



PROGRAM

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TIMETABLE SOLAR INTEGRATION WORKSHOP

Sunday, 20 Oct. 2013		Monday, 21 October 2013		Tuesday, 22 October 2013		
Tutorials		Solar Workshop Day 1		Solar Workshop Day 2		
		08:00 – 09:00	Foyer C 1 st floor	08:00 – 09:40	Room Bartholomew	Room Harpley
			Registration		SESSION 5a: International Market Issues	SESSION 5b: PV Modeling
		09:00 – 09:10	Room Bartholomew & Harpley	09:00 – 11:10	Coffee Break 09:40 – 10:00	
			OPENING: Welcome and Introduction			
		09:10 – 10:50	Room Bartholomew & Harpley	10:00 – 11:10	Room Bartholomew	Room Harpley
			SESSION 1: Keynote Session		SESSION 6a: Solar Forecasting II	SESSION 6b: Future European Power System with a High Share of Renewables
		Coffee Break & Poster Session 10:50 – 11:20		Coffee Break 11:10 – 11:30		
11:20 – 13:00	Room Bartholomew	Room Harpley	Room Bartholomew & Harpley			
	SESSION 2a: Experiences with Large-Scale Integration of Solar Power into Power Systems	SESSION 2b: Solar Power and Storage	SESSION 7: Closing Session - Podium Discussions			
Lunch 13:00 – 14:00 (Atrium -2)		Lunch 12:15 – 13:15 (Atrium -2)				
13:00 – 17:00	Room Prescott 1 st floor	Room Bartholomew	Room Harpley	Room Trinity		
	Solar Tutorials	14:00 – 15:40	SESSION 3a: PV and Distribution Grids	SESSION 3b: Power System Operation Issues	12 th Wind Integration Workshop Day 1	
		Coffee Break & Poster Session 15:40 – 16:00		OR:		
		16:00 – 17:20	Room Bartholomew	Room Harpley	Room Bartholomew & Harpley	
SESSION 4a: PV and Smart Grids	SESSION 4b: Solar Forecasting I		First European PV GRID Forum			
	19:00	Restaurant at Grange Tower Bridge Hotel				
		Solar Dinner				

MONDAY, 21 OCTOBER 2013

08:00 – 09:00 Registration

09:00 – 09:10 Opening: Welcome and Introduction, Thomas Ackermann

09:10 – 10:50 SESSION 1: KEYNOTE SESSION

> Session Chair Thomas Ackermann (Energynautics, Germany)

09:10 – 10:30 Presentations (20 min. each):

- TBA
TBA
- **PV Positioning as a Major Player in the Electricity Sector - Market and Technology Trends**
F. Thies (EPIA, Belgium) (SIW13-1045)
- **PV Evolution and Coming Challenges from a German TSO Perspective**
A. J. Gesino (TenneT TSO, Germany)
- **Italian experience with PV integration**
R. Lama (Enel Distribution, Italy)

10:30 – 10:50 Discussions

10:50 – 11:20 Coffee Break & Poster Session

11:20 – 13:00 SESSION 2A: EXPERIENCES WITH LARGE-SCALE INTEGRATION OF SOLAR POWER INTO POWER SYSTEMS

> Session Chair Charles Smith (UVIG, USA)

11:20 – 12:40 Presentations (16 min. each):

- **Evaluation of Technical Solutions for a Large Scale Integration of PV in European Distribution Grids**
M. Vandenberg, V. Helmbrecht, D. Craciun (DERlab, Germany), H. Loew (BSW, Germany), R. Lama (Enel Distribution, Italy), R. Hermes (RWE Deutschland, Germany), M. Reking, G. Concas (EPIA, Belgium), P. M. Sonvilla (Eclareon, Germany) (SIW13-1035)
- **Inverter-Based Voltage Control with Reactive Power: Large-Scale Deployment Results**
C. Dierckxsens, K. De Brabandere, O. Gammoh, (3E, Belgium), B. Bletterie (AIT, Austria), W. Deprez (Infrax, Belgium), Y. T. Fawzy (SMA Solar Technology, Germany), B. Uljanić, B. Blažič, (University of Ljubljana, Slovenia), A. Woyte (3E, Belgium) (SIW13-1026)
- **Examining the Development of Non-Controllable Photovoltaic and Decentralized Generation Capacity in the Context of Balancing the German Power System**
K. Burges, M. Doering, R. Kuwahata, G. Papaefthymiou, (Ecofys Germany, Germany) (SIW13-1089)
- **Solar Power and the Future of the Grid**
A. Galiteva (Renewables 100 Policy Institute, USA) (SIW13-1051)
- **Costs and Benefits of Fossil-Fueled Plant Flexibility**
D. Lew, G. Brinkman, G. Stark (NREL, USA), G. Jordan, S. Venkataraman (GE Energy, USA), N. Kumar, S. Lefton (Intertek-APTECH, USA) (SIW13-1047)

12:40 – 13:00 Discussions

11:20 – 13:00 **SESSION 2B: SOLAR POWER AND STORAGE**
> Session Chair **Julio Usaola (University Carlos III, Spain)**

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

- **Evaluating the Benefits of Storage in Low Voltage Distribution Systems with High PV Penetration**
J.-D. Schmidt, E. Tröster (Energynautics, Germany) (SIW13-1093)
- **Domestic Photovoltaic Systems, Battery Storage, and the Economic Impact of Time-of-use Electricity Pricing**
E. McKenna, M. Thomson (Loughborough University, United Kingdom) (SIW13-1010)
- **Increasing the Share of PV by a Factor of 2-3 over the Self-use Limit Through Urban Electricity-to-thermal Conversion Schemes**
P. Lund, J. Mikkola (Aalto University, Finland) (SIW13-1046)
- **Modelling Concentrating Solar Power with Thermal Energy Storage for Integration Studies**
M. Hummon, P. Denholm, J. Jorgenson, M. Mehos (NREL, USA) (SIW13-1037)

12:40 – 13:00 **Discussions**

13:00 – 14:00 **Lunch Break**

14:00 – 15:40 **SESSION 3A: PV AND DISTRIBUTION GRIDS**
> Session Chair **Jens Bömer (TU Delft, the Netherlands)**

14:00 – 15:20 **Presentations (20 min. each):**

- **The Impact of Low Voltage Disconnection of Distributed PV on Bulk Electricity System Reliability**
A. Tuohy, A. Gaikwad, J. Taylor, D. Brooks (Electric Power Research Institute, USA) (SIW13-1030)
- **Meeting Utility Step Voltage Change Requirements by Providing Precise Voltage Control for a PV Plant on a Distribution Feeder**
J. Diaz de Leon II (AMSC, USA), B. L. Agrawal (Arizona Public Service, USA) (SIW13-1012)
- **Technical Assessment of On-Load Tap-Changers in Flemish LV Distribution Grids**
N. Efkarpidis, C. Gonzalez, T. Wijnhoven, D. Van Dommelen, T. De Rybel, J. Driesen (KU Leuven, Belgium) (SIW13-1013)
- **Probabilistic Tool Based on Smart Meters Data to Evaluate the Impact of Distributed Photovoltaic Generation on Voltage Profiles in LV Grids**
V. Klonari, F. Vallée (University of Mons, Belgium), O. Durieux (ORES, Belgium), J. Lobry (University of Mons, Belgium) (SIW13-1004)

15:20 – 15:40 **Discussions**

14:00 – 15:40 **SESSION 3B: POWER SYSTEM OPERATION ISSUES**
> Session Chair **Helge Urdal (National Grid, United Kingdom)**

14:00 – 15:20 **Presentations (20 min. each):**

- **Pool of Photovoltaic Systems Delivering Control Reserve**
M. Jansen, M. Speckmann (Fraunhofer IWES, Germany), A. von Harpe, M. Hahler (Enerparc, Germany) (SIW13-1000)
- **Primary Frequency Control through Grid Connected Photovoltaic Active Generator**
A. N. Azmi, M. Kolhe (University of Agder, Norway) (SIW13-1077)
- **PV Generation Capacity Reserve for Intermittency Mitigation and Revenue Maximization**
K. Papastergiou (Formerly ABB Corporate Research, Sweden), N. Efkarpidis (ABB Corporate Research, Sweden) (SIW13-1042)
- **Variability Analysis and Cycling Impacts of Solar PV in the Southwest United States**
A. Tuohy, E. Lannoye (EPRI, Ireland), C. Hansen (Sandia National Laboratories, USA), N. Troy (Electroroute Market Access, Ireland) (SIW13-1027)

15:20 – 15:40 **Discussions**

15:40 – 16:00 Coffee Break & Poster Session

16:00 – 17:20	SESSION 4A: PV AND SMART GRIDS
> Session Chair	Nis Martensen (Energynautics, Germany)
16:00 – 17:00	Presentations (20 min. each):
	<ul style="list-style-type: none">• Active Distribution System Management J. Alvarez Fernandez (Eurelectric, Belgium), J. Tello Guijarro (Gas Natural Fenosa, Spain), P. Mandatova (Eurelectric, Belgium), D. Treballe (Gas Natural Fenosa, Spain) (SIW13-1091)• Assessing the Potential Role of Large-Scale PV Generation and Electric Vehicles in Future Low-Carbon Electricity Industries P. Vithayasrichareon, G. Mills, I MacGill (University of New South Wales, Australia) (SIW13-1058)• A New Measurement Technology for Solar Integration from the U.S.A. ARPA-E Program A. McEachern (Power Standards Lab, USA) (SIW13-1076)
17:00 – 17:20	Discussions

16:00 – 17:20	SESSION 4B: SOLAR FORECASTING I
> Session Chair	TBA
16:00 – 17:05	Presentations (16 min. each):
	<ul style="list-style-type: none">• Synthetic High-Frequency Solar Photovoltaic Data to Meet Grid Compliance J. D. Frank, P. Beaucage, M. C. Brower, M. Grammatico (AWS Truepower, United States) (SIW13-1088)• Downscaling Solar Power Output to 4-Seconds for Use in Integration Studies M. Hummon, A. Weekley, K. Searight, K. Clark (NREL, USA) (SIW13-1038)• PV Forecasting Confidence Intervals for Reserve Planning and System Operation P. Kreutzkamp, O. Gammoh, K. De Brabandere (3E, Belgium), M. Rekinge (EPIA, Belgium) (SIW13-1034)• Cross-Correlation of Photovoltaic Output Fluctuation in Power System Operation for Large-Scale Photovoltaic Integration Y. Ikeda (Kyoto University, Japan), K. Ogimoto (University of Tokyo, Japan) (SIW13-1023)
17:05 – 17:20	Discussions

19:00 Solar Workshop Conference Dinner

TUESDAY, 22 OCTOBER 2013

08:00 – 9:40	SESSION 5A: INTERNATIONAL MARKET ISSUES
> Session Chair	Eoghan McKenna (Loughborough University, United Kingdom)
08:00 – 9:20	Presentations (20 min. each):
	<ul style="list-style-type: none">• The Market Value of Solar PV L. Hirth (Vattenfall, Germany) (SIW13-1066)• Solar Integration in Australia's Electricity Market J. Gilmore, B. Vanderwaal, I. Rose (ROAM Consulting, Australia) (SIW13-1021)• 100% Renewables in Australia - Will a Capacity Market be Required? J. Riesz, I. MacGill (University of New South Wales, Australia) (SIW13-1020)• Optimized Residential Loads Scheduling Based on Dynamic Pricing of Electricity: A Simulation Study C. Ogwumike, A. Modibbo, M. Denai (Teesside University, United Kingdom) (SIW13-1069)
09:20 – 9:40	Discussions

08:00 – 9:40 **SESSION 5B: PV MODELING**
 > Session Chair **Bernd Weise (DigSILENT, Germany)**

- 08:00 – 9:20** **Presentations (20 min. each):**
- **PV Modelling for Generation Adequacy Studies**
 J. Usaola, V. Ramírez-Jusado (Universidad Carlos III, Spain), T. Gafurov, M. Prodanovic (IMDEA Eney, Spain) (SIW13-1014)
 - **Measurement Based PV Inverter Modelling and Verification**
 Z. Fan, T. Gehlhaar (Germanischer Lloyd, Germany), J. Huang, M. Liu (CEPRI, China) (SIW13-1001)
 - **Quasi Steady-State Modelling of Low-Voltage Connected Photovoltaic Systems for Analysing Distribution Feeder Behaviour During Faults**
 B. G. Rawn (KU Leuven, Belgium), S. Torres Romo (Prolec GE, Mexico), M. Gibescu, M. van der Meijden (Delft University of Technology, the Netherlands) (SIW13-1063)
 - **Active Power Reserves Evaluation in Large Scale PVPPs**
 B.-I. Crăciun, T. Kerekes, D. Sera, R. Teodorescu (Aalborg University, Denmark), U. D. Annakkage (University of Manitoba, Canada) (SIW13-1078)
- 09:20 – 9:40** **Discussions**

9:40 – 10:00 **Coffee Break**

10:00 – 11:10 **SESSION 6A: SOLAR FORCASTING II**
 > Session Chair **Marissa Hummon (NREL, USA)**

- 10:00 – 10:50** **Presentations (16 min. each):**
- **Metrics for Evaluating the Accuracy of Solar Power Forecasting**
 J. Zhang, B.-M. Hodge, A. Florita (NREL, USA), S. Lu, H. F. Hamann (IBM TJ Watson Research Center, USA), V. Banunarayanan (U.S. Department of Energy) (SIW13-1036)
 - **Towards a Multi-time-scale Integrated Solar Forecast System**
 P. Beaucage, J. D. Freedman (AWS Truepower, USA), J. Zack (MESO, USA), J. Kleissl, B. Urquhart, I. Gohari (UC San Diego, USA), A. Kankiewicz (Clean Power Research, USA) (SIW13-1075)
 - **Farm-scale Operational Solar Power Forecasting: Assessment of Hybrid Physical and Numerical Forecasting Methodologies**
 S. Siblot, B. Graff, A. Falgon, A. Ben Daoud, G. Bontron (Compagnie Nationale du Rhône, France) (SIW13-1056)
- 10:50 – 11:10** **Discussions**

10:00 – 11:10 **SESSION 6B: FUTURE EUROPEAN POWER SYSTEM WITH HIGH SHARE RENEWABLES**
 > Session Chair **Phil Lawton (National Grid, United Kingdom)**

- 10:00 – 10:50** **Presentations (16 min. each):**
- **Overview Over the Regulatory Approaches for the Integration of Solar Power in Europe**
 D. Fouquet, J. V. Nysten (Becker Büttner Held, Belgium) (SIW13-1008)
 - **Quantifying the Cost of Integrating Photovoltaics into the Future European Union Electricity System**
 D. Pudjianto, P. Djapic, J. Dragovic, G. Strbac (Imperial College London, United Kingdom) (SIW13-1040)
 - **Transmission Network Loading in Europe with High Shares of Renewables**
 T. Brown (Energynautics) (SIW13-1094)
- 10:50 – 11:10** **Discussions**

11:10 – 11:30 Coffee Break

11:30 – 12:15	SESSION 7: CLOSING SESSION-PODIUM DISCUSSIONS
> Session Chair	TBA
11:30 – 12:10	
<ul style="list-style-type: none">• Podium discussions	
Participants: TBA	
12:10 – 12:15	Closing Remarks

12:15-13:15 Lunch

13:00 Start Wind Integration Workshop

13:00 Start of the First European PV GRID Forum

CONFIRMED POSTER PRESENTATIONS

- **Development of a Tool for Prediction of the PV Electricity Production Based on Optical-thermal Model**
G. Caruso (Altran Research, France), V. Bourdin (LIMSI-CNRS, France), P. Hoang, V. Archambault (Altran Research, France) [\(SIW13-1007\)](#)
- **Analysis of Correlation Between Wind Generation and Potential PV Generation in Northern Poland**
M. Bajor (Institute of Power Engineering Gdansk, Poland) [\(SIW13-1022\)](#)
- **A Demonstrative Example of Photovoltaic Integration into Industrial Parks: Endering European Project**
A. Molina-García (Polytechnical University of Cartagena, Spain), J. M. Paredes (Technologic Centre for Energy and Environment, Spain), T. García-Egea (Catholic University San Antonio, Spain), R. Martínez-Sánchez (External technical consultant - COII Region of Murcia, Spain) [\(SIW13-1025\)](#)
- **A Solar and Wind Integrated Forecast Tool (SWIFT) Designed for the Management of Renewable Energy Variability on Island Grid Systems**
J. W. Zack, J. D. Freedman (AWS Truepower, USA), D. Nakafuji (Hawaiian Electric Company, USA) [\(SIW13-1032\)](#)
- **Power Flow Efficiency of a DC Distribution Grid - A test case with a High Penetration of Renewable Energy Resources in Different Operational Modes**
T. D. Mai, J. Tant, J. Driesen (KU Leuven, Belgium) [\(SIW13-1043\)](#)
- **Study on Gray-box Modelling and Parameter Identification of Grid-connected PV Inverter**
L.-N. Qu (China Electric Power Research Institute CEPRI, China), L. Yin (Ningxia Electric Power Company, China), M.-M. Sun (China Electric Power Research Institute CEPRI, China), R.-Y. Huang (Ningxia Electric Power Company, China) [\(SIW13-1044\)](#)
- **Customer Behavior Model for Load Adjustment and Tariff Forming**
S. Pflugradt, A. Arnoldt, O. Warweg, P. Bretschneider (Fraunhofer IOSB-AST, Germany) [\(SIW13-1062\)](#)
- **Statistical Assessment of the Impact of the Power Dependence Structure on the ESS Requirements of Islanded Microgrids**
G. Díaz, J. Coto, J. Gómez-Aleixandre, A. Diez (University of Oviedo, Spain) [\(SIW13-1070\)](#)
- **Opportunities for Large Scale Solar Photovoltaic Systems in Swedish Multi-family Housing**
N. Sommerfeldt (KTH, Sweden) [\(SIW13-1074\)](#)
- **Response of Low Voltage Networks with High Penetration of Photovoltaic Systems to Transmission Network Faults**
J. C. Boemer, K. Skaloumpakas, M. Gibescu, M. A.M.M. van der Meijden (Delft University of Technology, the Netherlands), W. L. Kling (Eindhoven University of Technology, the Netherlands) [\(SIW13-1081\)](#)
- **Lead-acid Battery Degradation Mechanisms in PV Systems**
W. Merrouche (CDER, Algeria), M. Kasser (ENP, Algeria), M. Trari (USTHB, Algeria), N. Achaibou, B. Bouzidi (CDER, Algeria) [\(SIW13-1082\)](#)
- **Decoupling and Control of Real and Reactive Power in Grid-Connected Photovoltaic Power System**
T. Allaoui (University of Tiaret, Algeria), M. Denaï (Teesside University, United Kingdom) [\(SIW13-1083\)](#)
- **Assumptions and Approximations Typically Applied in Modelling LV Networks with high Penetrations of Low Carbon Technologies**
A. J. Urquhart, M. Thomson (Loughborough University, United Kingdom) [\(SIW13-1092\)](#)