

4th Solar Integration Workshop

International Workshop on Integration
of Solar Power into Power Systems

10 - 11 November 2014

Berlin, Germany

SOLAR PROGRAM

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TIMETABLE SOLAR INTEGRATION WORKSHOP

Monday, 10 November 2014		Tuesday, 11 November 2014			
Solar Workshop Day 1		Solar Workshop Day 2			
8:00 – 9:00	Room Estrel Festival Center (EFC)	8:00 – 10:00	Room ECC 2	Room ECC 3	Room ECC 1
	Registration		SESSION 5a: Inverter Modelling	SESSION 5b: Storage Solutions	SESSION 5c: Solar Monitoring and Prediction
9:00 – 9:10	Room ECC 2	<i>Coffee Break (30min)</i>			
	OPENING: Welcome and Introduction				
9:10 – 10:50	Room ECC 2	10:30 – 12:15	Room ECC 2	Room ECC 3	Room ECC 1
	SESSION 1: Keynote Session – PV in the German Power System		SESSION 6a: Solar Power and Power System Modelling	SESSION 6b: Grid Integration Aspects	SESSION 6c: Solar Power Forecasting
<i>Coffee Break (30min) & Poster Session</i>		<i>Break (5min)</i>			
11:20 – 13:00	Room ECC 2	12:20 – 13:00	Room ECC 1		
	SESSION 2a: International Grid Integration Experience and Studies		SESSION 2b: Solar Power and Market Integration	SESSION 7: Closing Session – Podium Discussion	
<i>Lunch (1h)</i>		<i>Lunch (1h)</i>			
14:00 – 16:00	Room ECC 2	14:00	Room ECC 1		
	SESSION 3a: Concentrating Solar Power and the Power System		SESSION 3b: Discussion Session – PV and Ancillary Services	Start of the 13th Wind Integration Workshop	
<i>Coffee Break (30min) & Poster session</i>					
16:30 – 18:45	Room ECC 2	16:30 – 18:45	Room ECC 3		
	SESSION 4a: Solar Grid Integration Studies		SESSION 4b: PV and Distribution Networks		
20:00	<i>Solar Dinner Restaurant "Umspannwerk Ost"</i>				

MONDAY, 10 NOVEMBER 2014

08:00 – 09:00 Registration

09:00 – 09:10 Opening: Welcome and Introduction, Thomas Ackermann (Energynautics, Germany)

09:10 – 10:50 SESSION 1: KEYNOTE SESSION – PV IN THE GERMAN POWER SYSTEM

> Session Chair Thomas Ackermann (Energynautics, Germany)

09:10 – 10:22 Presentations (18 min. each)

- **The Amazing Adventures of Photovoltaics**
L. Waldmann (Agora Energiewende, Germany)
- **Renewable Energy Integration - New Challenges for Distribution System Operators**
R. Pluciennik (E.DIS, Germany)
- **Operating Power Systems with High Photovoltaic Generation During a Solar Eclipse – Challenges and Operational Measures**
K. Burges, M. Döring, R. Kuwahata (Ecofys Germany, Germany), U. Bachmann, R. Sikora, M. Zirkelbach (50Hertz Transmission, Germany) (SIW14-1067)
- **Solar Power in a 100% Renewables Scenario for Rhineland-Palatinate**
E. Tröster, T. Brown, T. Ackermann, S. Geidel/S. Langanke (Energynautics, Germany) (SIW14-3001)

10:22 – 10:50 Discussions

10:50 – 11:20 Coffee Break

11:20 – 13:00 SESSION 2A: INTERNATIONAL GRID INTEGRATION EXPERIENCE AND STUDIES

> Session Chair J. Charles Smith (UVIG, USA)

11:20 – 12:40 Presentations (20 min. each)

- **Grid Integration of Large Utility-Scale PV Plants: Key Lessons Learned**
M. Morjaria D. Anichkov, V. Chadliev, S. Soni (First Solar, USA) (SIW14-1113)
- **Power Plant Control Experience in Large Scale PV Plant. Modeling, Control, Simulation and Implementation**
E. Bullich-Massagué, M. Aragüés-Peñalba, R. Ferrer-San-Jose, O. Gomis-Bellmunt (CITCEA-UPC, Spain), L. Serrano-Salamanca, C. Pacheco-Navas (GreenPowerMonitor, Spain) (SIW14-1084)
- **Augmenting Conventional Plant Operation to Facilitate Renewable Integration**
E. Lannoye, A. Tuohy (EPRI, USA), N. Troy (ElectroRoute, Ireland) (SIW14-1095)
- **Large-scale Integration of PV and Impact on Storage Demand in a European Renewable Power System of 2050**
C. Bussar P. Stöcker, Z. Cai, L. Moraes Jr., M. Leutholt, D.U. Sauer (RWTH-Aachen University/FZ Jülich, Germany) (SIW14-3007)

12:40 – 13:00 Discussions

11:20 – 13:00	SESSION 2B: SOLAR POWER AND MARKET INTEGRATION
> Session Chair	Jens Bömer (Delft University of Technology, the Netherlands)
11:20 – 12:40	Presentations (20 min. each)
	<ul style="list-style-type: none"> • PV Development as Prosumers: the Role and Challenges Associated to Producing and Self-Consuming PV Electricity G. Masson (IEA-PVPS, France), S. Orlandi (Becquerel Institute, Belgium), K. Petrick (IEA-RETD, Spain), V. Cassagne (Total, France), J. I. Briano, M. J. Baez Morandi (Eclareon, Spain), R. Margolis (NREL, USA), W. Rickerson (MCG, USA) (SIW14-3010) • Quantative Analysis of the Merit Order Effect from Photovoltaic Production in Key European Countries H. Gouzerh (Green Giraffe Energy Bankers, France), S. Orlandi (Becquerel Institute, Belgium), N. Gourvitch (Green Giraffe Energy Bankers, France), G. Masson (Becquerel Institute, Belgium), (SIW14-3011) • Solar Forecasting Analysis and Synthesis for Use in Production Cost Simulation E. Lannoye, A. Tuohy (EPRI, USA), T. Vargas, C. Yong, O. Bartholomy (Sacramento Municipal Utility District, USA), A. Kankiewicz (Clean Power Research, USA) (SIW14-1094) • Increasing the Solar Share through Smart Matching of PV, Load and Energy Infrastructure in Urban Context J. Mikkola, J. Salpakari, J. Ypyä, P. Lund (Aalto University, Finland) (SIW14-1138)
12:40 – 13:00	Discussions

13:00 – 14:00 Lunch Break

14:00-16:00	SESSION 3A: CONCENTRATING SOLAR POWER AND THE POWER SYSTEM
> Session Chair	Karsten Burges (Ecofys, Germany)
14:00-15:40	Presentations (20 min. each)
	<ul style="list-style-type: none"> • Impact of Large Scale Penetration of Concentrated Solar Thermal Power on Oscillatory Stability of the Australian Future Grid J. W. Shim (University of Sydney, Australia/Yonsei University Korea, South Korea), G. Verbič (University of Sydney, Australia), K. Hur (Yonsei University Korea, South Korea), D. J. Hill (University of Sydney, Australia/University of Hong Kong) (SIW14-1045) • Dynamic Modelling of Concentrated Solar Power and Power Plant Integration M. Tähtinen, L. Kannari, R. Weiss, H. Mikkonen (VTT, Finland) (SIW14-1070) • The Role of Concentrating Solar Power in Integrating Solar and Wind Energy P. Denholm, M. Mehos (NREL, USA) (SIW14-1024) • Feasibility of Concentrated Solar Power (CSP) Integration with Coal and Biomass Co-fired Power Plant – Prospects in Different Operation Environments E. Tsupari, J. Kärki, M. Tähtinen (VTT, Finland) (SIW14-1069) • A PV and Concentrated Solar Power (CSP) Integration Study Experience in a Mediterranean Partner Country K. Mentessidi, M. Aguado (CENER, Spain), K. Loudiyi, F. Z. Harmouch, K. Loudiyi (Al Akhawayan University, Morocco) (SIW14-1097)
15:40 – 16:00	Discussions

14:00 – 16:00	SESSION 3B: DISCUSSION SESSION - PV AND ANCILLARY SERVICES
> Session Chair	Mahesh Morjaria (First Solar, USA)
14:00 – 15:20	Presentations (20 min. each)
	<ul style="list-style-type: none"> • Grid Support Services from Wind and Solar PV - RServices Project Technical Summary M. Reking, I.-T. Theologitis (EPIA, Belgium), F. Van Hulle (XP Wind, Belgium), F. Chapalain (EDSO 4SG, Belgium), N. Cutululis (DTU, Denmark), H. Holttinen, J. Kiviluoma (VTT, Finland), L. M. Faiella (Fraunhofer IWES, Germany), I. Pineda (EWEA, Belgium) (SIW14-3013) • dena Ancillary Services Study 2030: Security and Reliability of a Power Supply with a High Percentage of Renewable Energy H. Seidl (Deutsche Energie-Agentur dena, Germany) • Ancillary Services with Regional Renewable Generation and Battery Storage Controlled by Virtual Power Plant J. Fischer, T. Buschmann, U. Focken, M. Lange (energy & meteo systems, Germany) (SIW14-1083) • Distributed Solar Battery Systems Providing Primary Control Reserve R. Hollinger, M. Llerena Engesser, L. M. Diazgranados, T. Erge, G. Bopp (Fraunhofer ISE, Germany) (SIW14-1132)
15:20 – 16:00	Discussions

16:00 – 16:30 Coffee Break

16:30 – 18:45	SESSION 4A: SOLAR GRID INTEGRATION STUDIES
> Session Chair	Nicholas Miller (GE Energy, USA)
16:30 – 18:10	Presentations (20 min. each)
	<ul style="list-style-type: none"> • Large Scale Integration of Solar PV: Fast and Easy Method for Assessing Scenarios and Grid Implications on a National Level R. van Gerwen, W. van der Veen (DNV GL, the Netherlands) (SIW14-1128) • Modelling and Analysis of Large Scale Solar Energy Integration in the Moroccan Power System H. G. Svendsen, O. C. Spro, O. Alstad (SINTEF Energy Research, Norway), K. Loudiyi, A. S. Sennou (Al Akhawayn University, Morocco) (SIW14-1075) • The Solar Power Absorption Capacity of the Seychelles Island Systems T. Brown, N. Martensen, T. Ackermann (Energynautics, Germany) (SIW14-3002) • The Impact of Improved Solar Forecasts on Bulk Power System Operations in ISO-NE C. Brancucci Martínez-Anido, A. Florita, B.-M. Hodge (NREL, USA) (SIW14-1086) • Study on the Methods to Suppress the Frequency and Tie-line Power Flow Fluctuation Due to High Penetration of Photovoltaic Generation Using the Existing Thermal Generators Y. Tsujii, T. Tsuji, T. Oyama (Yokohama National University, Japan), K. Furuta, S. C. Verma (Chubu Electric Power, Japan) (SIW14-1028)
18:10 – 18:45	Discussions

16:30 – 18:45	SESSION 4B: PV AND DISTRIBUTION NETWORKS
> Session Chair	Barbara O'Neill (NREL, USA)
16:30 – 18:10	Presentations (20 min. each)
	<ul style="list-style-type: none"> <p>A Proposal for New Requirements for the Fault Behaviour of Distributed Generation Connected to Low Voltage Networks E. van Ruitenbeek, J. C. Boemer, K. Skaloumpakas, J. L. Rueda Torres (Delft University of Technology, the Netherlands), M. Gibescu (Eindhoven University of Technology, the Netherlands), M. van der Meijden (Delft University of Technology, the Netherlands) (SIW14-1115)</p> <p>Integration of Renewable Energy Resources and Technical Requirements in European Distribution Networks T. García-Sánchez, E. Gómez-Lázaro (University of Castilla-La Mancha, Spain), A. Gomes (University of Coimbra, Portugal), A. Molina-García (Polytechnical University of Cartagena, Spain) (SIW14-1133)</p> <p>Innovative Solutions for the Grid Integration of Renewable Energies – Applications for Voltage Control and Reactive Power Compensation in PV Power Plants T. Smolka, T. Funk, T. Schlegel, M. Sojer (Maschinenfabrik Reinhausen, Germany), J. Langstädtler, J. Döll, M. Brennecke (FGH, Germany) (SIW14-1014)</p> <p>Systematic Parameterization of Voltage Control Droops Implemented in Photovoltaic Plants Y. T. Fawzy, D. Mende (SMA Solar Technology, Germany), C. Dierckxsens (3E, Belgium), B. Bletterie (AIT Austrian Institute of Technology, Austria) (SIW14-1091)</p> <p>High Penetration PV in Local Distribution Grids Outcomes of the IEA PVPS Task 14 Subtask 2 T. Stetz, M. Kraiczy, K. Diwold (Fraunhofer IWES, Germany), M. Braun (Fraunhofer IWES, Germany/ Basler&Hofmann, Switzerland), B. Bletterie, C. Mayr, R. Bründlinger (AIT Austrian Institute of Technology, Austria), B. Noone, A. Bruce, I. MacGill (University of New South Wales, Australia), B. Mather (NREL, USA), K. Ogimoto (University of Tokyo, Japan), K. Washihara (NEDO, Japan), Y. Ueda (Tokyo Institute of Technology, Japan), A. Iaria, A. Gatti, D. Cirio (RSE, Italy), M. Rekingier, I. Theologitis (EPIA, Belgium), K. De Brabandere (3E, Belgium), S. Tselepis (CRES, Greece), C. Bucher (Basler&Hofmann, Switzerland), W. Yibo (Chinese Academy of Science, China)</p>
18:10 – 18:45	Discussions

20:00 Solar Workshop Dinner

TUESDAY, 11 NOVEMBER 2014

8:00 – 10:00	SESSION 5A: INVERTER MODELLING
> Session Chair	Nis Martensen (Energynautics, Germany)
8:00 – 9:40	Presentations (20 min. each)
	<ul style="list-style-type: none">• Phasor Domain Modelling of Full Scale Frequency Converters for Protection Studies I. Kocar, T. Kauffmann, U. Karaagac, J. Mahseredjian (Polytechnical School Montréal, Canada), E. Farantatos (EPRI, USA) (SIW14-1136)• Power Control Flexibilities for Grid-Connected Multi-Functional Photovoltaic Inverters Y. Yang, F. Blaabjerg, H. Wang (Aalborg University, Denmark), M. Godoy Simões (Colorado School of Mines, USA) (SIW14-1059)• Harnessing PV Inverter Controls for Increased Hosting Capacities of Smart Low Voltage Grids C. Winter, M. Heidl (Fronius International, Austria), R. Schwalbe (AIT Austrian Institute of Technology, Austria), W. Prüggl (Vienna University of Technology, Austria) (SIW14-1129)• Determination of Advanced Inverter Settings to Improve Distribution System Performance M. Rylander, J. Smith, H. Li (EPRI, USA) (SIW14-1112)• Smart Inverter Operation for Solving Voltage Regulation Problems in Distribution Systems E. Ghiani, F. Pilo (University of Cagliari, Italy), A. Rossi (ABB Solar, Italy) (SIW14-1102)
9:40 – 10:00	Discussions

8:00 – 10:00	SESSION 5B: STORAGE SOLUTIONS
> Session Chair	Paul Denholm (NREL, USA)
8:00 – 9:30	Presentations (18 min. each)
	<ul style="list-style-type: none">• Transient Battery Storage at Low Short Circuit Ratio (SCR) W. Kuehn, D. Mueller (Frankfurt University of Applied Sciences, Germany) (SIW14-1090)• Potential for Balancing Wind and Solar Power Using Heat Pump Heating and Cooling Systems D. Fischer (Fraunhofer ISE, Germany/KTH Royal Institute of Technology, Sweden), K. B. Lindberg (NTNU, Norway), S. Mueller, E. Wiemken, B. Wille-Haussmann (Fraunhofer ISE, Germany) (SIW14-1079)• A Hierarchical Coordination Control of Multiple Energy Storage in Distribution Network D. Liang (DNV GL, Singapore), L. Wang, N. Wade, P. Taylor (Newcastle University, United Kingdom), E. de Jong (DNV GL, the Netherlands), A. Crossland (Durham University, United Kingdom), (SIW14-1036)• Simulation of a Sustainable Energy System in Grafing (Munich Region) S. Bschorer, F. Samweber (Research Center for Energy Economics, Germany) (SIW14-1077)• Scientific Measuring and Evaluation Program for Photovoltaic Battery Systems (WMEP PV-Speicher) K.-P. Kairies, D. Magnor, D. U. Sauer (RWTH Aachen, Germany) (SIW14-1140)
9:30 – 10:00	Discussions

8:00 – 10:00	SESSION 5C: SOLAR MONITORING AND PREDICTION
> Session Chair	Luis Dominguez (ABB Corporate Research, Switzerland)
8:00 – 9:36	Presentations (16 min. each)
	<ul style="list-style-type: none"> • Advanced Cloud Simulations for Improved Solar Power Forecasts in Germany K. Rogers (DNV GL, United Kingdom), J. Schipper (DNV GL, Germany) (SIW14-1071) • An Overview of Remote Monitoring PV Systems: Acquisition, Storages, Processing and Publication of Real-Time Data Based on Cloud Computing S. Manzano, R. Peña-Ortiz, D. Guevara, A. Ríos (Technical University of Ambato) (SIW14-1050) • A Proposed Grid-connection Monitor and Control Solution for Photovoltaic Power Stations P. Gao, X. Zhao, D. Wu (NR Electric, China) (SIW14-1056) • Approaches and Results to Improve Solar Power Predictions in Difficult Meteorological Situations H. Wiebe, J. Schmelter, U. Focken, M. Lange (energy & meteo systems, Germany) (SIW14-1082) • Solar Power Forecasting for Smart Grids Considering ICT Constraints R. Bessa (INESC TEC, Portugal) (SIW14-1012) • Solar Forecast Improvement Project: A Public-Private Collaboration M. Marquis, S. Benjamin, E. James, J. Olson (NOAA National Oceanic and Atmospheric Administration, USA), A. Heidinger (NOAA NESDIS, USA), C. Molling (University of Wisconsin, USA), J. Michalsky, K. Lantz (NOAA National Oceanic and Atmospheric Administration, USA), V. Banunarayanan (Department of Energy, USA), S. Haupt (National Center for Atmospheric Research, USA), H. Hamann (IBM Research, USA) (SIW14-1126)
9:36 – 10:00	Discussions
10:00 – 10:30	Coffee Break
10:30 – 12:15	SESSION 6A: SOLAR POWER AND POWER SYSTEM MODELLING
> Session Chair	Bernd Weise (DlG SILENT, Germany)
10:30 – 11:50	Presentations (20 min. each)
	<ul style="list-style-type: none"> • Integration of Future Solar Photovoltaic Generation in Garmisch-Partenkirchen C. S. Arnemo (NTNU, Norway), E.-M. Bärthlein, M. Hartung (GE Global Research, Germany), T. Toftevaag (NTNU, Norway) (SIW14-1134) • Modular Verification of Grid Code Compliance (GCC-Services) T. Gehlhaar (DNV GL, Germany), P. Gardner (DNV GL, United Kingdom) (SIW14-1085) • Dynamic Modelling Platform for Integrated Power Plants M. Jegoroff, M. Tähtinen, H. Mikkonen, T. Leino (VTT, Finland) (SIW14-1076) • Modelling Active and Reactive Power of PV-Systems as Input for State Estimation W. Biener, S. Killinger, B. Wille-Hausmann, C. Wittwer (Fraunhofer ISE, Germany) (SIW14-1058)
11:50 – 12:15	Discussions

10:30 – 12:15	SESSION 6B: GRID INTEGRATION ASPECTS
> Session Chair	Nickie Menemenlis (IREQ / Hydro Québec, Canada)
10:30 – 11:50	Presentations (20 min. each)
	<ul style="list-style-type: none"> • Fluctuations in Large-Scale Photovoltaic and Wind Power Feed-In G. Lohmann, J. Kühnert, E. Lorenz, A. Hammer, D. Heinemann (University of Oldenburg, Germany) (SIW14-1065) • Voltage Fluctuation Analysis in Distribution Systems with PVs considering Smoothing Effect and Tap Control Y. Hakuto, T. Tsuji, T. Oyama, (Yokohama National University, Japan), Y. Matsuura, K. Abe, M. Minami (Kansai Electric Power, Japan), K. Aiba, K. Mori, K. Ishibashi (Tokyo Electric Power, Japan) (SIW14-1053) • Incorporating Multiple Uncertainties into Iterative Probabilistic Load Flow K. Dallmer-Zerbe, B. Wille-Hausmann, C. Wittwer (Fraunhofer ISE, Germany) (SIW14-1061) • Predictive Control System for Charging Electric Vehicles based on Radio Ripple Control integrating Renewable Energie A. Arnoldt, S. Ritter, O. Warweg, (Fraunhofer IOSB-AST, Germany) (SIW14-1062)
11:50 – 12:15	Discussions

10:30 – 12:15	SESSION 6C: SOLAR POWER FORECASTING
> Session Chair	Manoël Rekinger (EPIA, Belgium)
10:30 – 11:50	Presentations (20 min. each)
	<ul style="list-style-type: none"> • Integration of PV Power and Load Forecasts into the Operation of Residential PV Battery Systems J. Weniger, J. Bergner, V. Quaschnig (HTW Berlin University of Applied Sciences, Germany) (SIW14-1116) • Electrical Model Parameter Characterization for Short-term Solar Power Forecasting J. Sumaili, R. J. Bessa, D. F. Rahman (INESC TEC, Portugal), R. Tomé, J. Sousa, (Prewind, Portugal) (SIW14-1081) • Random Forest Prediction in Solar Radiation Forecasting Schemes Applied to Handling Ramps and Large Forecast Errors M. Kratzenberg, H. H. Zürn (Federal University of Santa Caterina, Brazil), P. P. Revheim, H. G. Beyer (University of Agder, Norway), (SIW14-1110) • Modelling and Simulation of Utility-scale PV Plants under Partial Shading Conditions L. F. Dominguez (ABB Corporate Research, Switzerland) (SIW14-1054)
11:50 – 12:15	Discussions

12:20 – 13:00	SESSION 7: CLOSING SESSION
> Session Chair	Jens Bömer (Delft University of Technology, the Netherlands)
12:20 – 12:55	Podium Discussions – Topic: Grid Codes and System Transformation to Unlock the Full Potential of PV Systems for Ancillary Services
	<ul style="list-style-type: none"> • Participants: M. Dietmannsberger (Helmut-Schmidt-University Hamburg, Germany) M. Morjaria (First Solar, USA) M. Rekinger (EPIA, Belgium) J. C. Smith (UVIG, USA)
12:55 – 13:00	Closing Remarks

13:00 – 14:00 Lunch

POSTER PRESENTATIONS

- **Simulation and Optimization of Hybrid Energy System Autonomous PV-Diesel-Wind Power with Battery Storage for Relay Antenna Telecommunication**
T. Tahri, M. Bouchachia, O. Braikia (Chlef University, Algeria) (SIW14-1008)
- **A Comparative Study of Diffuse Irradiance Models on Inclined Surfaces for Wolfenbuettel, Germany**
S. Dimopoulou (Ostfalia University of Applied Sciences/Clausthal University of Technology, Germany), E. Boggasch (Ostfalia University of Applied Sciences, Germany), A. Rausch (Clausthal University of Technology, Germany) (SIW14-1010)
- **Electric Vehicle Charging and Photovoltaic Power Production from Eight Solar Charging Stations in Sweden**
J. Munkhammar, J. Widén (Uppsala University, Sweden), P. Wickman (Solelia Greentech, Sweden) (SIW14-1043)
- **Internal Active Power Reserve Management in Large-Scale PV Power Plants**
B.-I. Craciun, S. Spătaru, T. Kerekes, D. Sera, R. Teodorescu (Aalborg University, Denmark) (SIW14-1057)
- **GIS Ready Solar Cadaster**
M. Radauer (Salzburg Netz, Austria) (SIW14-1068)
- **Modelling and Analysis of a CSP Plant Technology for Small Power Networks -Technical and Financial Evaluation**
I. Davidson (University of KwaZulu-Natal, South Africa), N. K. Mbambai (Burmeister & Partners Consulting Engineers, Namibia) (SIW14-1093)
- **Application of Wireless-Sensor Network to PV Solar Module Monitoring**
A. Molina-García (Polytechnical University of Cartagena, Spain), J.C. Campelo, J. J. Serrano (Polytechnical University of Valencia, Spain), E. Gómez-Lázaro (University of Castilla-La Mancha, Spain), T. García-Sánchez (University of Castilla-La Mancha, Spain) (SIW14-1103)
- **Evaluation of a Hybrid Method for Forecasting Photovoltaic Energy Availability in Building Integrated Photovoltaic System with Energy Storage**
J. Salome, J. M. Ramírez, (CINVESTAV del IPN, Mexico) (SIW14-1108)
- **Simulation of PV Power Plant's Output in Uruguay**
D. Oroño, R. Alonso, G. Crapuchetti, G. Hermida, M. Puppo (University of the Republic, Uruguay) (SIW14-1109)
- **Impact of PV Power Plants on the Voltage Conditions and Power System Losses in MV Distribution Network**
D. Jakus, J. Vasilj, R. Goić (University of Split, Croatia) (SIW14-1123)
- **Coordinated Control of Renewable Energy Sources in Distribution Networks**
D. Jakus, J. Vasilj, H. Tutovac (University of Split, Croatia) (SIW14-1124)
- **Optimal Operation and Planning using FACTS Device in Power Systems with PV Generators**
N. Bin Salim, T. Tsuji, T. Oyama, (Yokohama National University, Japan), K. Uchida (Waseda University, Japan) (SIW14-1137)
- **Modelling of Photovoltaic Modules with Battery Energy Storage in Simulink/Matlab With In-Situ Measurement Comparisons**
H. Vika, O.-M. Midtgård, I. Ranaweera (NTNU, Norway), G. H. Yordanov (University of Agder, Norway) (SIW14-1141)
- **Technical and Economic Analysis for a Residential Grid Connected PV System with Possibilities of Different Battery Energy Storage Capacities (Case Study: Southern Norway).**
A. N. Azmi (University of Agder, Norway/Technical University Malaysia Melaka, Malaysia), M. L. Kolhe (University of Agder, Norway), A. G. Imenes (Teknova, Norway) (SIW14-1142)
- **Distribution Grid Photovoltaic Systems in a Norwegian Context**
C. M. Granum, K. O. Asklund (Hafslund Nett, Norway), S. Merlet (Multiconsult, Norway), O.-M. Midtgård (Norwegian University of Science and Technology, Norway) (SIW14-1144)
- **A Multi-Objective Control Strategy for Distribution Networks with Renewables**
T. Brown, N. Martensen S. Cherevatskiy (Energynautics, Germany), E. Rikos (CRES, Greece) (SIW14-3003)
- **Power Management System in Electro-Solar Vehicle**
H. Saidi, A. Mudoun (Mohamed Boudiaf University of Science and Technology, Algeria), S. Kouadri Mousthefai (Hassiba Benbouali University, Algeria) (SIW14-3004)
- **Determining Intra-Hour Solar Irradiance Variability with a Low-Cost Solar Logger Network**
D. Lingfors, U. Zimmermann, J. Widén (Uppsala University, Sweden) (SIW14-3012)
- **Solar Power Forecasting for a Massive and Secure Injection of Photovoltaics on the Grid**
S. Cros, N. Sébastien, O. Liandrat, S. Jolivet, N. Schmutz (Reuniwatt, Reunion Island, France)