4C: DISTRIBUTION GRID ASPECTS II

16:10 – 17:35 | 15 October 2019 | Redwood C | Session Chair: Alison O'Connell (EPRI, Ireland)

- **Empirical Analysis of Voltage Variations in Low Voltage Distribution Grids from Photovoltaic**
M. Alhamwi, N. Etherden (Vattenfall R&D, Sweden), E. Mulenga, M. H. J. Bollen (Luleå University of Technology, Sweden) (Submission-ID SIW19-216)
 - **Navigating IEEE 1547: Grid Readiness for Distributed Energy Resources**
A. Tuohy (EPRI, USA) (Submission-ID SIW19-78)
 - **Impact Assessment of High Penetration of Photovoltaic Power Generations on Residual Load Profile of Various Distribution Networks based on Statistical Data**
T. Kato, M. Imanaka, M. Kurimoto, S. Sugimoto (Nagoya University, Japan) (Submission-ID SIW19-150)
- Poster Flash Talk (5 min.):**
- **Tapping Flexibility Potential of Decentralized Controllable Loads for Smart Markets through Aggregation**
M. Müller, A. Zeiselmair, J. L. Pedraza Gómez (Forschungsstelle für Energiewirtschaft / Research Center for Energy Economics (FfE), Germany) (Submission-ID SIW19-33)

SESSION 5A: EXPERIENCES AND BEST PRACTICES FROM FRONT-RUNNER COUNTRIES FOR SOLAR AND WIND INTEGRATION

09:00 – 10:40 | 16 October 2019 | Redwood A | Session Chair: Emanuele Taibi (IRENA)



- **The Knowledge Framework for Power Sector Transformation**
Raul Miranda (IRENA, Germany)
- **Secrets of Successful Integration**
Debbie Lew (Debra Lew LLC, United States)
- **Experience from Wind and Solar Integration: IEAWind Task 25**
Hannele Holttinen (IEA Wind Task 25 | Recognis, Finland)
- **Wind and Solar Integration at ERCOT: Experiences and Best Practices**
Julia Matevosyan (ERCOT, United States)

SESSION 5B: DISTRIBUTION GRID ASPECTS III

09:00 – 10:40 | 16 October 2019 | Redwood B | Session Chair: TBA

- **Managing Grid Phase Loss with PV Plants**
S. McGuinness (EPRI, Europe) (Submission-ID SIW19-34)
- **A Methodology for the Assessment of PV Induced Flicker**
J. Doms (Tractebel, Belgium), J. Wynants (Siemens, Belgium), S. Cole (Tractebel, Belgium) (Submission-ID SIW19-215)
- **PV Forecasting in Distribution System Operation – Requirements and Applications**
M. Kraiczy, B. Mey, H. Becker, S. Drauz, R. Fritz (Fraunhofer IEE, Germany), S. Wende v. Berg, M. Braun (Fraunhofer IEE, Germany | University of Kassel, Germany), P. Hofbauer, B. Rindt (egrid application & consulting, Germany) (Submission-ID SIW19-64)
- **Smart Meter as a Cornerstone for Grid Integration of Renewable Energies**
S. Azad, M. Ludwig, M. Zdrallek (University of Wuppertal, Germany), B. Brandherm, A. Ndiaye, M. Deru (German Research Center for Artificial Intelligence (DFKI), Germany), J. Zimpel, M. Hörhammer (Voltaris, Germany), A. Schalk (VSE AG, Germany), C. Breuer (STEAG Technischer Service, Germany), N. Neusel-Lange (SPIE SAG, Germany), (Submission-ID SIW19-129)

How much storage do we need? / Silver bullet or economic disaster?

Panelists:

- Thorsten Buelo (SMA, Germany)
- Harley Mackenzie (HARD software, Australia)
- Debra Lew (Debra Lew LLC, USA)
- Paul Gardner (Paul Gardner Energy Consulting, UK)

POSTER PRESENTATION PAPERS

- **Realtime Simulation Studies on Power System Stabilizing Effect of Virtual Synchronous Generator for Grid-Connected Inverter**
J. Kato, T. Masaya, Y. Ota, T. Nakajima (Tokyo City University, Japan), Y. Mitsugi, H. Hashiguchi (Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan) ([Submission-ID SIW19-226](#))
- **Tertiary Based Cooperative Decentralized Control of DC Microgrid**
H. Aboelsoud, T. Tsuji (Yokohama National University, Japan) ([Submission-ID SIW19-238](#))
- **Collaborative Control Method for Distribution System Equipment and PCS for PV - Voltage Rise Suppression Function Revising Waiting Time**
A. Moriwaki, S. Uemura (Central Research Institute of Electric Power Industry, Japan) ([Submission-ID SIW19-268](#))