07 May 2019

Poster Tours

Session 1 Network components

Poster Tour PT11

Block 1: Asset management and condition assessment of Network Components – Cables, lines and associated components

5 June 2019 from 09:00 to 10:30
5 June 2019 from 11:00 to 12:30

Poster Area

37 **Cross-bonding for MV cable systems: advantages and impact on accessories design**
Ralf Meier, NKT (Germany) • Dario Quaggia, Prysmian Group (Italy) • Ladislaus Kehl, TE Connectivity (Germany)

43 **Field Study of Intermittent Faults in Low-Voltage Underground Cable Systems**
Armand van Deursen, Eindhoven University of Technology (Netherlands) • Peter Wouters, Eindhoven University of Technology (Netherlands) • Han Slootweg, Eindhoven University of Technology / Enexis Netbeheer (Netherlands) • Fred Steennis, DNV GL Energy & Eindhoven University of Technology (Netherlands)

52 **Automated visual inspection – comparing computer vision to machine learning**
Joao Gomes-Mota, Albatroz Engineering (Portugal)

54 **Dry Zone Formation Surrounding Underground Medium Voltage Cables During Load Cycling**
Ossama Gouda, Cairo University (Egypt)

97 **A Risk-Assessed Approach to Overhead Line Corridor Clearance Management**
Jason Noctor, ESB International (Ireland) • Patrick Porter, ESB International (Ireland) • Oisin Armstrong, ESB International (Ireland) • Alan Carroll, ESB International (Ireland)

99 **The Application of Advanced Data Analytics to Smart Meter Data**
Peter Kai Cheung Wong, Jemena (Australia) • Steven Spence, Jemena (Australia) • Jiangxia Zhong, Jemena (Australia)

263 **Lightning protection of unshielded overhead medium voltage power lines in South Africa**
Andreas Beutel, Eskom Holdings SOC Ltd (South Africa) • Bruce McLaren, Eskom Holdings SOC Ltd (South Africa) • Hendri Geldenhuys, Eskom Holdings SOC Ltd (South Africa) • Willem Dirkse Van Schalkwyk, Eskom Holdings SOC Ltd (South Africa) • John Van Coller, University of Witwatersrand (South Africa)

415 **Interpretation of Statistical Analysis on LV Asset Condition**

Maikel Klerx, Eindhoven University of Technology (Netherlands) • Johan Morren, Eindhoven University of Technology / Enexis Netbeheer (Netherlands) • Aad Prein, Stedin (Netherlands) • Denny Harmsen, Alliander (Netherlands) • Edwin Groot-Kabalt, Ksandr (Netherlands) • Han Slootweg, Eindhoven University of Technology / Enexis Netbeheer (Netherlands)

535 **Asset Management of HV Cables on an Electricity Distribution Network Using On-line Condition Monitoring**

Graham Earp, EA Technology (United Kingdom) • John Burns, NIE Networks (United Kingdom)

569 **The THOR Hammer Tester - a step change in the management of wooden utility poles**

Ralph Eyre-Walker, SP Energy Networks (United Kingdom) • Catherine Dow, SP Energy Networks (United Kingdom) • Russell Bryans, SP Energy Networks (United Kingdom) • Baraneedaran Sriskantharajah, Groundline Engineering (United Kingdom)

662 **A disruptive method for vegetation management on Enedis' Medium**

Michel CORDONNIER, Enedis (France) • Paolo GUZZINI, Delair (France)

694 **Material efficiency for circular economy: from assessments to optimizations**

Thierry Cormenier, Schneider Electric (France) • Marcel Chevalier, Schneider Electric (France) • Karim Helal, Schneider Electric (France) • Matthieu Briens, Schneider Electric (France)

757 **Measuring PD propagation in complex MV distribution network configurations**

Sonia Raquel Barrios Pereira, Ormazabal Corporate Technology (Spain) • Ian Gilbert, Ormazabal Corporate Technology A.I.E (Spain) • Iñaki Orue, Ormazabal Corporate Technology A.I.E (Spain) • Patrick Mulroy, Ormazabal Corporate Technology A.I.E (Spain) • Aritz Hurtado, Ormazabal Corporate Technology A.I.E (Spain)

807 **A new approach for evaluating the condition of cable systems and estimation of remaining life time of MV underground power cables**

Tobias Neier, BAUR GmbH (Austria) • Manfred Bawart, BAUR GmbH (Austria) • Sung Min Kim, KEPCO Korean Electric Power Corporation (Korea, Republic of) • Jens Knauel, BAUR GmbH (Austria)

921 **Automated Identification technology of Trees Endangering to Distribution Facilities by using Mobile Mapping System**

Daiki Mori, CHUBU Electric Power Co.,Inc. (Japan) • Yasuhisa Watanabe, CHUBU Electric Power Co.,Inc. (Japan) • Itushi Ishihara, CHUBU Electric Power Co.,Inc. (Japan) • Masato Ohori, Hitachi Solutions, Ltd. (Japan)

940 **DISTRIBUTION SURGE ARRESTER MONITORING**

Michel CORDONNIER, Enedis (France) • Christian GAZZOLA, DERVASIL (France) • Damien Jeanneau, Sicame (France) • Iulia IVAN, Enedis (France) • Denis SPORTIELLO , Enedis (France) • Alban-Marie LIMONET, Enedis (France)

943 **Standardization and contingency storage for submarine cable systems**

Hans Lavoll Halvorson, SINTEF Energy Research (Norway) • Magnus Johansson, REN Sjøkabelberedskap AS (Norway) • Bjørn Haukanes, REN Sjøkabelberedskap AS (Norway)

1037 **Energy harvesting technology applicable to Distribution Line**

Boo-hyun Shin, KEPCO(Korea Electric Power Corporation) (Korea, Republic of) • Jun-hyuk Lm, KEPCO(Korea Electric Power Corporation) (Korea, Republic of)

1114 **Pioneer earth systems remote monitoring for secondary distribution substations**

Lígia Fernandes, EDP Distribuição – Energia, S.A. (Portugal) • Ricardo Catalão, EDP Distribuição – Energia, S.A. (Portugal) • Luís Pires, EDP Distribuição – Energia, S.A. (Portugal) • João Pinto, EDP Distribuição – Energia, S.A. (Portugal) • Carolina Janeiro, EDP Distribuição – Energia, S.A. (Portugal) • Luís Rocha, EDP Labelec (Portugal) • Marcos Cordeiro, Eneida Wireless and Sensors, S.A. (Portugal)

1123 **Use of fault statistics for the management of aging medium voltage PILC cable systems**

Jens Zoëga Hansen, Danish Energy (Denmark)

1128 **Condition Monitoring of Surge Protective Devices by Measuring the Magnetic Field of Discharge Currents in Power Distribution Systems**

Stefan Joerres, University of Kassel (Germany) • Albert Claudi, University of Kassel (Germany) • Gernot Finis, Phoenix Contact GmbH & Co.KG (Germany) • Martin Wetter, Phoenix Contact GmbH & Co.KG (Germany)

1149 **Impact of fault localization on MV cables on adjacent telecommunication cables**

Blandine Hennuy, ENGIE-Laborelec (Belgium) • Jonathan Moens, Laborelec (Belgium) • Marcel Van Den Berg, Sibelga (Belgium) • Philippe Colin, Ores (Belgium) • Joost Van Slijcken, Fluvius (Belgium)

1189 **Research and Application of Distribution Network Equipment Remote Monitoring and Fault Diagnosis System Based on Wireless Technology**

Le Gu, Guangzhou Power Supply Co.,Ltd (China) • Haibo Su, Guangzhou Power Supply Co.,Ltd (China) • Yong Wang, Guangzhou Power Supply Co.,Ltd (China) • Jun Chen, Guangzhou Power Supply Co.,Ltd (China) • Huihong Huang, Guangzhou Power Supply Co.,Ltd (China) • Wenxiong Mo, Guangzhou Power Supply Co.,Ltd (China)

1369 **Propagation Characteristics of Partial discharge Signals in Medium Voltage Branched Cable Joints using HFCT Sensor**

Muhammad Shafiq, University of Vaasa (Finland) • Guillermo Robles, Carlos III University of Madrid (Spain) • Kimmo Kauhaniemi, University of Vaasa (Finland) • Brian Stewart, University of Strathclyde (United Kingdom) • Matti Lehtonen, Aalto University (Finland)

1390 **Features Selection for Partial Discharge and Interference Recognition of HV Cables based on Random Forest Method**

Ganjun Wang, Zhongshan Power Supply Bureau of the Guangdong Power Grid Corporation, China Southern Power Grid Co., Ltd. (China) • Jingshu Li, Huazhong University of Science and Technology (China) • Yufeng Hu, China Southern Power Grid Co., Ltd. (China) • Xiaosheng Peng, Huazhong University of Science and Technology (China) • Yijiang Wu, Zhongshan Power Supply Bureau of the Guangdong Power Grid Corporation, China Southern Power Grid Co., Ltd. (China) • Yuzhu Chen, Huazhong University of Science and Technology (China)

1492 **Frequency Response of a Real Cable Network and its Impact on Field PD Measurements**

Saliha Abdul Madhar, Haefely Test AG / TU Delft (Switzerland) • Petr Mraz, Haefely Test AG (Switzerland) • Sonia Raquel Barrios Pereira, Ormazabal Corporate Technology (Spain) • Nabil Akroud, Ormazabal Corporate Technology (Spain)

1497 **Practical method for global earthing system determination of the urban area**

Primož Hrobat, EIMV (Slovenia) • Jure Strmec, EIMV (Slovenia) • Vilijem Bonča, Elektro Gorenjska (Slovenia)

1718 **Ambient Temperature Influence on Cable Trifurcating Joint Failures**

ShengJi Tee, SP Energy Networks (United Kingdom) • Malcolm Bebbington, SP Energy Networks (United Kingdom) • David Neilson, SP Energy Networks (United Kingdom) • Russell Bryans, SP Energy Networks (United Kingdom) • Matthew Jones, SP Energy Networks (United Kingdom) • Jonathan Fox, SP Energy Networks (United Kingdom)

1739 **Optimizing network replacement with AI**

Odilon Faivre, Enedis (France) • Pierre Cochet, Enedis (France) • Jérémie Mérigeault, Enedis (France) • Sébastien Folleville, Enedis (France)

1747 **Investment Decision-Making Using Probabilistic Life Cycle Costing – Comparing Flooded Lead-Acid and Lithium Ion Batteries for Power Supply Backup in Substations**

Jan Henning Jürgensen, KTH Royal Institute of Technology (Sweden) • Åsa Majlund, KTH Royal Institute of Technology (Sweden) • Patrik Gustafsson, KTH Royal Institute of Technology (Sweden) • Eysteinn Eiríksson, KTH Royal Institute of Technology (Sweden) • Patrik Hilber, KTH Royal Institute of Technology (Sweden)

1749 **Integrating Circular Economy in Asset Management. A case study on circular asset development.**

co den Hartog, Liander N.V. (Netherlands) • Sanne Preso, Qirion N.V. (Netherlands) • Dominique Hermans, Alliander N.V. (Netherlands)

1768 **Deterioration Trend Analysis Utilizaing Environmental Data and Asset Management: the Case of Porcelain Cutout**

Daisuke Muramoto, The Kansai Electric Power Company (Japan) • Koichi Tanaka, The Kansai Electric Power Company (Japan) • Kazuhiro Murata, The Kansai Electric Power Company (Japan)

1866 **Condition assessment of medium voltage underground cables based on tangent delta and partial discharge measurements**

Pertti Pakonen, Tampere University (Finland) • Juha Keränen, Helen Sähköverkko Oy (Finland) • Tuomo Heinonen, Dekra Industrial Oy (Finland) • Pekka Verho, Tampere University (Finland)

1890 **On-Site Testing of 66 kV Subsea Array Cables for Off-Shore Windfarms**

Uwe Kaltenborn, Highvolt Prüftechnik Dresden GmbH (Germany) • Peter Coors, Highvolt Prüftechnik Dresden GmbH (Germany) • Ralf Pietsch, Highvolt Prüftechnik Dresden GmbH (Germany) • Thomas Steiner, Highvolt Prüftechnik Dresden GmbH (Germany)

1980 **A Battery Testing Toolbox for Real-World Operating Conditions**

Jelle Smekens, Laborelec (Belgium) • Dominique Corbisier, Laborelec (Belgium) • Dries Lemmens, Laborelec (Belgium) • Rafael Jahn, Laborelec (Belgium) • Catherine Stuckens, Laborelec (Belgium) • Felix Hildenbrand, RWTH Aachen (Germany)

2133 **Autonomous monitoring system for the detection of disrupting power cables on distribution networks using computer vision techniques**

Ignacio Leonardo Del Hoyo, UTFPR (Brazil) • José Francisco Bianchi Filho, Lactec (Brazil) • Gerson Alcantara Andrade, Copel (Brazil) • Guilherme Cordeiro Vogt, UFPR (Brazil) • Yan Victor Murmel, UTFPR (Brazil) • Sebastião Ribeiro Júnior, UFPR (Brazil) • Alan Naoto Tabata, Lactec (Brazil) • Gabriel dos Santos Haveroth, Lactec (Brazil)

2154 **Low voltage overhead distribution Neutral wire multi-Grounding by Poles (NGP)**

Mehrdad Tarafdar Hagh, University of Tabriz (Iran, Islamic Republic of) • Vahid Chakeri, University of Tabriz (Iran, Islamic Republic of)

2331 **Test recommendations for ground screen power cable connections (poster linked to the CIRED working group)**

Sverre Hvidsten, SINTEF Energy Research (Norway)

Poster Tour PT12

Block 2: Asset management and condition assessment of Network Components – Substations, switchgear and transformers

5 June 2019 from 09:00 to 10:30
5 June 2019 from 11:00 to 12:30

Poster Area

93 **Fingerprinting made easy by machine learningFingerprinting made easy by machine learning**

Sathiswar Jayaseelan, TUE (Netherlands) • Albert Pondes, Enexis (Netherlands) • Armand Deursen, van, TUE (Netherlands) • Han Slootweg, Eindhoven University of Technology / Enexis Netbeheer (Netherlands)

110 **Residual Magnetic Flux of Transformer at Power System Accident**

Yukihiko Himata, Tokyo Denki University (Japan) • Takashi Nakajima, Tokyo Denki University (Japan) • Tadashi Koshizuka, Tokyo Denki University (Japan) • Shiro Maruyama, Toshiba Energy Systems & Solution Corporation (Japan) • Minoru Saito, Toshiba Energy Systems & Solution Corporation (Japan) • Hiroyuki Maejima, Toshiba Energy Systems & Solution Corporation (Japan)

227 **Identification of Copper or Aluminum for Winding Material of Dry Type Transformer**

W X MO, Power Test and Research Institute Guangzhou Power Supply Company (China) • H B WANG, Power Test and Research Institute Guangzhou Power Supply Company (China) • K YIN, Power Test and Research Institute Guangzhou Power Supply Company (China) • W CAO, wuhan university (China) • Y QIN, Power Test and Research Institute Guangzhou Power Supply Company (China) • J G WANG, wuhan university (China) • L GAN, Power Test and Research Institute Guangzhou Power Supply Company (China) • Y D FAN, wuhan university (China)

383 **Partial Discharge alert system in medium voltage switchgear**

Carlo Gemme, ABB (Italy) • Francesco Guastavino, University of Genova (Italy) • Kai Hencken, ABB (Switzerland) • Andrej Krivda, ABB (Switzerland) • Yannick maret, ABB (Switzerland) • Marco Testa, ABB spa (Italy) • Federico Gallesi, University of Genova (Italy)

384 **Installed base modernization and monitoring solution at Petrochemical Company**

Carlo Gemme, ABB (Italy) • Danie Mare, ABB (South Africa) • Junaid Sulaiman, petrochemical company (South Africa)

417 **Criteria to Prioritize the Replacement of HV Instrument Transformers in a Distribution Utility: a Practical Approach**

José Luis Martínez, Edenor S.A. (Argentina)

573 **New generation of Smart low-voltage switchgear and controlgear assembly**

Javier Cormenzana, Ormazabal (Spain) • Roberto Martinez, Ormazabal (Spain) • Sergio Sebastián, Ormazabal (Spain) • Susana Carillo, Endesa (Spain) • Francisco Javier Leiva, Endesa (Spain)

658 **Asset management application. Instrument Transformers On Line Monitoring System**

Nuria Calvo, Arteche (Spain) • Enrique Chávez, Arteche (Mexico) • Rolando Gómez, Arteche (Mexico)

676 **Research on Intelligent Diagnosis Method of Oil Temperature Defect in Distribution Transformer Based on Machine Learning**

Fei Xiao, State Grid ShangHai Municipal Electric Power Company (China) • Guo-jian Yang, State Grid ShangHai Municipal Electric Power Company (China) • Wei Hu, Tellhow Software Co. Ltd. (China)

697 **Sweep Frequency Response Analysis test as tool for distribution transformers management**

Hernan Mayora, IITREE - LAT (Argentina) • Raúl Emilio Alvarez, IITREE - LAT (Argentina) • Emilio Calo, IITREE - LAT (Argentina) • Leonardo Catalano, IITREE - LAT (Argentina) • Pablo Morcelle del Valle, IITREE - LAT (Argentina)

835 **Integrating Life Cycle Assessment in operational Asset Management decision making: A case study on asset procurement.**

Willem Haanstra, University of Twente (Netherlands) • Rolf Gelpke, University of Twente (Netherlands) • co den Hartog, Liander N.V. (Netherlands) • Ihsan Karakoc, Liander Assetmanagement (Netherlands)

865 **End of life evaluation of power transformers**

Jose Quintana, SP Energy Networks (United Kingdom) • David Walker, SP Energy Networks (United Kingdom) • Ian Hunter, Polaris Diagnostics (United Kingdom)

884 **Towards Smart Digital Circuit Breakers enabling advanced control and diagnostic features**

Marco Testa, ABB spa (Italy) • Pierino Bertolotto, ABB spa (Italy) • Diego Pagnoncelli, ABB spa (Italy) • Marco Riva, ABB spa (Italy)

887 **Distribution transformer modelling and monitoring**

jean françois tissier, ITRON (France) • jérome Cornet, ITRON (France) • Laurent Party, ITRON (France) • Pierre Jeanne, ITRON (France)

1009 **Lifecycle cost analysis of online dissolved gas analysis monitors**

Simon Sutton, Doble Engineering Company (United Kingdom) • John Skog, Maintenance and Test Engineering LLC (USA)

1030 **Compact Solutions for Electrical Installations in Urban Infrastructure**

Dhiraj Ingole, The Tata Power Co. Ltd (India) • Chintamani Chitnis, The Tata Power Co. Ltd (India) • Bhagyalakshmi Nair, The Tata Power Co. Ltd (India) • Sandeep Kundargi, The Tata Power Co. Ltd (India)

1129 **Ageing behaviour of medium-voltage substations**

Petros Dalamaras, University of Wuppertal (Germany) • Markus Zdrallek, University of Wuppertal (Germany) • Ulrich Groß, Rheinische NETZGesellschaft mbH (Germany) • Martin Knapp, Rheinische NETZGesellschaft mbH (Germany) • Heike Schulze, Mitteldeutsche Netzgesellschaft Strom mbH (Germany) • Patrick Klöckner, MVV Netze GmbH (Germany) • Axel Straube, SWS Netze Solingen GmbH (Germany) • Ralf Gawlitta, SWS Netze Solingen GmbH (Germany)

1187 **Forensic studies on 9teardown power transformers - Correlation between DPv paper and 2-FAL andextrapolation to estimate the remaining useful lifetime of relative transformers inservice**

João Vasco Ferreira, EDP Distribuição (Portugal) • Cristina Carvalho, EDP Distribuição (Portugal) • Luís Pinto Sá, EDP Distribuição (Portugal) • Anabela Peixoto, LABELEC (Portugal) • Rui Martins, LABELEC (Portugal)

1188 **MV/LV Transformer Substations Monitoring gives rapid response to faults (Case Studies-New Technologies)**

Rafael Minguez, Viesgo Distribucion (Spain) • Igor Auzokoa, Ingeteam Power Technology (Spain) • Benito Barrenetxea, Ingeteam Power Technology (Spain) • Javier Celada, Ingeteam Power Technology (Spain) • Rafa Toledo, Ingeteam Power Technology (Spain) • Jose Antonio Saez, Viesgo Distribucion (Spain) • Marcos Alvarez, Viesgo Distribucion (Spain)

1312 **The performance of in-service shunt capacitor switching devices as investigated by CIGRE WG A3.38**

Edgar Dullni, ABB AG (Germany) • Benjamin Baum, DNVGL (New Zealand) • Daniel Desmond, S&C Electric Comp. (USA) • Christian Heinrich , Siemens (Germany)

1333 **Investigations at operational aged switchgears with the age up to 50 years**

Thomas Gräf, Hochschule für Technik und Wirtschaft Berlin (Germany)

1479 **Distribution transformer integration in Eco-grid**

Alexandre HAMMEN, Schneider Electric (France) • Gianluca RANALLETTA, Schneider Electric (France)

1521 **On-line PD monitoring of Medium Voltage assets: an innovative approach to improve asset management**

Andrea Caprara, Techimp - Altanova group srl (Italy) • Giacomo Ciotti, Techimp - Altanova group srl (Italy)

1587 **Digital remote IOs to simplify Substation retrofits & upgrades: ENEDIS PCCN example**

Jean-Pierre MOLINIE, ENEDIS (France) • Jean MARMONIER, Schneider-Electric (France) • Julien CORNILLE, Schneider-Electric (France) • Bruno ANDRÉ, Schneider-Electric (France)

1593 **Quality and Reliability of Smart Grid Components**

Massimo Bartolucci, Enel (Italy) • Stefano Gottardelli, Enel (Italy) • Alfonso Sturchio, Enel (Italy) • Giuseppe Molina, Enel (Italy) • Fabio Zucchetti, Enel (Italy)

1613 **Smart Secondary Substation. A reality and a big opportunity for innovative solutions for predictive maintenance and life extension.**

Iñaki Apellaniz, Ormazabal (Spain) • Joseba Arostegui, Ormazabal (Spain) • José Ramón Tejedo, Iberdrola (Spain) • Juan Antonio Sánchez, Ormazabal (Spain)

1735 **Thermal measurement on a HV/LV substation installed in a building - Study and thermical balance on ventilation**

Couyade Jean - Miichel, EDF R&D (France) • Basuyaux Laurent, EDF R&D (France)

1744 **Dynamic Thermoelectric Modelling of Oil-filled Transformers for Optimized Integration of Wind Power in Distribution Networks**

Syed Hamza Hasan Kazmi, Orsted Offshore Wind A/S (Denmark) • Joachim Holbøll, Technical University of Denmark (DTU) (Denmark) • Thomas Herskind Olesen, Orsted Offshore Wind A/S (Denmark) • Troels Stybe Sørensen, Orsted Offshore Wind A/S (Denmark)

1821 **Monitoring of a large fleet of Substation Power transformers**

Mohammed ZOUITI, Enedis (France) • Annie KIRCHE, Enedis (France) • Antoine TROBOIS, Edf International networks (France) • Laurent KARSENTI, Edf International networks (France)

1865 **On-Site Testing of Distribution Transformers**

Uwe Kaltenborn, Highvolt Prüftechnik Dresden GmbH (Germany) • Andreas Thiede, Highvolt Prüftechnik Dresden GmbH (Germany)

1881 **Automated Testing of Distribution Transformers and Utilization of Test Information**

Raoul Harkenthal, HIGHVOLT Prüftechnik Dresden GmbH (Germany) • Uwe Kaltenborn, Highvolt Prüftechnik Dresden GmbH (Germany) • David Kremzow, HIGHVOLT Prüftechnik Dresden GmbH (Germany)

1924 **Smart Distribution Transformers: Non-Invasive Sensing to Enable Business Transformation**

Joana Faria, University of Coimbra (Portugal) • David Lima, University of Coimbra (Portugal) • Luís Oliveira, eneida.io (Portugal) • José Oliveira, Eneida.IO (Portugal) • Francisco Cardoso, University of Coimbra (Portugal)

1931 **Anomalies in On-Load Tap Changers: failure prevention through continuous monitoring and advanced data analysis techniques**

Marco Tozzi, Camlin Power Ltd (United Kingdom) • Steve Cox, Electricity North West (United Kingdom) • Lorenzo Chiesi, Camlin Technologies (Italy) • Anatoliy Mudryk, Camlin Power Ltd (United Kingdom)

2017 **Overview of Non Intrusive Methods for Switchgear Condition Assessment prepared by CIGRE/CIRED A3.32 Working Group**

Nenad Uzelac, G&W Electric Co. (USA) • Nicola Garibaldi, Qualitrol (Switzerland) • Christian Heinrich , Siemens (Germany) • Colin McCahey, ESP International (Ireland) • Per Westerlund, KTH Royal Institute of Technology (Sweden)

2089 **Mitigation of lock-in effect for compact substations with transformers meeting future EU efficiency regulations**

Radoslaw Szewczyk, DuPont (Poland) • Philippe Trifigny, Cahors (France) • Jean-Claude Duart, DuPont (Switzerland)

2260 **Field PD testing on solid dielectric MV switch**

Ana Milosevic, Electrical engineering Institute Nikola Tesla (Serbia) • Nenad Kartalovic, Electrical engineering Institute Nikola Tesla (Serbia) • Srdjan Milosavljevic, Electrical engineering Institute Nikola Tesla (Serbia) • Nenad Uzelac, G&W Electric Co. (USA) • R. J. Reg Gamblin, Manitoba Hydro (Canada) • Mark Niemczyk, Manitoba Hydro (Canada) • Udo Ranninger, Omicron Electronics (Austria)

2300 **Practical Study on Ventilation & Cooling of MV distribution substations and Providing Effective Ventilation Solution**

Saeed Abachizadeh, Tabriz Power Distribution Company (Iran, Islamic Republic of) • Masoud Rahmani, Tabriz Power Distribution Company (Iran, Islamic Republic of) • Rahim Hamrah, Tabriz Power Distribution Company (Iran, Islamic Republic of)

2324 **Smart Solution and Application for MV class Switchgear**

Hyun-Wook Lee, LSIS Co. (Korea, Republic of) • Young-Woo Jeong, LSIS Co. (Korea, Republic of) • Seog-Won Lee, LSIS Co. (Korea, Republic of) • Kil-Young Ahn, LSIS Co. (Korea, Republic of) • Young-Geun Kim, LSIS Co., Ltd. (Korea, Republic of)

Poster Tour PT13

Block 3: Innovation in Network Components – Cables, lines and new types of components

5 June 2019 from 14:30 to 16:00
5 June 2019 from 16:30 to 18:00

Poster Area

36 **Modelling and Testing of Saturated Core Fault Current Limiter**

David Klaus, ASG Power Systems (United Kingdom) • Antonio Morandi, University of Bologna (Italy) • Antonio Pellecchia, ASG Superconductors (Italy) • Gianni Grasso, Columbus Superconductors (Jamaica)

98 **ACCURATE REVENUE METERING WITH LOW POWER CURRENT AND VOLTAGE SENSORS ACCORDING TO THE RECENT IEC 61869-10 AND IEC 61869-11 STANDARDS**

Rob Kopmeiners, Alliander (Netherlands) • Denny Harmsen, Alliander (Netherlands) • Jens Weichold, 3M (Germany) • Marcus Biström, Netcontrol (Finland) • Douglas Brown, Netcontrol (United Kingdom)

103 **Low-power Instrument Transformers Frequency Response and Accuracy Requirements for Harmonics**

Miroslav Hrabcik, ABB s.r.o. (Czech Republic) • Radek Javora, ABB s.r.o. (Czech Republic) • Vaclav Prokop, ABB s.r.o. (Czech Republic)

306 **Use of self administered energy meters - Accesibility of the population with low income resources to sustainable energy.**

Miguel Pulice, Edenor (Argentina)

409 **Screen Connection for MV cables with laminatd Aluminium screen**

Kai-Uwe Bentkowski, Behr Bircher Cellpack BBC Radeberg GmbH (Germany) • Klaus-Dieter Haim, University of Applied Sciences Zittau/Görlitz (Germany)

513 **Design and Verification of DC 1000V Air Circuit Breaker for Broad range of Protection in LVDC Distribution**

Young Kook Kim, LSIS Co., Ltd. (Korea, Republic of) • Sangchul Lee, LSIS Co., Ltd. (Korea, Republic of) • Woojin Park, LSIS Co., Ltd. (Korea, Republic of) • Kil-Young Ahn, LSIS Co. (Korea, Republic of) • Young-Geun Kim, LSIS Co., Ltd. (Korea, Republic of)

645 **The development and application of a multi-terminal power electronics soft open point device**

Yi Lu, State Grid Zhejiang Electric Power Research Institute (China)

709 **A New Installation Technology of Mid-Voltage Cable Joint Using RTV Silicone Rubber Adhesive**

Xiaohui Zhu, State Grid Tianjin Electric Power Research Institute (China) • Zhengzheng Meng, State Grid Tianjin Electric Power Research Institute (China) • Huai Zou, State Grid Tianjin Electric Power Research Institute (China)

1033 **Lessons learnt from the eco-design process for an elbow connector for medium voltage networks**

Lucie Domingo, Nexans (France) • Stefaan Van den Broeck, Nexans (Belgium)

1233 **Presenting new equipment called “variable spring damper” to reduce the possibility of failure of distribution poles in medium-voltage overhead lines**

Foad Gol avar mohammadi, Power Distribution Company of Kurdistan (Iran, Islamic Republic of)

1282 **Underground distribution network monitoring so much easier**

Francisc Zavoda, IREQ(HQ) (Canada) • George Fofeldea, 3M Canada (Canada) • ERnie Rodrigez, 3M USA (USA)

1366 **A Study of the Optical Bending Sensor characteristic for Distribution Underground Cable Joint**

Hyoung-Jun Park, Electronics and Telecommunications of Research Institute (Korea, Republic of) • Ji Hyoung Ryu, Electronics and Telecommunications of Research Institute (Korea, Republic of) • Hyun-Jin Kim, Electronics and Telecommunications of Research Institute (Korea, Republic of) • Sung Chang Kim, Electronics and Telecommunications of Research Institute (Korea, Republic of) • Youngbeom Jung, KEPCO Research Institute (Korea, Republic of) • Byungsung Lee, KEPCO Research Institute (Korea, Republic of) • Seok Hun Song, KEPCO (Korea, Republic of) • Dongmin Kim, KEPCO (Korea, Republic of)

1442 **Application of RTV coating on Insulators and their benefits**

Tushar Rahatal, Tata Power (India) • Jagdish Kamble, Tata Power (India) • Devendra Santani, Tata Power (India) • Parmanand Tendulkar, Tata Power (India) • Gajanan Kale, Tata Power (India) • Shriprakash Joshi, Tata Power (India)

1528 **TEMPORARY OR SEMI-PERMANENT SINGLE CORE POWER CABLES: A NEW WAY TO SAFE AND RELIABLE YET FAST INSTALLATION**

Theo Bruijnse, Power Chain Solutions BV (Netherlands) • Jan Dikken, Power Chain Solutions BV (Netherlands)

1529 **Application of LVDC Distribution Switchboard System with New and Renewable Energy Source on the Demonstration Site**

YoungPyo Cho, KEPCO Research Institute (Korea, Republic of) • HongJoo Kim, KEPCO Research Institute (Korea, Republic of) • SeokWoong Kim, KEPCO Research Institute (Korea, Republic of) • JinTae Cho, KEPCO Research Institute (Korea, Republic of) • JuYoung Kim, KEPCO Research Institute (Korea, Republic of) • InYong Seo, KEPCO Research Institute (Korea, Republic of)

1549 **Conceptual Design of a 25.8 kV, 2.0 kA Resistive SFCL for Power System Interconnection**

Min Jee Kim, LSIS Co., Ltd. (Korea, Republic of) • Ok-Bae Hyun, LSIS Co., Ltd. (Korea, Republic of) • Sang Hoon Lee, LSIS Co., Ltd. (Korea, Republic of) • Gyeong Ho Lee, LSIS Co., Ltd. (Korea, Republic of) • Chae Yoon Bae, LSIS Co., Ltd. (Korea, Republic of) • Young-Geun Kim, LSIS Co., Ltd. (Korea, Republic of) • Jong-Jin Lee, Korea Electric Power Corporation (Korea, Republic of) • Yong Hoon Jang, Korea Electric Power Corporation (Korea, Republic of)

1550 **Online Monitoring Leads to Improve the Reliability and Sustainability of Power Grids**

Doina VORNICU, CEZ Romania (Romania) • Laurentia PREDESCU, CEZ Romania (Romania) • Alessandro Mingotti, University of Bologna (Italy) • Lorenzo Peretto, University of Bologna (Italy)

1555 **Development of High Speed DC Circuit Breaker using IGBT Drivers**

HongJoo Kim, KEPCO Research Institute (Korea, Republic of) • YoungPyo Cho, KEPCO Research Institute (Korea, Republic of) • HyunMin Kim, KEPCO Research Institute (Korea, Republic of) • JinTae Cho, KEPCO Research Institute (Korea, Republic of) • JuYoung Kim, KEPCO Research Institute (Korea, Republic of) • InYong Seo, KEPCO Research Institute (Korea, Republic of)

1601 **Special tests on MV Joints**

Massimo Bartolucci, Enel (Italy) • D'Orazio Luigi, Enel (Italy) • Alfonso Sturchio, Enel (Italy) • Maurizio Della Corte, Enel (Italy) • Humberto Forero Pedraza, Enel (Italy) • Federico Marmeggi, Enel (Italy) • Alessandro Erba, Enel (Italy) • Alfonso Rinaldini, Enel (Italy)

1617 **The Operational Performance and Benefits of an MVDC Device Integrated within a 33kV Distribution Network**

Jonathan Berry, Western Power Distribution (United Kingdom) • Yiango Mavrocostanti, Western Power Distribution (United Kingdom)

1642 **Smart Common utility duct system for Under Ground Power Cables.**

ROBIN KUMAR GIRI, Tata Power Company Limited (India) • Dhiren Pandya, Tata Power Company Limited (India) • Muraleedharan T, Tata Power Company Limited (India) • Sanket Bendkhale, Tata Power Company Limited (India)

1689 **Experience on diagnosis of MV cable in wind farm**

Dae-jin Park, LS Cable & Systems (Korea, Republic of) • Chung-hwan Lee, LS Cable & Systems (Korea, Republic of) • Hyeon-seok Lee, LS Cable & Systems (Korea, Republic of) • Jung-ji Kwon, LS Cable & Systems (Korea, Republic of) • Jin-wook Choi, LS Cable & Systems (Korea, Republic of) • Seok-hyun Nam, LS Cable & Systems (Korea, Republic of)

1696 **Comparison of different thermal models for optimized dimensioning of HV cable cluster grids as means of efficient integration of large scale renewable DER**

Sebastian Wingender, E.DIS Netz GmbH (Germany) • Steffen Trinks, Technische Universität Berlin (Germany) • Gerd Wessolek, Technische Universität Berlin (Germany) • Stefan Dorendorf, E.DIS Netz GmbH (Germany)

1784 **Smart Metering 2G – Evolution of a Smart Metering experience**

Alessandro Pitì, e-distribuzione (Italy) • Antonio Cammarota, E-distribuzione Spa (Italy) • Gianni Ceneri, e-distribuzione (Italy) • Alessandra Boscagin, e-distribuzione (Italy) • Daniele Mardero, e-distribuzione (Italy) • Antonio Signorini, e-distribuzione (Italy)

1837 **Benchmarking Linear and Non-Linear Behaviour of Power Inductors for Switched Mode Power Supplies**

Markus Makoschitz, AIT Austrian Institute of Technology GmbH (Austria) • Jon Berrotaran, AIT Austrian Institute of Technology GmbH (Austria) • Sumanta Biswas, AIT Austrian Institute of Technology GmbH (Austria)

1921 **Numerical simulations of a new desing of pin insulators**

Alessandro Dadam, Celesc Distribuição S.A. (Brazil) • Aline Salum, Lactec (Brazil) • Signie Santos, Lactec (Brazil) • Guilherme Silva, Lactec (Brazil) • Vitoldo Filho, Lactec (Brazil) • Edemir Kowalski, Lactec (Brazil) • Rodrigo Quadros, Lactec (Brazil) • Fábio Richart, Lactec (Brazil)

1944 **Improve underground cabling projects by designing a special spacer**

Saeed Abachizadeh, Tabriz Power Distribution Company (Iran, Islamic Republic of) • Ali Sabzikari, Tabriz electric power distribution company (Iran, Islamic Republic of) • Jafar farshbaf hamed, Tabriz electric power distribution company (Iran, Islamic Republic of)

2050 **Fault current limiting circuit breaker in distribution systems**

Magnus Backman, ABB Corporate Research (Sweden) • Thomas Eriksson, ABB Corporate Research (Sweden) • Tobias Hintzen, ABB AG (Germany) • John Moutafidis, UK Power Networks (United Kingdom)

2059 **Research on the improved fault current limiter based on high coupled split reactor**

Kaijian WU, State Key Laboratory of Advanced Electromagnetic Engineering and Technology (China) • Zhao YUAN, State Key Laboratory of Advanced Electromagnetic Engineering and Technology (China) • Lixue CHEN, State Key Laboratory of Advanced Electromagnetic Engineering and Technology (China) • Junjia HE, State Key Laboratory of Advanced Electromagnetic Engineering and Technology (China) • Yuan PAN, State Key Laboratory of Advanced Electromagnetic Engineering and Technology (China) • Jingjing YE, State Key Laboratory of Advanced Electromagnetic Engineering and Technology (China)

2167 **Technical Recommendations for Implementation of Dynamic Cable Rating System – Cable Modelling**

Ali Kazerooni, WSP (United Kingdom) • Cameron Scott, WSP (United Kingdom) • David Ruthven, SP Energy Networks (United Kingdom) • Watson Peat, SP Energy Networks (United Kingdom)

2316 **Aerial MV Covered Networks : worth a new look?**

Robert Battle, Sicame (Australia) • Rajesh Khanna, Sicame (India) • Blaise Beauger, Sicame (France) • Damien Jeanneau, Sicame (France)

Poster Tour PT14

Block 4: Innovation in Network Components – Substations, switchgear and transformers

5 June 2019 from 14:30 to 16:00
5 June 2019 from 16:30 to 18:00

Poster Area

28 **SF6 Alternative – What to learn from the high voltage experience**

yannick KIEFFEL, GE Grid Solutions (France) • Arnaud Ficheux, GE Grid Solutions (France) • Robert Luescher, GE Grid Solutions (Switzerland) • Elodie Laruelle, GE Grid Solutions (France) • Louis Maksoud, GE Grid Solutions (France)

259 **Integrated dual voltage sensors based reclosers improving power distribution in developing countries**

Vijay Shah, ABB India Ltd. (India) • Vikas Jakate, ABB India Ltd. (India) • Gary Foubert, ABB SPA (Italy) • Luca Fornasari, ABB SPA (Italy)

340 **Comparison of SF6-free load-break switching principles**

Martin Schaak, SIEMENS AG (Germany) • Kristian Ermeler, SIEMENS AG (Germany) • Marvin Bendig, RWTH Aachen (Germany) • Thomas Krampert, RWTH Aachen (Germany)

376 **Endurance Life Prediction of Gas-Insulated Circuit Breaker and Spring Operating Mechanism Components**

JaeHo Jeong, LSIS (Korea, Republic of) • KwangJin Ko, LSIS (Korea, Republic of) • SungJun Tak, LSIS (Korea, Republic of) • HeeSub Ahn, LSIS (Korea, Republic of) • JongUng Choi, LSIS (Korea, Republic of) • Young-Geun Kim, LSIS Co., Ltd. (Korea, Republic of) • Min Jee Kim, LSIS Co., Ltd. (Korea, Republic of)

380 **Arc phenomena and method of arc extinction in air circuit breaker**

Woojin Park, LSIS Co., Ltd. (Korea, Republic of) • Young Kook Kim, LSIS Co., Ltd. (Korea, Republic of) • Sangchul Lee, LSIS Co., Ltd. (Korea, Republic of) • Kil-Young Ahn, LSIS Co. (Korea, Republic of) • Young-Geun Kim, LSIS Co., Ltd. (Korea, Republic of)

398 **Integration, Analysis and Optimization of Components in Secondary Substations for e-Mobility**

Carlos Nieto, ABB (Estonia) • Danel Türk, ABB (Estonia) • Tiit Simonlatser, ABB (Estonia)

511 **ASSESSING POSSIBLE ALTERNATIVES TO SF6 IN MV SWITCHGEAR**

José Manuel Inchausti, Ormazabal (Spain) • Jesús Izcara, Ormazabal (Spain) • Javier Larrieta, Ormazabal (Spain) • Sergio Sebastián, Ormazabal (Spain)

557 **Hardware dependability study of an automatic circuit recloser**

Jaroslav Snajdr, Schneider Electric (Germany) • Marc Ferrazzi, Schneider Electric (France) • Pavel Novak, Schneider Electric (Germany) • Laurence Amigues, Schneider Electric (France)

561 **Comparison of alternatives to SF6 regarding EHS and end of life**

Romain Maladen, Schneider Electric (France) • Christophe Prevé, Schneider Electric (France) • Daniel Piccoz, SASU Daniel PICCOZ (France)

596 **Fully motorised cubicle leads to more safe, reliable and easy to use AIS switchgear.**

Philippe BRUN, Schneider-electric (France) • Venanzio FERRARO, Schneider-electric (Italy) • Jean-Pierre MELEY, Schneider-electric (France)

617 **Reliable Arc Flash Damage Mitigating System In MV Switchgear**

Young-Woo Jeong, LSIS Co. (Korea, Republic of) • Hyun-Wook Lee, LSIS Co. (Korea, Republic of) • Seog-Won Lee, LSIS Co. (Korea, Republic of) • Kil-Young Ahn, LSIS Co. (Korea, Republic of) • Young-Geun Kim, LSIS Co., Ltd. (Korea, Republic of)

678 **High-Voltage Fuses - Next Generation with Improved Performance**

Dirk Wilhelm, SIBA GmbH (Germany) • Dr. Jens Weber, SIBA GmbH (Germany) • Johannes-Georg Gödeke, SIBA GmbH (Germany)

770 **Innovative SF6 free switch with shunt vacuum interuption technology**

Christophe Prevé, Schneider Electric (France) • Romain Maladen, Schneider Electric (France) • François TRICHON, Schneider-Electric (France) • Daniel Piccoz, SASU Daniel PICCOZ (France)

771 **Dielectric stress, design and validation of MV switchgear**

Christophe Prevé, Schneider Electric (France) • Romain Maladen, Schneider Electric (France) • Garret DAKIN, SCHNEIDER-ELECTRIC (United Kingdom) • Francois GENTILS, SCHNEIDER-ELECTRIC (France) • Daniel Piccoz, SASU Daniel PICCOZ (France)

874 **Decomposition and Electrical strength of C5-PFK/Air and C4-PFN/Air mixtures as possible SF6 substitute gases**

Guopei Wu, Guangzhou Power Supply Bureau Co., Ltd (China) • Wenxiong Mo , Guangzhou Power Supply Bureau (China) • Libo Lin, Guangzhou Power Supply Bureau Co., Ltd (China) • Qingdan Huang, Guangzhou Power Supply Bureau Co., Ltd (China) • Haoyong Song, Guangzhou Power Supply Bureau Co., Ltd (China) • Weiyan Liao, Guangzhou Power Supply Bureau Co., Ltd (China) • Chentao Li, Guangzhou Power Supply Bureau Co., Ltd (China)

883 **High Performance Smart MV apparatus for arc furnace applications**

Andrea Bianco, ABB spa (Italy) • Bill Brewer, NUCOR SMG P (USA) • Martin Štefanka, ABB (Czech Republic) • Marco Riva, ABB spa (Italy)

967 **Comparison and selection of accelerated corrosion test protocol for Gas Insulated Switchgear**

Keyur TANDEL, Schneider Electric (India) • Thierry Cormenier, Schneider Electric (France) • Juan CARLOS PEREZ QUESADA, Schneider Electric (Spain)

1031 **RMU with Eco-Efficient Gas Mixture: Evaluation after 3 years of Field Experience**

Martin Kristoffersen, ABB (Norway) • Maik Hyrenbach, ABB AG (Germany) • Denny Harmsen, Alliander (Netherlands) • Theo Van Rijn, Liander (Netherlands) • Robert Vosse, Qirion (Netherlands)

1035 **Magnetic Fluid Seal for Switchgear**

RAO Yi, Guangzhou Power Supply Company, China Southern Grid (China) • GAN Lin, Guangzhou Power Supply Company, China Southern Grid (China) • MA Jieran, Guangzhou Power Supply Company, China Southern Grid (China) • LUO Linhuan, Guangzhou Power Supply Company, China Southern Grid (China) • YAN Xiaohui, Guangzhou Power Supply Company, China Southern Grid (China) • HAO Fangzhou, Guangzhou Power Supply Company, China Southern Grid (China) • SHEN Chao, Guangzhou Power Supply Company, China Southern Grid (China)

1084 **Eco-efficient puffer-type load break switch for medium voltage applications**

Elham Attar, ABB AS (Norway) • Magne Saxegaard, ABB (Norway) • Maik Hyrenbach, ABB AG (Germany) • Pouria Homayonifar , ABB (Norway) • Tor Bratsberg, ABB (Norway) • Ole Granhaug, ABB (Norway) • Nina Støa-Aanensen, Sintef (Norway) • Erik Jonsson, Sintef (Norway)

1100 **Smart Switchgear for Extreme Installation Environments**

Blair Kerr, G&W Electric Co. (USA) • Janet Ache, G&W Electric Co. (USA) • Nenad Uzelac, G&W Electric Co. (USA) • Stephen Linn, G&W Electric Co. (USA)

1346 **Emission Reductions through use of Sustainable SF6 Alternatives**

John Owens, 3M (USA) • Ang Xiao, 3M (USA) • Jason Bonk, 3M (USA)

1552 **An Enel-ABB partnership to develop an eco-sustainable alternative to SF6 for MV switchgears, dimensionally compatible with existent apparatus using SF6**

Luciano Chenet, ABB SPA (Italy) • Maik Hyrenbach, ABB AG (Germany) • Elham Attar, ABB AS (Norway) • Ivano Gentilini, Enel Global Infrastructure & Networks s.r.l. (Italy) • Luca Giansante, e-distribuzione S.p.A. (Italy)

1625 **Performance of Synthetic Ester and Mineral Oil in an Experimental Study of Impregnation of Cellulose Insulation Papers used in power transformers**

Inmaculada Fernández, University of Cantabria (Spain) • Jaime Sanz, University of Cantabria (Spain) • Carlos J. Renedo, University of Cantabria (Spain) • Felix Ortiz, University of Cantabria (Spain) • Ernesto Iván Diestre, Repsol Technology Center (Spain) • Ismael Vela, Repsol Technology Center (Spain)

1637 **Advanced Finite Element calculation of losses due to the harmonic content of current and design optimization of High Voltage distribution transformers**

SERGIO BARRIO, ORMAZABAL CORPORATE TECHNOLOGY (Spain) • ALVARO ORTIZ, ORMAZABAL COTRADIS (Spain) • PABLO CIRUJANO, ORMAZABAL COTRADIS (Spain) • VICENTE AUCEJO, INDIELEC (Spain)

1646 **Start&Stop system for more efficient Smart Transformers at renewable power plants. Beyond the Ecodesign Directive.**

LUIS DEL RIO ETAYO, ORMAZABAL CORPORATE TECHNOLOGY (Spain) • BITTOR VILLAMERIEL, ORMAZABAL CORPORATE TECHNOLOGY (Spain) • IBON LARRACOECHEA, ORMAZABAL CORPORATE TECHNOLOGY (Spain) • RAFAEL AGUNSO, ORMAZABAL CORPORATE TECHNOLOGY (Spain) • PABLO CIRUJANO, ORMAZABAL COTRADIS (Spain)

1654 **Using smart distribution transformers to reduce both industrial energy consumption and peak demand by means of a CVR strategy**

IBON LARRACOECHEA, ORMAZABAL CORPORATE TECHNOLOGY (Spain) • ALENA ULASENKA, ORMAZABAL CORPORATE TECHNOLOGY (Spain) • LUIS DEL RIO ETAYO, ORMAZABAL CORPORATE TECHNOLOGY (Spain) • PABLO CIRUJANO, ORMAZABAL COTRADIS (Spain)

1714 **Pilot of an environmentally friendly SF6-free MV switchgear technology and assessment of sensor technologies**

Bastian Wölke, Westnetz GmbH (Germany) • Manjunath Ramesh, Nuventura GmbH (Germany) • Anna Carina Schneider, Westnetz GmbH (Germany) • David Jebamony, Nuventura GmbH (Germany)

1845 **Comparative Study on Turbulent Flow Structure under Air, CO2 and SF6 Gas Blasting Visualized by Band-Pass Filtering Schlieren System**

Yuki Inada, Saitama University (Japan) • Hiroyuki Nagai, The University of Tokyo (Japan) • Akiko Kumada, The University of Tokyo (Japan) • Kunihiko Hidaka, The University of Tokyo (Japan) • Yuki Demura, Kanazawa University (Japan) • Yu Tabata, Kanazawa University (Japan) • Yasunori Tanaka, Kanazawa University (Japan) • Tomoyuki Nakano, Central Research Institute of Electric Power Industry (Japan)

1862 **Adaptation of the Thermal Network Method (TNM) for use in low-voltage switchgear and controlgear assemblies**

Robert Adam, IEEH Technische Universität Dresden (Germany) • Julian Heger, IEEH Technische Universität Dresden (Germany)

1909 **Decomposition of SF6-free gas mixturesby energy impacts**

Achim KALTER , SIEMENS AG (Germany) • Karsten ESSER-RANK, SIEMENS AG (Germany) • Florian KESSLER, SIEMENS AG (Germany) • Henning MILNIKEL, SIEMENS AG (Germany) • Daniel PESCH , SIEMENS AG (Germany) • Roland POHLE, SIEMENS AG (Germany)

2053 **Fast recovery adaptable transformer for renewable generation**

Pablo Pacheco, ABB (Spain) • Miguel Cuesto, ABB (Spain) • Ignacio CAMPOS, IBERDROLA Renovables (Spain) • Oscar HERNÁNDEZ , IBERDROLA Renovables (Spain) • Jesús MARCOS, IBERDROLA Renovables (Spain)

2058 **Improving System Safety and Reliability with Solid Dielectric Switchgear**

Kennedy Darko, G&W Electric Co. (USA) • Alexander Beierlein, G&W Electric Co. (USA) • Stefan Micic, G&W Electric Co. (USA)

2078 **A New Medium Voltage Circuit Breaker Type for the ANSI Market**

Predrag Milovac, IEM (USA)

2108 **Innovative insulation materials helping in cost reduction of modern transformers**

Radoslaw Szewczyk, DuPont (Poland) • Richard Marek, DuPont (USA) • Giorgio Vercesi, DuPont (Switzerland) • Jean-Claude Duart, DuPont (Switzerland) • Robert Casey Ballard, DuPont (USA)

2116 **Assessment and Development of Stability Enhancing Methods for Dynamically Changing Power Hardware-in-the-Loop Simulations**

Efren Guillo-Sansano, University of Strathclyde (United Kingdom) • Mazheruddin Hussain Syed, University of Strathclyde (United Kingdom) • Andrew Roscoe, Siemens Gamesa Renewable Energy (United Kingdom) • Graeme M. Burt , University of Strathclyde (United Kingdom)

2173 **Technical requirements of Smart Transformer for Deployment in Grid Application**

Ali Kazerooni, WSP (United Kingdom) • Giovanni De Carne, Kiel University (Germany) • Markus Andersen, Kiel University (Germany) • Marco Liserre, Kiel University (Germany) • Michael Eves, SP Energy networks (United Kingdom) • James Yu, SP Energy networks (United Kingdom)

Session 2 Power quality and electromagnetic compatibility

Poster Tour PT21

Block 1: Electric and magnetic fields, grounding, transients and immunity of systems

4 June 2019 from 09:00 to 10:30

Poster Area

35 **Temperature and voltage distortion analysis in LED lamps**

Elena Gutiérrez Ballesteros, University of Cordoba (Spain) • Aurora Gil de Castro, University of Cordoba (Spain) • Sarah Rönnberg, Luleå University of Technology (Sweden) • Selcuk Sakar, Luleå University of Technology (Sweden)

156 **IMPACT OF INSTALLATION PHOTOVOLTAIC CELLS ON ELECTROMAGNETIC FIELDS AND ELECTRICAL PARAMETERS**

Mohammad Atia, North Delta Electricity Distribution Company (Egypt) • Kamelia Youssef, Ministry of Electricity and Renewable Energy (Egypt)

226 **Frequency Response Test and Key Parameter Estimation of Oil-immersed Capacitive Voltage Transformer**

Mingxing Zhu, Anhui University (China) • Yadong JIAO, Anhui University (China) • Wei Huang, Asian Power Quality Initiative (China) • Qing Zhong, South China University of Technology (China) • Jan Meyer, Technische Universitaet Dresden (Germany)

367 **40 MW Photovoltaic Power Plant's Earthing System Design – New Challenges for an Integrated Methodology**

Carlos Cardoso, EDP Labelec (Portugal) • Andreia Leiria, EDP Labelec (Portugal)

519 **Analysis of effects of harmonics generated by PCS on the protection devices of ungrounded distribution systems**

Su-Hyeong Jang, LSIS Co., Ltd. (Korea, Republic of) • Kyung-Won Park, LSIS Co., Ltd. (Korea, Republic of) • Young-Geun Kim, LSIS Co., Ltd. (Korea, Republic of)

550 **Measurement of Earth Fault Current and Earth Potential Rise on Live HV Systems**

Mark Davies, RINA Consulting (United Kingdom) • Robert Weller, RINA Consulting (United Kingdom) • Paul Jones, RINA Consulting (United Kingdom) • Stephen Tucker, UK Power Networks (United Kingdom) • Hao Guo, Power Networks Demonstration Centre (United Kingdom)

611 **Underground Power Cables Magnetic Field effects on Human Health**

Ahmad Anany, North Delta Electric Distribution Company (Egypt)

628 **Analyzing And Investigation of Lightning Overvoltage on Distribution Transformers Considering Case Study in SOLTANIH-ZANJAN**

hassan emami, ZANJAN electrical distribution company (Iran, Islamic Republic of) • Hossein Kaboli, ZANJAN electrical distribution company (Iran, Islamic Republic of) • Hossein Emami, ZANJAN electrical distribution company (Iran, Islamic Republic of)

699 **Influence of NSDD phenomenon on power quality after breaking of vacuum circuit-breaker**

Guangwei FAN, Xi'an High Voltage Apparatus Research Institute Co., Ltd. (China) • Gang LI, Xi'an High Voltage Apparatus Research Institute Co., Ltd. (China) • Haojun LIU, Xi'an High Voltage Apparatus Research Institute Co., Ltd. (China) • Shi HUANG, Xi'an High Voltage Apparatus Research Institute Co., Ltd. (China) • Zhaoyang ZHANG, Xi'an High Voltage Apparatus Research Institute Co., Ltd. (China)

763 **Immunity Assessment of Household Appliances in the Frequency Range from 2 to 150 kHz**

Victor Khokhlov, Technische Universitaet Dresden (Germany) • Jan Meyer, Technische Universitaet Dresden (Germany) • Peter Schegner, Technische Universitaet Dresden (Germany) • Daniel Agudelo-Martínez, Universidad Nacional de Colombia (Colombia) • Andrés Pavas, Universidad Nacional de Colombia (Colombia)

765 **Light intensity immunity performance of LED street lamps under power quality disturbances**

Selcuk Sakar, Luleå University of Technology (Sweden) • Sarah Rönnberg, Luleå University of Technology (Sweden) • Math Bollen, Luleå University of Technology (Sweden)

822 **Global Earthing System Characterisation of an Actual UK Distribution Network**

Paul Jones, RINA Consulting (United Kingdom) • Mark Davies, RINA Consulting (United Kingdom) • Robert Weller, RINA Consulting (United Kingdom) • Stephen Tucker, UK Power Networks (United Kingdom)

843 **FAST CALCULATION OF DC-BIASED UHV TRANSFORMER**

Huan Wang, State Grid Shanghai Qingpu electric power supply company (China)

965 **Derating method for dry type power transformers based on currentdistortion parameters**

Bart Verhelst, Ghent University (Belgium) • Johan Rens, School for Electronic and Electrical Engineering, North-West University (NWU) (South Africa) • Jan Desmet, Ghent University – Research Group EELAB/Lemcko (Belgium)

1096 **Active and passive shield for aerial power lines**

aldo canova, Politecnico di Torino (Italy) • Luca Giaccone, Politecnico di Torino (Italy) • Vincenzo Cirimele, Politecnico di Torino (Italy)

1104 **Assessment of EMF-Exposure in Residences due to PLC-based Smart Metering**

Gernot Schmid, Seibersdorf Laboratories (Austria) • Andreas Abart, Netz Oberösterreich GmbH (Austria)

1168 **Understanding the harmonic performance of voltage transformers for distribution system power quality monitoring**

Vidyadhar Peesapati, The University of Manchester (United Kingdom) • Richard Gardner, The University of Manchester (United Kingdom) • James King, Nortech Management Ltd (United Kingdom) • Samuel Jupe, Nortech Management Ltd (United Kingdom) • Jonathan Berry, Western Power Distribution (United Kingdom)

1213 **Identifying ground faults on a TT grounded systemwith a 9 channel PQ analyser**

Andrew Sagl, Megger (USA)

1231 **Towards an integral EMC test of intelligent Ring Main Units**

Sjoerd Nauta, Alliander (Netherlands) • Ramiro Serra, TU Eindhoven (Netherlands) • Benjamin Baum, DNVGL (New Zealand) • Maarten van Riet, Alliander (Netherlands)

1320 **Magnetic shielding of power supply of electric glass oven**

aldo canova, Politecnico di Torino (Italy)

1383 **How the observed declining strength of Distribution Earthing Networks will impact the risk exposure of power utilities**

Darren Woodhouse, Safearth Consulting (Australia) • Stephen Palmer, Safearth Consulting (Australia)

1415 **Earthing System Testing Methods - Historic Approaches & Recent Developments**

Stephen Palmer, Safearth Consulting (Australia) • Darren Woodhouse, Safearth Consulting (Australia)

1619 **EXPERIMENTAL INVESTIGATION OF FERRORESONANCE AND MITIGATION MEASURES IN 35 KV ISOLATED NETWORKS**

Maja Muftić Dedović, University of Sarajevo, Faculty of Electrical Engineering (Bosnia and Herzegovina) • Adnan Mujezinović, University of Sarajevo, Faculty of Electrical Engineering (Bosnia and Herzegovina) • Nedim Turković, EPC Elektroprivreda of Bosnia and Herzegovina (Bosnia and Herzegovina) • Nedis Dautbašić, University of Sarajevo, Faculty of Electrical Engineering (Bosnia and Herzegovina) • Irfan Turković, University of Sarajevo, Faculty of Electrical Engineering (Bosnia and Herzegovina) • Amir Tokić, University of Tuzla, Faculty of Electrical Engineering (Bosnia and Herzegovina) • Zijad Bajramović, University of Sarajevo, Faculty of Electrical Engineering (Bosnia and Herzegovina)

1624 **Assessment of Smart Meter Communication Over PLC PRIME in a Laboratory Simulating a Real Grid**

Pedro Arsenio, EDP Labelec (Portugal) • Marco Silva, EDP Labelec (Portugal) • Diogo Ribeiro, EDP Labelec (Portugal) • Roberto Barros, EDP Labelec (Portugal) • Pedro Nunes, EDP Distribuição (Portugal)

1671 **Occupational EMF-Exposure: A Simple Guide for Testing Compliance with Requirements of Directive 2013/35/EU**

Andreas Abart, Netz Oberösterreich GmbH (Austria) • Ernst Schmautzer, TU Graz (Austria) • Wolfgang Emmer, TU Graz (Austria) • Katrin Friedl, APG (Austria) • Rudolf Mörk Mörkenstein, IES (Austria)

1700 **Estimation of stray current impact on electrical earthing systems**

Aurel Garry, EDF R&D (France) • Sarah Nasr, EDF R&D (France)

1750 **Earthing design incorporating risk quantification – an expensive overhead or key decision-making tool?**

William (Bill) Carman, Bill Carman Consulting (Australia) • Stephen Palmer, Safearth Consulting (Australia)

2040 **IDENTIFICATION AND OPTIMIZATION OF THE SEQUENCE OF PARALLEL CONDUCTORS USING AN AUTOMATIC TOOL**

aldo canova, Politecnico di Torino (Italy) • Luca Giaccone, Politecnico di Torino (Italy) • Vincenzo Cirimele, Politecnico di Torino (Italy)

2091 **Case study of the implementation of cross-bonding to underground long medium voltage cables in wind parks**

Elefterios Kalogrianitis, National Technical University of Athens (Greece) • Katerina Damianaki, National Technical University of Athens (Greece) • Christos Christodoulou, National Technical University of Athens (Greece) • Theofilos Papadopoulos, Democritus University of Thrace (Greece) • Ioannis Gonos, National Technical University of Athens (Greece)

2119 **Simplified Magnetic Field Evaluation for Workers with Conductor Loops**

Katrin Friedl, APG (Austria) • Andreas Abart, Netz Oberösterreich GmbH (Austria) • Ernst Schmautzer, TU Graz (Austria) • Wolfgang Emmer, TU Graz (Austria)

2230 **New methodology for on-site measurement of Voltage Transformer magnitude and phase ratio as a function of frequency**

Joseph Melone, University of Strathclyde (United Kingdom) • Federico Coffele, University of Strathclyde (United Kingdom)

Poster Tour PT22

Block 2: Power Quality issues of new technologies

4 June 2019 from 11:00 to 12:30

Poster Area

9 **Passive Mitigation Technique for the Harmonics Caused by LED Lamps**

Abdelrahman Akila, South Delta for Electricity Distribution Company (Egypt) • Mohamed Etman, South Delta for Electricity Distribution Company (Egypt) • Kamelia Youssef, Ministry of Electricity and Renewable Energy (Egypt)

92 **Harmonic Analysis of Electrical Vehicle Fast-charging Station Considered Uncertainty of Load**

Pan Hu, State Grid Hubei Electric Power Research Institute (China) • Yuchuan Hu, State Grid Hubei Electric Power Research Institute (China) • Kai Ding, State Grid Hubei Electric Power Research Institute (China) • Yimin QIAN, State Grid Hubei Electric Power Research Institute (China)

105 **Investigating Increased Error of Measurement Meters in Smart Grids in Presence of high frequency harmonics (Supra-Harmonic) of distributed generation sources**

Javad Behkesh Noshahr, Ardabil Province Electricity Distribution Company (Iran, Islamic Republic of)

222 **Novel Circuit to Compensate the Effect of Source Open Circuit Fault in Distributed Generation System**

Maged N. F. Nashed, Electronics Research Institute (Egypt) • Mona Eskander, Electronics Research Institute (Egypt)

237 **Characterization of Interactions between PV systems and energy efficient lighting (LED)**

Vineetha Ravindran, Luleå University of Technology (Sweden) • Tatiano Busatto, Luleå University of Technology (Sweden) • Sarah Rönnberg, Luleå University of Technology (Sweden) • Math Bollen, Luleå University of Technology (Sweden) • Jan Meyer, Technische Universitaet Dresden (Germany)

287 **A Robust D-FACTS Based Metaheuristic Control System for Battery Charging Scheme**

Ahmed Omar, Electrical Power and Machines, High Institute of Engineering (Egypt) • Shady H. E. Abdel Aleem, 15th of May Higher Institute of Engineering, Mathematical and Physical Sciences (Egypt) • Essam E. A. El-Zahab, Electrical Power and Machines Engineering, Cairo University (Egypt) • Fahmy Bendary, Faculty of Engineering Shoubra, Benha University (Egypt)

370 **Overvoltage due to single-phase and three-phase connected PV and what to do about it**

Enock Mulenga, Luleå University of Technology (Sweden) • Math Bollen, Luleå University of Technology (Sweden) • Nicholas Etherden, Vattenfall R&D (Sweden)

404 **Impact of PV on Harmonics in Low-Voltage Networks**

Sarah Rönnberg, Luleå University of Technology (Sweden) • Tatiano Busatto, Luleå University of Technology (Sweden) • Math Bollen, Luleå University of Technology (Sweden)

562 **Influence of PV plant 1 MWp connected on MV overhead line on voltage quality in PCC – case study**

Drago Bago, P.U Elektroprivreda HZ HB, Mostar (Bosnia and Herzegovina) • Ivan Ramljak, P.U Elektroprivreda HZ HB, Mostar (Bosnia and Herzegovina)

599 **Optimal Control of DVR to enhance the power quality of PV/Wind/Fuel cell hybrid system feeding a new community**

mohamed osama, housing and building research center (Egypt) • mohamed mosaad, higher technological institute (Egypt) • mahmoud al ahmar, shoubra faculty of engineering (Egypt) • adel mallawany, housing and building research center (Egypt) • Fahmy Bendary, Faculty of Engineering Shoubra, Benha University (Egypt)

667 **Description of the low frequency phenomena involved when connecting a 3 kW EV charger to the distribution network: modelling, validation and perspectives.**

Michel Rioual, EDF (France)

675 **Interharmonics and LED flicker: an assessment by CFD**

Jos Knockaert, Ghent University (Belgium) • Colin Debruyne, ATS (Belgium) • Jan Desmet, Ghent University – Research Group EELAB/Lemcko (Belgium)

738 **Power Quality Assessment of a Single Customer Micro Grid-Case Study**

Mohsen Zabihi, Mashhad Electric Energy Distribution Co. (MEEDC) (Iran, Islamic Republic of) • Naser Nakhodchi, Luleå University of Technology (Sweden) • Hashem Ghorbanpanah, Mashhad Electric Energy Distribution Co. (MEEDC) (Iran, Islamic Republic of) • Saeed Alishahi, Mashhad Electric Energy Distribution Co. (MEEDC) (Iran, Islamic Republic of) • Mohammad Alishahi, Islamic Azad University (Iran)

841 **PV Based Dynamic Voltage Restorer for Power Quality Enhancement in Distribution System**

Zeinab Elkady, Electronic Research Institute (Egypt) • Ahmed Ali Mansour, Electronic Research Institute (Egypt) • Naser Abdel-Rahim, Future University in Egypt (Egypt) • Mohsen Mohamed Elhagry, Electronic Research Institute (Egypt) • Fahmy Bendary, Faculty of Engineering Shoubra, Benha University (Egypt)

916 **Impact of Fast Charging Stations on Grid Quality**

Francisc Zavoda, IREQ(HQ) (Canada) • Rosmery Rozas , Hydro Quebec (Canada) • Jean-Luc Dupré, Hydro Quebec (Canada)

958 **Object Detection Based Power Quality Expert System for an Electric Vehicle Infrastructure**

Tim Streubel, University of Stuttgart, Institute of Power Transmission and High Voltage Technology (Germany) • Adrian Eisenmann, University of Stuttgart, Institute of Power Transmission and High Voltage Technology (Germany)

959 **Response of Rotor Over-Voltage in DFIG Based Wind Generator under Recurring Voltage Sags**

Jie Ren, Sichuan University (China) • Yang Wang, Sichuan University (China) • Xianyong Xiao, College of Electrical Engineering and Information Technology, Sichuan University (China) • Kai Liu, Sichuan University (China)

960 **Light flicker Performance of Low power LED Units**

Hend Salama, Higher Institute of Engineering & Technology (Egypt) • Fahmy Bendary, Faculty of Engineering Shoubra, Benha University (Egypt)

963 **PowerQuality improvement in a rural grid by grid storage system**

Johannes Ferstl, KNG-Kärnten Netz GmbH (Austria) • Herwig Renner, Graz University of Technology (Austria) • Stephan Brandl, KNG-Kärnten Netz GmbH (Austria)

1022 **Harmonic analysis and mitigation in distribution grids with high penetration of power inverters**

Stefan Schori, Bern University of Applied Sciences (Switzerland) • Michael Höckel, Bern University of Applied Sciences (Switzerland) • Luca Dalessandro, Schaffner Group (Switzerland) • Adrian Rupp, ewz (Switzerland) • Jürg Greuter, ewz (Switzerland) • Lukas Heiniger, Bern University of Applied Sciences BFH (Switzerland)

1032 **Strategies for Voltage Oscillation Mitigation in LV Distribution Networks with EV Smart Charging control**

Jorge Nájera, Universidad Politécnica de Madrid (Spain) • Hugo Mendonça, Universidad Politécnica de Madrid (Spain) • Rosa María de Castro, Universidad Politécnica de Madrid (Spain) • Jaime R. Arribas, Universidad Politécnica de Madrid (Spain)

1074 **Impact of Fast Charging and Home Charging Infrastructure for Electric Vehicles on the Power Quality of the Distribution Grid**

Michael Auer, ewz (Switzerland) • Evdokia Kaffe, ewz (Switzerland) • Raffael La Fauci, ewz (Switzerland)

1170 **An evaluation of V2G for distribution network harmonic suppression**

Preye Ivry, Nortech Management Limited (United Kingdom) • Jin Yang, Aston University (United Kingdom) • Jim Scott, Grid Edge Limited (United Kingdom) • Zhengyu Lin, Aston University (United Kingdom) • Clara Serrano, Aston University (United Kingdom) • Graham Gissing, Aston University (United Kingdom)

1356 **A Practical Case of Harmonic current Issues Operating a Small Rooftop PV Plant**

Dejan Matvoz, Elektroinstitut Milan Vidmar Ljubljana (Slovenia) • Matjaž Miklavčič, SODO - Electricity Distribution System Operator (Slovenia)

1409 **A Data-driven Harmonic Modeling Method for Electric Vehicle Charging Stations**

Yiming Liu, Huazhong University of Science and Technology (China) • Yan Li, Huazhong University of Science and Technology (China) • Jiaxin Ren, Huazhong University of Science and Technology (China) • Shaorong Wang, Huazhong University of Science and Technology (China) • Li Li, University of Technology Sydney (Australia)

1513 **An Analysis of Harmonic Disturbances in Distribution Systems Caused by Grid-Connected Inverters: Experimental Verification of High-Order Harmonic Resonance**

Naotaka Okada, CRIEPI (Japan) • Kenichiro Sano, Tokyo Institute of Technology (Japan) • Yoshichika Noda, CRIEPI (Japan) • Kentaro Fukushima, CRIEPI (Japan)

1527 **The Impact of LED Lighting Systems to the Power Quality and Recommendations for Installation Methods to Achieve the Expected Energy Efficiency**

Kalle Ruuth, Tampere University (Finland) • Antti Hilden, Tampere University (Finland) • Jenni Rekola, Tampere University (Finland) • Pertti Pakonen, Tampere University (Finland) • Pekka Verho, Tampere University (Finland)

1554 **Charging problems in EV paradise**

Henrik Kirkeby, PQA AS (Norway) • Vegard Bøe, Elbilforeningen (Norway) • Kjetil Hartvigsen, Hafslund Nett AS (Norway) • Ketil Sagen, Energi Norge AS (Norway)

1561 **LED technology in Public Lighting – Analysis of the impact in power quality in the low voltage grid distribution**

Pedro Veloso, EDP Distribuição (Portugal) • António Cardoso, EDP Distribuição (Portugal) • Fernando Bastião, EDP Distribuição (Portugal) • Nuno Melo, EDP Distribuição (Portugal) • Susana Morgado, EDP Distribuição (Portugal) • Bruno Gonçalves, EDP Distribuição (Portugal) • Rafael Tavares, EDP Distribuição (Portugal) • Fabrice Gonçalves, EDP Distribuição (Portugal)

1572 **Power Hardware-in-the-Loop Testbed for High Frequency Interdependency Issues of Inverter-Based Generation**

RON BRANDL, FRAUNHOFER IEE / DERlab e.V. (Germany) • Axel Seibel, Fraunhofer IEE (Germany) • Fabian Schnabel, Fraunhofer IEE (Germany) • Jonas Steffen, Fraunhofer IEE (Germany) • Marco Jung, Fraunhofer IEE (Germany) • Diana Strauss-Mincu, Fraunhofer IEE (Germany) • Michael Schmidhuber, Sumida Componetns & Modules GmbH (Germany) • Juan Montoya, Fraunhofer IEE (Germany)

1802 **How Photovoltaic Inverter Firmware Could Affect PQ**

Petr Bilik, VSB-TU Ostrava (Czech Republic) • Radek Martinek, VSB-TU Ostrava (Czech Republic) • Jan Vanus, VSB-TU Ostrava (Czech Republic) • Martin Kaspirek, E.ON Distribuce (Czech Republic)

1814 **Impact of Renewable Generation on the harmonic distortion in distribution networks: Key Findings of the German research project NetzHarmonie**

Max Domagk, Technische Universität Dresden (Germany) • Jan Meyer, Technische Universitaet Dresden (Germany) • Marko Mühlberg, FGW e. V. (Germany) • Florian Ackermann, Fraunhofer-Institute for Solar Energy (Germany) • Stefan Reichert, Fraunhofer-Institute for Solar Energy (Germany) • Marc Florian Meyer, Helmut-Schmidt-Universität (Germany) • Farhad Safargholi, Technische Universitaet Chemnitz (Germany) • Max Hoven, FGH e. V. (Germany)

1859 **Design and Control Strategy of Thyristor Voltage Regulator for Distribution Line Voltage Regulation for Expansion of Distributed Power Supply**

Hong-Moon Chae, Chungbuk university (Korea, Republic of) • Jung-Hun LEE, Chungbuk national university (Korea, Republic of) • Je-Chang Ryu, Chungbuk national university (Korea, Republic of) • Hong-Won LEE, Chungbuk national university (Korea, Republic of) • Seung-Gyu JEON, Chungbuk national university (Korea, Republic of) • Dong-Kyu KIM, Chungbuk national university (Korea, Republic of) • Jae Eon Kim, Chungbuk national university (Korea, Republic of)

1888 **Solar power plant in a modern office building: Power and power quality considerations**

Antti Hilden, Tampere University (Finland) • Pertti Pakonen, Tampere University (Finland) • Pekka Verho, Tampere University (Finland)

1895 **Modelling of harmonics produced by Compact Fluorescent Lamps in the frequency range 2-150 kHz**

Caroline Leroi, Université Catholique de Louvain (UCL) (Belgium) • Emmanuel De Jaeger, Université catholique de Louvain (UCLouvain) (Belgium)

2097 **Artificial neural network based UPQC controller for power quality improvement in Micro-grids**

Mohammad Amin Heidari, Shiraz Electrical Distribution company (SHEDC) (Iran, Islamic Republic of) • Ebadollah Ebadi, Shiraz Electrical Distribution company (SHEDC) (Iran, Islamic Republic of) • Mohammad Reza Mansourisaba, Shiraz Electrical Distribution company (SHEDC) (Iran, Islamic Republic of) • Yamin Rastroshan, Shiraz Electrical Distribution company (SHEDC) (Iran, Islamic Republic of) • Mina Sajadi, Shiraz Electrical Distribution company (SHEDC) (Iran, Islamic Republic of)

2234 **E-mobility impact on supply in distribution grid**

Martin Kurfiřt, E.ON Distribuce (Czech Republic) • Martin Kaspirek, E.ON Distribuce (Czech Republic) • Daniel Kouba, E.ON Distribuce (Czech Republic) • David Mezera, E.ON Distribuce (Czech Republic) • Jan Hlavnicka, E.ON Distribuce (Czech Republic)

2321 **DESIGNING A MICROGRID TO IMPROVE CONTINUITY OF SERVICE AND FLEXIBILITY THE CASE OF POLITECNICO DI MILANO LEONARDO CAMPUS**

Maurizio Delfanti, Politecnico di Milano (Italy) • Alessandro Blaco, Politecnico di Milano (Italy) • Filippo Bovera, Politecnico di Milano (Italy) • Mauro Pozzi, Politecnico di Milano (Italy) • Giuliana Invernizzi, SEL (Italy) • Giorgio Vielmini, SEL (Italy)

Poster Tour PT23

Block 3: Power Quality simulations, system studies, measurement and mitigation

4 June 2019 from 14:30 to 16:00

Poster Area

53 **Practical Case Study of Capacitor Oversizing in MV Distribution Networks using ETAP and Network Analyzer**

Abdullah Shaheen, SDEDCo, Ministry of Electricity (Egypt)

55 **Variations of supraharmonic emissions in low voltage networks**

Sarah Rönnberg, Luleå University of Technology (Sweden) • Aurora Gil de Castro, University of Cordoba (Spain) • Angela Espin Delgado, Luleå University of Technology (Sweden)

74 **HARMONICS CANCELLATION IN THE RESIDENTIAL DISTRIBUTION NETWORKS**

Ahmed Elhenawy, South Cairo Electricity Distribution (Egypt) • Mahmoud Gilany, Faculty of Engineering, Cairo University (Egypt) • Kamelia Youssef, Ministry of Electricity and Renewable Energy (Egypt)

86 **Optimal Harmonic Passive Filters for Power Factor Correction, Harmonic Mitigation and Electricity Bill Reduction Using Dragonfly Algorithm**

Sherif Ismael, Engineering for the Petroleum and Process Industries (Enppi) (Egypt) • Shady H. E. Abdel Aleem, 15th of May Higher Institute of Engineering, Mathematical and Physical Sciences (Egypt) • Almoataz Abdelaziz, Faculty of Engineering and Technology, Future University in Egypt (Egypt) • Fahmy Bendary, Faculty of Engineering Shoubra, Benha University (Egypt)

119 **Empirical end-device disturbance recognition by waveform feature learning models**

Sang-keun Moon, Korea Electric Power Cooperation (KEPCO) (Korea, Republic of) • Jong-man Joung, Korea Electric Power Cooperation (KEPCO) (Korea, Republic of) • Byungsung Lee, KEPCO Research Institute (Korea, Republic of) • Jin-o Kim, Hanyang University (Korea, Republic of)

123 **Fault Ride Through in PMSM Drive Based on Dynamic Voltage Restorer and Ultracapacitor**

Maged N. F. Nashed, Electronics Research Institute (Egypt) • Mona Eskander, Electronics Research Institute (Egypt)

134 **Inter-Area Power Oscillations Mitigation for Electrical Systems Via Novel Fuzzy Control Based Braking Resistor Model**

Mohamed Fayez, Cairo Electricity Production Company (Egypt) • Mohamed Mandor, Faculty of Engineering Shoubra, Benha University (Egypt) • Mohamed El-Hadidy, Egyptian Electricity Holding Company (EEHC) (Egypt) • Fahmy Bendary, Faculty of Engineering Shoubra, Benha University (Egypt)

155 **Railway Power Conditioner With Parallel Quasi-resonant Controller**

le zhao, State Grid Shanghai Electric Power Company Electric Power Research Institute (China) • Ying-hui YU, State Grid Shanghai Electric Power Company Electric Power Research Institute (China) • Yi-long CAO, Shanghai University of Electric Power (China) • Qiang GUO, State Grid Shanghai Electric Power Company Electric Power Research Institute (China)

213 **ENHANCEMENT OF DISTRIBUTION NETWORKS PERFORMANCE USING POWER FILTER/COMPENSATOR**

Abdelazeem Abdelsalam, Suez Canal University (Egypt) • Almoataz Abdelaziz, Ain Shams University (Egypt) • Fahmy Bendary, Faculty of Engineering Shoubra, Benha University (Egypt)

416 **Modelling the propagation of harmonic voltages in large medium voltage distribution networks**

Adnan Bosovic, Public Electric Utility Elektroprivreda of Bosnia and Herzegovina (Bosnia and Herzegovina) • Herwig Renner, Graz University of Technology (Austria) • Andreas Abart, Netz Oberösterreich GmbH (Austria) • Ewald Traxler, Netz Oberösterreich GmbH (Austria) • Jan Meyer, Technische Universitaet Dresden (Germany) • Max Domagk, Technische Universität Dresden (Germany) • Mustafa Music, Public Electric Utility Elektroprivreda of Bosnia and Herzegovina (Bosnia and Herzegovina)

426 **A Multiple Harmonic Source Localization Method based on Data Analysis**

Xian Zheng, College of Electrical Engineering and Information Technology, Sichuan University (China) • Xianyong Xiao, College of Electrical Engineering and Information Technology, Sichuan University (China) • Shuangting Xu, College of Electrical Engineering and Information Technology, Sichuan University (China) • Ying Wang, College of Electrical Engineering and Information Technology, Sichuan University (China) • Yiran Li, College of Electrical Engineering and Information Technology, Sichuan University (China) • Huaying Zhang, Shenzhen Power Supply Bureau, Shenzhen 518001 China (China)

475 **Multi –harmonic source decoupling algorithm and treatment in the radial distribution network**

Zhimin Huang, Guangzhou Power Supply Company Limited (China) • Ming Qi, Guangzhou Power Supply Company Limited (China) • Yanlong Yang, Guangzhou Power Supply Company Limited (China)

483 **Application of adaptive EEMD method in voltage sag detection**

Jie SONG, State Grid Shanghai EPRI (China) • Qishi XIAO, State Grid Shanghai EPRI (China) • Ling PAN, State Grid Shanghai EPRI (China) • Yongjun JIN, Liandi(Nanjing) Information Systems Co., Ltd. (China) • Zengyun MA, Liandi(Nanjing) Information Systems Co., Ltd. (China)

485 **Comprehensive Evaluation of Voltage Sags Based on Grid and Device Sensitivity Analysis**

Ruochen Duan, Shanghai Municipal Electric Power Company (China) • Yiwen Zuo, Shanghai Municipal Electric Power Company (China) • Yanjun Chen, Shanghai Municipal Electric Power Company (China)

582 **Analysis of Harmonic Distortion Levels on Alexandria Distribution Network**

Hanaa Karawia, Alex. Electricity Distribution Co (Egypt) • Maha Ali, Alex. Electricity Distribution Co (Egypt)

647 **Design of versatile waveform platform for supraharmonic testing and calibration**

Deepak Amaripadath, LNE & FEMTO-ST, CNRS, Univ. Bourgogne Franche-Comté, UTBM (France) • Robin Roche, FEMTO-ST, CNRS, Univ. Bourgogne Franche-Comté, UTBM (France) • Jean-Pierre Braun, METAS (Switzerland) • Loïc Joseph-Auguste, EDF (France) • Daniela Istrate, LNE (France) • Dominique Fortuné, LNE (France) • Fei Gao, FEMTO-ST, CNRS, Univ. Bourgogne Franche-Comté, UTBM (France)

677 **Efficient open-source power quality analyser and smart meter**

Francisco G. Montoya, Universidad de Almeria (Spain) • Raul Baños, Universidad de Almeria (Spain) • Alfredo Alcayde, Universidad de Almeria (Spain) • Francisco Arrabal, Universidad de Almeria (Spain)

830 **Impact of Distributed Energy Resources on resonance conditions and harmonic amplification in distribution systems**

Grazia Todeschini, Swansea University (United Kingdom) • Senthooran Balasubramaniam, Swansea University (United Kingdom)

930 **A power system model for resonance studies**

Oscar Lennerhag, Independent Insulation Group (Sweden) • Math Bollen, Luleå University of Technology (Sweden)

937 **Stochastic Analysis of Transient Voltage Dip in Distribution System**

Mehdi Ahrarinouri, Shiraz Electricity Distribution Company (SHEDC) (Iran, Islamic Republic of) • Mohammadamin Alipour, Shiraz Electricity Distribution Company (SHEDC) (Iran, Islamic Republic of) • Mohammad Reza Shirali, Shiraz University (Iran, Islamic Republic of)

984 **Measurements and Simulation of Supraharmonic Resonances in Public Low Voltage Networks**

Matthias Klatt, Technische Universität Dresden (Germany) • Franziska Kaiser, Technische Universität Dresden (Germany) • Jan Meyer, Technische Universitaet Dresden (Germany) • Christian Lakenbrink, Netze BW GmbH (Germany) • Christoph Gaßner, Bayernwerk Netz GmbH (Germany)

1025 **Voltage variation in MV distribution networks and its impact on selection of MV/LV transformation ratio**

Filip Broz, EGC-EnerGoConsult CB (Czech Republic) • Karel Prochazka, EGC-EnerGoConsult CB (Czech Republic) • Martin Kaspirek, E.ON Distribuce (Czech Republic) • Jan Jiricka, E.ON Distribuce, a.s. (Czech Republic)

1062 **Harmonic Emission Level Assessment Considering the Influence of Filters in Harmonic Source Side**

FENG QIAN, State Grid Shanghai Electric Power Research Institude (China) • Mu Cuo, STATE GRID TIBET ELECTRIC POWER RESEARCH INSTITUTE (China) • Xingang Yang, STATE GRID SHANGHAI ELECTRIC POWER RESEARCH INSTITUTE (China) • Jinshuai Zhao, The College of Electrical Engineering and Information Technology, Sichuan University (China) • Fangwei Xu, The College of Electrical Engineering and Information Technology, Sichuan University (China) • Hongru Zheng, The College of Electrical Engineering and Information Technology, Sichuan University (China)

1078 **SURVEY OF CURRENT GRADIENT AT PUBLIC LOW VOLTAGE CUSTOMER TERMINALS IN GERMANY**

Pierre Jaques, Mittweida University of Applied Sciences (Germany) • Ralf Hartig, Mittweida University of Applied Sciences (Germany) • Anke Fröbel, Otto von Guericke University Magdeburg (Germany) • Robert Stiegler, Technische Universität Dresden (Germany) • Jan Meyer, Technische Universitaet Dresden (Germany) • Ralf Kolander, Mitteldeutsche Netzgesellschaft Strom mbH (Germany)

1191 **Determining the impedance-frequency characteristic of the network in capacitor placement studies by prioritizing the harmonic pollution of feeders under different loads**

Foad Gol avar mohammadi, Power Distribution Company of Kurdistan (Iran, Islamic Republic of)

1228 **Analysis and design of harmonic filter for commercial and official substations in Lorestan Province Electricity Distribution Network**

Ferydoon Khodnia, Lorestan Province Electricity Distribution Company (Iran, Islamic Republic of) • Ebrahim Sharifipour, Lorestan Province Electricity Distribution Company (Iran, Islamic Republic of) • Solmaz Bazgir, Yekta Behineh Tavan Company (Iran, Islamic Republic of) • Farhad Pourtahmasbi, Yekta Behineh Tavan Company (Iran, Islamic Republic of) • Reza Mehri, Islamic Azad University of Hamedan (Iran, Islamic Republic of)

1229 **Measurement and analysis of zero-sequence current levels during normal operation**

Sjoerd Nauta, Alliander (Netherlands) • Ramiro Serra, TU Eindhoven (Netherlands) • Jeroen van Waes, TenneT TSO B.V. (Netherlands) • Frans Provoost, Alliander (Netherlands) • Maarten van Riet, Alliander (Netherlands) • Kees Koreman, TenneT TSO B.V. (Netherlands)

1239 **Simulations in GNU Octave to Analyse the Behaviour of Rogowski Coil Integrators for Measurement of Nonsinusoidal Currents**

Anke Fröbel, Otto von Guericke University Magdeburg (Germany) • Naga Manognya Malladi, Otto von Guericke University Magdeburg (Germany) • Thomas Jäckle, ZES ZIMMER Electronic Systems GmbH (Germany) • Mario Schönecker-Baußmann, ZES ZIMMER Electronic Systems GmbH (Germany) • Florian Schilling, Physikalisch-Technische Bundesanstalt (PTB) (Germany) • Matthias Schmidt, Physikalisch-Technische Bundesanstalt (PTB) (Germany) • Timur Öznur, Ostfalia University of Applied Science (Germany) • Ralf Vick, Otto von Guericke University Magdeburg (Germany)

1431 **Characteristics of Fifth and Seventh Harmonics in Japanese Electric Power Distribution System**

Naotaka Okada, CRIEPI (Japan) • Kenji Yukihira, CRIEPI (Japan)

1512 **A Network-Wide Evaluation of Single-Point Harmonic Contributions from Customer Installations: Comparison of Different Methods**

Aljaz Spelko, University of Ljubljana (Slovenia) • Igor Papic, University of Ljubljana (Slovenia) • Sasa Z. Djokic, The University of Edinburgh (United Kingdom)

1535 **Incipient Fault Prediction in Power Quality Monitoring**

Volker Hoffmann, SINTEF AS (Norway) • Kasia Michałowska, SINTEF AS (Norway) • Christian Andresen, SINTEF Energy Research AS (Norway) • Bendik Nybakk Torsæter, SINTEF Energy Research AS (Norway)

1627 **Research on the Typical Problem of Shunt Capacitors Excessive Noise Caused by Harmonics Based on Field Measurements**

ZHANG PENG, State Grid Shanghai Electric Power Research Institude (China) • PAN LING, State Grid Shanghai Electric Power Research Institude (China) • PAN AIQIANG, State Grid Shanghai Electric Power Research Institude (China) • FENG QIAN, State Grid Shanghai Electric Power Research Institude (China)

1641 **Characterization and Laboratory Performance Testing of Interconnected Star Phase Balancer**

Antti Supponen, Tampere University (Finland) • Antti Rautiainen, Tampere University (Finland) • Sami Repo, Tampere University of Technology (Finland) • Sami Laitinen, Ensto Finland Inc. (Finland) • Tommi Kasteenpohja, Ensto Finland Inc. (Finland)

1795 **EVALUATING TEMPORAL VARIATIONS OF HARMONIC IMPEDANCES FOR CONTINUOUS ASSESSMENT OF LOW-ORDER HARMONIC EMISSIONS FROM CUSTOMER INSTALLATIONS**

Aljaz Spelko, University of Ljubljana (Slovenia) • Igor Papic, University of Ljubljana (Slovenia) • Alfredo Testa, Universita della Campania (Italy) • Roberto Langella, Università della Campania “Luigi Vanvitelli” (Italy) • Sasa Z. Djokic, The University of Edinburgh (United Kingdom)

1799 **An analytic investigation of the dc link trajectories in electric power train applications**

Marcel Gladen, Wilo SE (Germany) • Martin Oettmeier, Wilo SE (Germany) • Volker Staudt, Ruhr-University Bochum (Germany) • Christoph Krimpmann, Smart Mechatronics GmbH (Germany)

1930 **Distribution System Reliability Modelling and Optimization of city Outskirts: Case Study of Polebaba Feeder**

Ebrahim Sharifipour, Lorestan Province Electricity Distribution Company (Iran, Islamic Republic of) • Ferydoon Khodnia, Lorestan Province Electricity Distribution Company (Iran, Islamic Republic of) • Hamzeh BEIRANVAND, Lorestan University (Iran, Islamic Republic of) • Mahmoud-Reza SHAKARAMI, Lorestan University (Iran, Islamic Republic of) • Hossein BAHRAMIAN-HABIL, Amirkabir University of Technology (Iran, Islamic Republic of) • Hekmat BEIRANVANDI , Lorestan Province Electricity Distribution Company (Iran, Islamic Republic of)

2049 **PQ prediction by way of parallel computing - benchmark and sensitivity analysis for classical ML approaches**

Adrian Eisenmann, University of Stuttgart, Institute of Power Transmission and High Voltage Technology (Germany) • Tim Streubel, University of Stuttgart, Institute of Power Transmission and High Voltage Technology (Germany) • Krzysztof Rudion, University of Stuttgart (Germany)

2052 **Assessment of Distributed Harmonic Filters on Grid Voltage Quality**

Gaurav Singh, EPRI (USA) • Carl Miller, Electric Power Research Institute (USA) • William Howe, Electric Power Research Institute (USA)

2306 **Impact of distribution network modelling on harmonic impedance in the HV grid**

Gu Ye, Eindhoven University of Technology (Netherlands) • Arnau Sans Ibos, Eindhoven University of Technology (Netherlands) • Vladimir Cuk, Eindhoven University of Technology (Netherlands) • Jeroen van Waes, TenneT TSO B.V. (Netherlands) • Sjef Cobben, Eindhoven University of Technology (Netherlands)

Poster Tour PT24

Block 4: Quality of supply, monitoring and Big Data analysis, standards and regulatory issues

4 June 2019 from 16:30 to 18:00

Poster Area

23 **Power quality performances of Enexis grids – an overview**

Sharmistha Bhattacharyya, Enexis (Netherlands) • Maarten Berende, Enexis (Netherlands)

331 **Comparisons of IEC/TR 61000-3-6 and IEEE Std 519 in the MV Systems**

Namhun Cho, KEPCO (Korea, Republic of) • Sungwoo Lee, KEPCO (Korea, Republic of) • Hyungchan Lee, Hongik University (Korea, Republic of) • InYong Seo, KEPCO Research Institute (Korea, Republic of)

366 **Typical harmonic levels and spectra with low-voltage customers**

Math Bollen, Luleå University of Technology (Sweden) • Aurora Gil de Castro, University of Cordoba (Spain) • Sarah Rönnberg, Luleå University of Technology (Sweden)

521 **The experimental evaluation and monitoring for power quality status of inverter-driven air conditioners according to climate change**

Ling Luo, State Grid Shanghai Electric Power Research Institute (China) • Shuang Xiao, State Grid Shanghai Electric Power Research Institute (China) • Fan Cheng, State Grid Shanghai SMEPC (China)

538 **Empirical measurements of Power Quality in Danish LV systems**

Henrik Hansen, Danish Energy (Denmark)

542 **Voltage dip assessment in context of voltage quality regulation**

Miloslava Tesarova, University of West Bohemia (Czech Republic) • Martin Kaspirek, E.ON Distribuce (Czech Republic)

551 **Methods for the Evaluation of New Power Quality Parameters: a Review of Rapid Voltage Changes and Supraharmonics**

Stefano Lodetti, CIRCE - Universidad de Zaragoza (Spain) • Jorge Bruna Romero, CIRCE Foundation (Spain) • Julio J. Melero, CIRCE - Universidad de Zaragoza (Spain)

635 **Issues on the Application of Chinese HarmonicStandard GB/T 14549**

Rui XIANG, Department of Electrical Engineering, Tsinghua University (China) • Yiwei ZHANG, Department of Electrical Engineering, Tsinghua University (China) • Yong MIN, Department of Electrical Engineering, Tsinghua University (China) • Fei XU, Department of Electrical Engineering, Tsinghua University (China) • Junfei HAN, Inner Mongolia Electric Power Research Institute (China) • Jun TAO, Inner Mongolia Electric Power Research Institute (China)

652 **Long-term power quality measurements in medium voltage networks**

Sarah Rönnberg, Luleå University of Technology (Sweden) • Elena Gutiérrez Ballesteros, University of Cordoba (Spain) • Aurora Gil de Castro, University of Cordoba (Spain) • Mailn Westman, Skellefteå Kraft Elnät (Sweden) • Magnus Brodin, Skellefteå Kraft Elnät (Sweden)

713 **Determination the Switching State of Compensatory Equipment Based on Monitor Data Analysis**

Ying Wang, College of Electrical Engineering and Information Technology, Sichuan University (China) • Ling-Feng Deng, Sichuan University (China) • Xianyong Xiao, College of Electrical Engineering and Information Technology, Sichuan University (China) • Chong Hu, Anhui Electric Power Research Institute (China) • Xin Wang, CEIEC Shenzhen Electric Technology Inc (China)

724 **Evaluation of Harmonic Impacts on Distribution Transformers in Mashhad Based on Smart Meter Data**

Amir Khazaee, Mashhad Electric Energy Distribution Co. (Iran, Islamic Republic of) • Hossein Delavaripour, Mashhad Electric Energy Distribution Co. (Iran, Islamic Republic of) • Mehran Ghasempour, Mashhad Electric Energy Distribution Co. (Iran, Islamic Republic of) • Hossein Hooshmandi Safa, Mashhad Electric Energy Distribution Co. (Iran, Islamic Republic of)

737 **Power Quality Assessment of Key Consumer Installation - Interruption statistics of Grid Disturbances**

GOUTHAM CHAKRAVARTHY YELMANCHLI, The Tata Power Company Limited (India) • Chintamani Chitnis, The Tata Power Co. Ltd (India) • NISHANT BHARGAVA, The Tata Power Company Limited (India) • Vishwas R Shrikhande, The Tata Power Company Limited (India)

739 **DECIPHERING POWER QUALITY CONCERNS OF CONSUMER – BEYOND THE METER**

GOUTHAM CHAKRAVARTHY YELMANCHLI, The Tata Power Company Limited (India) • Chintamani Chitnis, The Tata Power Co. Ltd (India)

744 **Advanced Utilization of Big Data for Real-time Monitoring and DataAnalytics in Sundom Smart Grid**

Petri Hovila, ABB Oy (Finland) • Aurelien Monot, ABB Corporate Research (Switzerland) • Hannu Laaksonen, University of Vaasa (Finland) • Matti Rita-Kasari, Jubic Oy (Finland)

1353 **Impact of IEC 61850 on Power Quality Monitoring andRecording**

Alexander Apostolov, OMICRON electronics (USA) • Frederic Dunet, OMICRON electronics (France) • Juan Parra, OMICRON electronics (Suriname)

1389 **Influence of Voltage Sag on Process Parameters and the Control Measures for a Process of Auxiliary Engine in Thermal Power Plant**

Yan Jianhai, Nanjing Golden Cooperate DC Power Distribution Technology. Co.,Ltd. (China) • Chen Wenbo, Nanjing Golden Cooperate DC Power Distribution Technology. Co.,Ltd. (China) • Mei Zhonghua, Nanjing Golden Cooperate DC Power Distribution Technology. Co.,Ltd. (China) • WANG Xinxiang, Nanjing Golden Cooperate DC Power Distribution Technology. Co.,Ltd. (China) • Li Jiateng, School of Electrical Engineering, Beijing Jiaotong University (China) • Liu Siyi, School of Electrical and Information Engineering, Hunan University (China)

1393 **New challenges for the determination of emission limits for customer installations - Activities of CIGRE JWG C4.40/CIRED on the revision of IEC reports 61000-3-6, 61000-3-7, 61000-3-13, 61000-3-14**

Jan Meyer, Technische Universitaet Dresden (Germany) • Mark Halpin, Auburn University (USA)

1398 **Survey of network impedance in the frequency range 2-9 kHz in public low voltage networks in AT/CH/CZ/GE**

Robert Stiegler, Technische Universität Dresden (Germany) • Jan Meyer, Technische Universitaet Dresden (Germany) • Michael Höckel, Bern University of Applied Sciences (Switzerland) • Stefan Schori, Bern University of Applied Sciences (Switzerland) • Karl Scheida, Österreichs E-Wirtschaft (Austria) • Tomáš Hanžlík, EGC – EnerGoConsult CB s.r.o. (Czech Republic) • Jiří Drápela, Brno University of Technology (Czech Republic)

1407 **Suitability of test procedures in IEC 61000-3-2 for assessing harmonic emission of modern mass-market equipment**

Jan Meyer, Technische Universitaet Dresden (Germany) • Ana-Maria Blanco, Technische Universitaet Dresden (Germany) • Roberto Langella, Università della Campania “Luigi Vanvitelli” (Italy) • Sasa Z. Djokic, The University of Edinburgh (United Kingdom)

1608 **Large scale PQ, temperature and energy monitoring in secondary substations.**

JOSE MARIA ROMERO GORDON, ENDESA (Spain)

1796 **OPERATION EFFECT TO VOLTAGE SAG IMMUNITY LEVELS OF AC CONTACTORS AT PETROCHEMICAL PLANT IN PAHANG, MALAYSIA**

KHALIS MOKHTAR, TNB Energy Services (Malaysia) • HAZRI DAHALAN MD RAZIP, Universiti Malaysia Pahang (Malaysia) • EFFINIZAM ABDUL LATIP, TNB Energy Services (Malaysia)

2072 **Service Quality in the Brazilian Electricity Distribution Sector: Challenges, Regulatory Approaches and Results**

João Marcelo Cavalcante de Albuquerque, Brazilian Electricity Regulatory Agency – ANEEL (Brazil) • Renato Eduardo Farias de Sousa, Brazilian Electricity Regulatory Agency – ANEEL (Brazil) • Hugo Lamin, Brazilian Electricity Regulatory Agency – ANEEL (Brazil)

2145 **Forecast of steady-state voltage problems considering simulation and socio-environmental information**

Renan Machado Sales, Sinapsis Inovação em Energia (Brazil) • Ivo Ordonha Cyrillo, Sinapsis Inovação em Energia (Brazil) • Marcelo Pelegrini, Sinapsis Inovação em Energia (Brazil) • Hector Luz, Sinapsis Inovação em Energia (Brazil) • Nelson Kagan, ENERQ - USP (Brazil) • Elson Borges da Silva Filho, Eletrobras (Brazil) • Daniel Perez Duarte, Sinapsis Inovação em Energia (Brazil)

2265 **Proposal to improve the Brazilian regulation on the electric energy reliability**

Ednelson de Moraes, USP (Brazil) • Carlos Almeida, ENERQ - USP (Brazil)

Session 3 Operation, control and protection

Poster Tour PT31

Block 1: Operation (Part 1)

6 June 2019 from 09:00 to 10:30

Poster Area

215 **Grid Operation 2025 - Digitalisation for Distribution System Operators**

Robert Schmaranz, KGN-Kärnten Netz GmbH (Austria) • Walter Schaffer, Salzburg Netz GmbH (Austria) • Ursula Tauschek, Österreichs Energie (Austria) • Roland Bergmayer, Energienetze Steiermark GmbH (Austria) • Gernot Bitzan, Energie Klagenfurt GmbH (Austria) • Leopold Fiedler, Netz Oberösterreich GmbH (Austria) • Klaus Schüller, TINETZ-Tiroler Netze GmbH (Austria) • Robert Stacher, Wiener Netze GmbH (Austria)

236 **Study of Calculation of Currents Induced by Closing-loop Operations in Medium-voltage Distribution Grids**

Kaiyu ZHANG, Electric Power Research Institute, SMEPC,Shanghai (China) • Yuyao FENG, Electric Power Research Institute, SMEPC,Shanghai (China) • Yinghui YU, Electric Power Research Institute, SMEPC,Shanghai (China) • Yong CUI, Electric Power Research Institute, SMEPC,Shanghai (China) • Yun SU, Electric Power Research Institute, SMEPC,Shanghai (China)

460 **Automation of DSO processes combining grid planning and operation: An efficient way to handle large numbers of connection requests**

Philipp Erlinghagen, envelio GmbH (Germany) • Robin Ashrafuzzaman, envelio GmbH (Germany) • Felix Glinka, envelio GmbH (Germany) • Peter Mathis, DigiKoo GmbH (Germany) • Benjamin Jambor, Westnetz GmbH (Germany) • Steffen Woltering, Leitungspartner GmbH (Germany)

584 **Implementation Of 3D Modeling For Simulation Laboratory Based On Unity And 3DMAX**

Chengying Jiang, SGCC (China) • Jinxia Jiang, SGCC (China)

590 **LV Grid Data Analysis demonstrated at DSO Arbon Energie**

Ingo Herbst, Siemens AG (Switzerland) • Slobodan Lukovic, USI Lugano (Switzerland) • Alberto Gasparin, USI Lugano (Switzerland) • Nicola Schulz, FHNW Brugg (Switzerland) • Jens Witzig, FHNW Brugg (Switzerland) • Silvan Kieber, Arbon Energie AG (Switzerland)

764 **Levers optimization in short-term operational planning for real distribution systems**

Hugo Morais, EDF (France) • Clement Paris, EDF (France) • Olivier Carré, Enedis (France) • Madeleine Carlier, EDF R&D (France) • Benoît Bouzigon , Enedis (France)

806 **Forecasting Method of LV Distribution's Load CurveBy Means of Machine Learning Utilizing Smart Meter Data**

Yuki Kanazawa, Chubu Electric Power Company (Japan) • Hiroyuki Ishikawa, Chubu Electric Power Company (Japan) • Hirokazu Uenishi, Chubu Electric Power Company (Japan) • Hiroki Ichinomiya, Mitsubishi Research Institute (Japan)

823 **Optimization of photovoltaics active power curtailment in low voltage networks by using Artificial bee colony method**

Tomislav Alinjak, HEP ODS d.o.o. (Croatia) • Ivica Pavic, Faculty of electrical engineering and computing, University of Zagreb (Croatia) • Marinko Stojkov, Mechanical engineering faculty in Slavonski Brod (Croatia) • Kruno Trupinic, HEP ODS d.o.o. (Croatia)

894 **Research on the optimization of the district energy mix for smart city operation**

Dong-joo Kim, KEPCO Research Institute (Korea, Republic of) • Seong-chul Kwon, KEPCO Research Institute (Korea, Republic of) • Jung-sung Park, KEPCO Research Institute (Korea, Republic of) • Moon-sung Bae, KEPCO Research Institute (Korea, Republic of) • Jong-uk Lee, KEPCO Research Institute (Korea, Republic of)

1038 **Reliability Analysis of Interconnected Electrical Power and ICT Systems using Hybrid Object-oriented Modelling Approach**

Yushi Chen, The University of Manchester (United Kingdom) • Jovica Milanovic, The University of Manchester (United Kingdom)

1086 **Over-specification due to lack of knowledge**

Gerard Schoonenberg, Eaton (Netherlands) • Maarten van Riet, Alliander (Netherlands)

1214 **Forecasted chronological Power Flow for enabling timely dynamic tariff activation**

Ricardo Gonçalves, EDP Distribuição (Portugal) • Miguel Louro, EDP Distribuição (Portugal) • André Paulo, EDP Distribuição (Portugal) • Pedro Ferreira, EDP Inovação (Portugal) • Marco Pinheiro, EDP Inovação (Portugal) • Margarida Pedro, EDP Inovação (Portugal) • Luís Marcelino Ferreira, Ambertree (Portugal) • Pedro Carvalho, AmberTREE (Portugal)

1567 **Demonstration Results of Energy Storage System for Multi-Purpose Utilization in Distribution Network**

Won Wook JUNG, KEPCO (Korea, Republic of) • Jeong Hun KIM, KEPCO (Korea, Republic of) • Won NAMKOONG, KEPCO (Korea, Republic of) • Changhoon Shin, Korea Electric Power Corporation (KEPCO) (Korea, Republic of)

1773 **Multi-energy Microgrid Scheduling: A multi-vector demonstrator case study**

Natalia-Maria Zografou-Barredo, Newcastle University (United Kingdom) • Charalampos Patsios, Newcastle University (United Kingdom) • Sara Louise Walker, Newcastle University (United Kingdom) • Peter Davison, Newcastle University (United Kingdom)

1789 **Analysis of voltage patterns for topology identification and GIS correction**

Luc Richaud, Odit-e (Spain) • Rémi Pellerej, Odit-e (France) • Clémentine Benoit, Odit-e (France) • Enrique Ramos, Schneider-Electric (Spain)

1906 **Approach for multi criteria optimization and performance monitoring of a Virtual Power Plant with urban structures**

Alexander Hobert, Institute of Power System Engineering, University of Wuppertal (Germany) • Heiko Schroeder, Institute of Power System Engineering, University of Wuppertal (Germany) • Björn Uhlemeyer, Institute of Power System Engineering, University of Wuppertal (Germany) • Marlon Koralewicz, Institute of Power System Engineering, University of Wuppertal (Germany) • Markus Zdrallek, University of Wuppertal (Germany) • Lena Seeger, Wuppertaler Stadtwerke GmbH (Germany) • Dirk Aschenbrenner, Wuppertaler Stadtwerke Netz GmbH (Germany) • Pascal Biesenbach, Aufbruch am Arrenberg e.V. (Germany)

1919 **Experience of SmartGrid implementation in Ufa city power grid for optimization of the distributive electric system operation expenses**

Dmitriy Sharovatov, BESK JSC (Russian Federation) • Andrey Kucheryavenkov, Trinity Engineering LLC (Russian Federation) • Ekaterina Kartasheva, Trinity Engineering LLC (Russian Federation)

1957 **Dynamic Line Rating Operational Planning: Issues and Challenges**

Seyede Fatemeh Hajeforosh, Luleå University of Technology (Sweden) • Math Bollen, Luleå University of Technology (Sweden) • Lars Abrahamsson, Luleå University of Technology (Sweden)

1962 **Method to characterize variability of photovoltaics power output**

Laurène Parent, National Institute of Solar Energy (France) • Delphine Riu, Univ. Grenoble Alpes, CNRS, Grenoble INP, G2Elab (France) • Tuan Quoc TRAN, National Institute of Solar Energy (France) • Thai-Phuong DO, National Institute of Solar Energy (France)

1998 **Fault Zone Classifier Performance Improvement of PMU-Enabled Distribution System Through Feature Engineering**

Anton Domini Sta. Cruz, University of the Philippines (Philippines) • Michael Angelo Pedrasa, University of the Philippines (Philippines) • Roel Dobbe, University of California, Berkeley (USA)

2068 **Phase Identification in smart metering pilot project Komorany**

Vaclav Vycital, Brno University of Technology (Czech Republic) • Michal Ptacek, Brno University of Technology (Czech Republic) • Petr Toman, Brno University of Technology (Czech Republic) • David Topolanek, Brno University of Technology (Czech Republic) • Jiří Drápela, Brno University of Technology (Czech Republic) • Juan Zamphiropolos, E.ON Distribuce (Czech Republic)

2313 **DESIGNING A LABORATORY SETUP TO EXPERIMENT WITH SMART METERING FOR SMART LOW VOLTAGE GRID APPLICATIONS**

Ali Hamdan, Grenoble INP (France) • Florent CADOUX, Fondation Partenariale de Grenoble INP (France) • Christine Collet, Grenoble INP (France)

Poster Tour PT32

Block 2: Control (Part 1)

6 June 2019 from 09:00 to 10:30

Poster Area

176 **Investigation and Comparison of Different Methods for LV Grid State Estimation considering Privacy Issues**

Marco Weisenstein, University of Kaiserslautern (Germany) • Robert Brandalik, Amprion GmbH (Germany) • Wolfram H. Wellßow, University of Kaiserslautern (Germany)

223 **Development of a novel voltage-estimation method suitable for large-scale PVs installation conditions**

Toshiki Oda, Central Research Institute of Electric Power Industry (CRIEPI) (Japan) • Naoyuki Takahashi, Central Research Institute of Electric Power Industry (CRIEPI) (Japan) • Satoshi Uemura, Central Research Institute of Electric Power Industry (CRIEPI) (Japan)

241 **Evaluation and Comparison of Islanding Detection Methods by extended Analysis of the Non Detection Zone**

Sebastian Palm, TU Dresden (Germany) • Peter Schegner, Technische Universitaet Dresden (Germany)

396 **LOW VOLTAGE (LV) SUPERVISION SYSTEMS**

Imanol López, Merytronic (Spain) • Haritz Zubia, Ariadna Grid (Spain) • Jonathan González, Merytronic (Spain) • Iñigo Lartategui, Pronutec (Spain) • Markel Sanz, Iberdrola (Spain) • Aurelio Sánchez, Iberdrola (Spain)

408 **Response of low voltage grids with connected prosumers to a voltage dip**

Daniel-Leon Schultis, TU Wien (Austria) • Albana Ilo, TU Wien (Austria)

558 **Experimental investigation of distribution grid restoration concepts using neighboring islanded LV-microgrids**

Philipp Linnartz, Institute for High Voltage Technology – RWTH Aachen University (Germany) • Nicolas Schulte, Institute for High Voltage Technology – RWTH Aachen University (Germany) • Sandor Simon, Institute for High Voltage Technology – RWTH Aachen University (Germany)

586 **Impact of Synchronous and Distributed Generation Unit Characteristics onto the Stable Operation of Low Voltage Islanded Microgrids**

Dominik Willenberg, Institute for High Voltage Technology – RWTH Aachen University (Germany) • Sandor Simon, Institute for High Voltage Technology – RWTH Aachen University (Germany) • Reinhold Bertram, Institute for High Voltage Technology – RWTH Aachen University (Germany) • Torsten Sowa, Schleswig-Holtstein Netz AG (Germany)

730 **Real smart grid: advanced operation and exploitation of LV networks**

Ana Gonzalez, Iberdrola (Spain)

741 **Design and implementation of a data centre for smart grids based on Software Defined Network Technology (SDN)**

Saeed Alishahi, Mashhad Electric Energy Distribution Co. (MEEDC) (Iran, Islamic Republic of) • Mohammad Hossein Yaghmaee Moghaddam, Ferdowsi University of Mashhad (Iran, Islamic Republic of) • Ahmadreza Montazerolghaem, Ferdowsi University of Mashhad (Iran, Islamic Republic of) • Mehdi Zarif, Islamic Azad University of Mashhad (Iran, Islamic Republic of)

831 **Superordinate Voltage Control in Smart Low-Voltage Grids –Laboratory and Field Test Results**

Bastian Maucher, Technical University Munich (Germany) • Markus Meyer, Technical University Munich (Germany) • Rolf Witzmann, Technical University of Munich (Germany)

867 **Modelling and Control of DC Microgrids in Residential Buildings**

Sergio Motta, VTT (Finland) • Antti Alahäivälä, VTT (Finland) • Poria Hasanpor Divshali, VTT Research Center of Finland (Finland) • Riku Pasonen, VTT (Finland) • Anna Kulmala, VTT Technical Research Centre of Finland (Finland) • Kari Mäki, VTT Research Center of Finland (Finland) • YoungPyo Cho, KEPCO Research Institute (Korea, Republic of) • HongJoo Kim, KEPCO Research Institute (Korea, Republic of)

1109 **IEC 61850 GOOSE MESSAGING APPLICATIONS IN DISTRIBUTION NETWORK PROTECTION AND AUTOMATION**

Maciej Grebla, NTNU (Norway) • Jaya Yellajosula, MTU (USA) • Hans Kristian Høidalen, NTNU (Norway) • Jorun Marvik, SINTEF (Norway)

1355 **Function and Operation Plan for Stable Off-Grid Microgrid**

Bo-Gun Jin, Hyosung Corp. (Korea, Republic of) • Dae-Hee Choi, Hyosung Corp. (Korea, Republic of) • Jin-Ho Lee, Hyosung Corp. (Korea, Republic of) • Woo-Kyu Chae, KEPRI (Korea, Republic of)

1510 **Enabling Autonomous Reconfiguration of Low Voltage Networks**

Maizura Mokhtar, Heriot-Watt University (United Kingdom) • Valentin Robu, Heriot-Watt University (United Kingdom) • Jim Whyte, NotSoAnalytic Ltd. (United Kingdom) • Ciaran Higgins, Derryherk Ltd. (United Kingdom) • David Flynn, Heriot-Watt University (United Kingdom) • Fiona Fulton, SP Energy Networks (United Kingdom) • Caroline Loughran, SP Energy Networks (United Kingdom)

1586 **Avoid technical problems in LV networks: from data-driven monitoring to predictive control**

Micael Simões, INESCTEC (Portugal) • Gil Sampaio, INESC TEC (Portugal) • André Madureira, INESCTEC (Portugal) • Ricardo Bessa, INESCTEC (Portugal) • Jorge Pereira, INESC TEC & FEP (Portugal) • Diogo Lopes, EDP Distribuição (Portugal) • Rita Pires, EDP Distribuição (Portugal) • Pedro Matos, EDP Distribuição (Portugal)

1603 **A study of Model Predictive Control applied to the French Demo of InterFlex**

Dominik Mildt, EON Energy Research Center - RWTH Aachen (Germany) • Marco Cupelli, EON Energy Research Center - RWTH Aachen (Germany) • Antonello Monti, EON Energy Research Center - RWTH Aachen (Germany) • Julien Bruschi, Enedis (France) • Thibaut Wagner, Enedis (France) • Christian Dumbs, Enedis (France)

1730 **Anti-islanding protection in distributed generation with synchronous generators**

Ivan Goran Kulis, Koncar-KET (Croatia) • Miljenko Boras, Koncar-KET (Croatia)

1800 **Analysis of practical issues in the development of voltage control system for Low Voltage DC Distribution System**

Phi Hai Trinh, Kookmin University (Korea, Republic of) • Hector Cho, Kookmin University (Korea, Republic of) • Van Thinh Huynh, Kookmin University (Korea, Republic of) • Il-Yop Chung, Kookmin University (Korea, Republic of) • SeokWoong Kim, KEPCO Research Institute (Korea, Republic of) • JuYoung Kim, KEPCO Research Institute (Korea, Republic of)

1903 **Simulation of islanding in distribution networks**

Attila Kovács, Astron Informatics Ltd. (Hungary) • Róbert Gaál, Astron Informatics Ltd. (Hungary) • János Csatár, Budapest University of Technology and Economics (Hungary)

1908 **MPC based energy management optimization for a European microgrid implementation**

Gonca Gürses-Tran, EON Energy Research Center - RWTH Aachen (Germany) • Dominik Mildt, EON Energy Research Center - RWTH Aachen (Germany) • Michael Hirst, E.ON UK (United Kingdom) • Marco Cupelli, EON Energy Research Center - RWTH Aachen (Germany) • Antonello Monti, EON Energy Research Center - RWTH Aachen (Germany)

1912 **ANALYSIS AND TEST OF EFFECTIVE SYNCHRONIZATION OF MICROGRID WITH THE UPSTREAM NETWORK ENABLED BY A RECLOSER**

Carlos Candido, EDP Distribuição (Portugal) • Joao Filipe Fernanders, EDP Distribuição (Portugal) • Joao Sa, EDP Distribuição (Portugal) • Neuza Gomes, EDP Distribuição (Portugal)

1928 **Improved Supervision and Control of the LV Portuguese Network**

Rita Pires, EDP Distribuição (Portugal) • Bernardo Almeida, EDP Distribuição (Portugal) • Miguel Louro, EDP Distribuição (Portugal) • Tiago Simões, EDP Distribuição (Portugal) • Pedro Nunes, EDP Distribuição (Portugal) • Mónica Vaz, CGI (Portugal) • Hugo Calado, CGI (Portugal) • Guilherme Pires, CGI (Portugal)

2255 **Voltage-frequency Stability of a Low Inertia Electrical Grid using a Kuramoto Model**

Robert Pollak, university of ottawa (Canada) • Javad Fattahi, university of ottawa (Canada) • Henry Schriemer, university of ottawa (Canada) • Rohit Rana, university of ottawa (Canada)

2293 **Microgrid Controller and Distributed Energy Resource Functionality Verification via Laboratory and Field Verification**

Arindam Maitra, EPRI (USA) • Gaurav Singh, EPRI (USA) • Jane Shi, EPRI (USA) • Annabelle Pratt, NREL (USA) • Prabakar Kumaraguru , NREL (USA) • Christian Jecu, EDF (France) • Loïc Joseph-Auguste, EDF (France)

Poster Tour PT33

Block 1: Operation (Part 2)

6 June 2019 from 11:00 to 12:30

Poster Area

49 **Reactive Power Provision by Means of Flexible Industry Consumers**

Tim Plößer, TU Darmstadt (Germany) • Anna Macke, TU Darmstadt (Germany) • Dominik Maihöfner, TU Darmstadt (Germany) • Jutta Hanson, Technische Universität Darmstadt (Germany)

343 **Cost Benefit Analysis (CBA) approach of Non-Conventional STATCOM Applications**

Mark Friese, TNEI Services (United Kingdom) • Stephanie Hay, TNEI Services (United Kingdom) • Emanuel Mugwanda, SP Energy Networks (United Kingdom) • Albert Santandreu, SP Energy Networks (United Kingdom) • David Neilson, SP Energy Networks (United Kingdom)

537 **Impact of renewable and distributed generation on grid restoration strategies**

Elmira Torabi, TU Wien (Austria) • Wolfgang Gawlik, TU Wien, Institute of Energy Systems and Electrical Drives (Austria) • Robert Schmaranz, KGN-Kärnten Netz GmbH (Austria) • Ewald Traxler, Netz Oberösterreich GmbH (Austria) • Rainer Krebs, Siemens AG (Germany) • Philipp Hinkel, TU Kaiserslautern (Germany) • Wolfram H. Wellßow, University of Kaiserslautern (Germany) • Martin Ostermann, PSI Software AG (Germany)

703 **Operation of distribution power systems with dynamic compensators to integrate intermittent energy sources.**

Marcelo Cassin, EPE Santa Fe (Argentina)

750 **Mobile-GIS evolving as a key tool for field Workforce Management**

SHRIRAM MODAK, TATA POWER (India) • SUNIL JOGLEKAR, TATA POWER (India) • RAKESH KADU, TATA POWER (India) • Daleep Singhal, TATA POWER (India) • Mahesh Yadav, TATA POWER (India)

751 **Distribution Network Maintenance Work Enhancement with Drones During Limited Mobile Network Access**

Joonas Säe, Tampere University (Finland) • Jarkko Laaja, Tampere University (Finland) • Heikki Paananen, Elenia Oy (Finland) • Mikko Valkama, Tampere University (Finland)

872 **TDX-Assist: Beyond state of art in TSO-DSO interoperability – The Portuguese demonstrator**

Tiago Simão, EDP Distribuição (Portugal) • Pedro Gama, EDP Distribuição (Portugal) • Miguel Louro, EDP Distribuição (Portugal) • Leonel Carvalho, INESC TEC (Portugal) • Gonçalo Glória, NESTER (Portugal) • Rui Pestana, REN (Portugal) • Francisco Reis, REN (Portugal) • João Silva, INESC TEC (Portugal)

896 **Research on Power Equipment Rainstorm Warning Combined with Weather Forecast Data Interpolation and Regional Assessment**

YIPING CUI, Guangzhou Power Supply Co. Ltd. (China) • LE LUAN, Guangzhou Power Supply Co. Ltd. (China) • YUQUAN LIU, Guangzhou Power Supply Co. Ltd. (China) • WENXIONG MO, Guangzhou Power Supply Co. Ltd. (China) • Xin Li, Guangzhou Power Supply Co. Ltd. (China) • HONGBIN WANG, Guangzhou Power Supply Co. Ltd. (China)

925 **Predicting the impacts of the major disturbances for better resource managementand situational awareness**

Santtu Vähäkuopus, Elenia Oy (Finland) • Heikki Paananen, Elenia Oy (Finland) • Lauri Anttila, Futurice Oy (Finland) • Tuomas Kupila, Taaleri Energia Operations Oy (Finland)

935 **Coordination of the transmission control center management and distribution control center management for disturbances in the regional parts of power system**

Mario Zadro, HEP - ODS d.o.o (Croatia) • Dario Polančec, HEP - ODS d.o.o (Croatia)

1209 **“Outage Forecast” – A Real Application of Machine Learning on Grid Operation Management Strategies**

Bernardo Almeida, EDP Distribuição (Portugal) • Gonçalo Faria, EDP Distribuição (Portugal) • Tiago Soares, EDP Distribuição (Portugal) • Ricardo Jorge Santos, EDP Distribuição (Portugal) • José Ferreira Pinto, EDP Distribuição (Portugal) • Tiago Santos, Smartwatt (Portugal) • Isabel Preto, Smartwatt (Portugal) • Cláudio Monteiro, FEUP (Portugal)

1395 **Cluster Autonomous Optimization of Distribution Networks with High Penetration of Distributed PV Units**

Yuanyuan Chai, Tianjin University (China) • Li Guo, Tianjin University (China) • Chengshan Wang, Tianjin University (China) • Zongzheng Zhao, Tianjin University (China)

1602 **Storm-proof automatic fault isolation and restoration system for medium voltage networks**

Jukka Kuru, Trimble Solutions Corporation (Finland) • Teemu Väre, Trimble Solutions Corporation (Finland) • Sami Vehmasvaara, Elenia Oy (Finland) • Heikki Paananen, Elenia Oy (Finland)

1871 **Reactive Power Flow over System Boundaries in the Distribution Grid**

Christoph Groiß, Salzburg Netz GmbH (Austria) • Paul Zehetbauer, AIT (Austria) • Roman Schwalbe, AIT (Austria) • Christian Schirmer, TU Wien (Austria)

1918 **The development of DNO flexibility services to fit within the existing UK market for ancillary services.**

Matthew Watson, Western Power Distribution (United Kingdom) • Gary Swandells, Smart Grid Consultancy (United Kingdom) • Roger Hey, Western Power Distribution (United Kingdom)

2036 **Analysis of the potential uncertainty in accommodation of NETSO dispatched services in DSO controlled networks**

David Tuffery, Western Power Distribution (United Kingdom) • Oliver Spink, Western Power Distribution (United Kingdom) • Stephen Quinn, Western Power Distribution (United Kingdom) • Clive Goodman, Western Power Distribution (United Kingdom)

2060 **Architectures for optimised interaction between TSOs and DSOs: compliance with the present practice, regulation and roadmaps**

Andrei Morch, SINTEF Energy Research (Norway) • Gianluigi Migliavacca , RSE SpA (Italy) • Ivana Kockar, University of Strathclyde (United Kingdom) • Han Xu, University of Strathclyde (United Kingdom) • Julia Merino, Tecnalia (Spain) • Helena Gerard, VITO (Belgium)

2061 **Evaluate and analysis the reason of distribution transformers burn near the compressed natural gas station in Tabriz city**

Reza Bazyar, Tabriz Electric Power Distribution Company (Iran, Islamic Republic of) • Majid Valizadeh, Ilam University (Iran, Islamic Republic of) • Mohammad Bagher Bannae Sharifian, Tabriz university (Iran, Islamic Republic of) • Mohammad Reza Javadi, Azar Region Communications Regulatory Authority (Iran, Islamic Republic of) • adel kazemi, Tabriz Electric Power Distribution Company (Iran, Islamic Republic of)

2114 **USE CASE APPLYING MACHINE-LEARNING TECHNIQUES FOR IMPROVING OPERATION OF THE DISTRIBUTION NETWORK**

Jørn Foros, SINTEF Energy Research (Norway) • Maren Istad, SINTEF Energy Research (Norway) • Andrei Morch, SINTEF Energy Research (Norway) • Bjørn Magnus Mathisen, SINTEF Digital (Norway)

2165 **Investigation on operating behavior of selected DC-provided components of a substation at depth discharge**

Hans-Juergen Wernegger , KNG-Kärnten Netz GmbH (Austria)

Poster Tour PT34

Block 2: Control (Part 2)

6 June 2019 from 11:00 to 12:30

Poster Area

68 **Real-time decision support system applied to distribution utility dispatches**

raul ferreira, Universidade Federal do Rio de Janeiro (Brazil) • Maurício Dal Pont, universidade federal de santa catarina (ufsc) (Brazil) • Wendell Teixeira, CPFL (Brazil)

79 **ENHANCEMENT OF DISTRIBUTION SYSTEM RESILIENCY BY FORMING NETWORKED SELF-ADEQUATE MICROGRIDS TO RESTORE CRITICAL LOADS**

Mojtaba Khederzadeh, Shahid Beheshti University (Iran, Islamic Republic of)

669 **Application of Multi-Agent Systems to Aid the Transition to a Distribution System Operator**

Joe Colebrook, IET (United Kingdom) • Ross Campbell, IET (United Kingdom) • Gita Judah, IET (United Kingdom)

740 **A study on wired and wireless automatic meter reading system applying data distribution technique**

CHUNG KI SEO, KEPCO KDN (Korea, Republic of) • SOON YEOL KWON, KEPCO KDN (Korea, Republic of)

849 **Smart Grid Co-Simulation by Developing an FMI-Compliant Interface for PSCAD**

Poria Hasanpor Divshali, VTT Research Center of Finland (Finland) • Matti Laukkanen, VTT Research Center of Finland (Finland) • Anna Kulmala, VTT Technical Research Centre of Finland (Finland) • Kari Mäki, VTT Research Center of Finland (Finland) • Arjan VanderMeer, Delft University of Technology (Netherlands) • Rishabh Bhandia, Delft University of Technology (Netherlands) • Edmund Widl, AIT Austrian Institute of Technology (Australia) • Cornelius Steinbrink, OFFIS (Germany)

968 **An Investigation on Data Gateway Functionalities for Enterprise Ancillary Services in Digital Substations**

Yiming Wu, Vattenfall Services Nordic AB (Sweden) • Florin Stelea, SWECO Energy AB (Sweden) • Anders Johnsson, Vattenfall Eldistribution (Sweden)

1067 **Sampled Measured Values Long Distance Transfer Experiment**

Tomáš Bajánek, ABB (Czech Republic) • Martin Štefanka, ABB (Czech Republic) • Jaroslava Orságová, Brno University of Technology (Czech Republic) • Stanislav Sumec, Brno University of Technology (Czech Republic) • Petr Mlýnek, Brno University of Technology (Czech Republic)

1335 **Transition to smartgrids in developing countries, contributions from telco operator in telecontrol of electricity distribution networks: Senegal case study**

Al Mansour KEBE, Senelec (Senegal) • Cheikh KA, Senelec (Senegal) • Abdoukader KANE, Senelec (Senegal)

1368 **Introduction to IEC 62361-102 CIM - 61850 Harmonization**

Thomas Berry, Schneider Electric (France)

1396 **Development of digital twin technology for operation and control in distribution system**

Satoshi Uemura, Central Research Institute of Electric Power Industry (CRIEPI) (Japan)

1427 **IOT Enabled Monitoring System for Non-Automated Unmanned Substations for Reliability Improvement.**

Parmanand Tendulkar, Tata Power (India) • Pramod Jadhav, Tata Power (India) • Christopher Selvin, Tata Power (India) • Santosh Wangde, Tata Power (India) • VT Narayanan, Tata Power (India) • Gajanan Kale, Tata Power (India)

1551 **PRIVATE FAN (Field Area Network) FOR NEXT GENERATION SMART GRIDS**

Tomaž Mavec, Elektro Gorenjska d.d. (Slovenia) • Aleš Sirnik, Elektro Gorenjska d.d. (Slovenia) • Aleš Blaznik, Elektro Gorenjska d.d. (Slovenia) • Robert Žavbi, Elektro Gorenjska d.d. (Slovenia) • Luka Močnik, Elektro Gorenjska d.d. (Slovenia)

1917 **Impact evaluation of IEC 62351 cybersecurity on IEC 61850 communications performance**

Mauro Giuseppe Todeschini, RSE Ricerca Sistema Energetico (Italy) • Giovanna Dondossola, RSE Ricerca Sistema Energetico (Italy) • Roberta Terruggia, RSE Ricerca Sistema Energetico (Italy)

1952 **5G Network Slicing as an Enabler for Smart Distribution Grid Operations**

H. V. Kalpanie Mendis, Norwegian University of Science and Technology (NTNU) (Norway) • Poul Einar Heegaard, Norwegian University of Science and Technology (NTNU) (Norway) • Katina Kralevska, Norwegian University of Science and Technology (NTNU) (Norway)

2122 **On The Cost-Effectiveness Of Multistage Deployment of Wide Area Monitoring Systems In Weak Networks under limited channel availability**

Dahunsi Okekunle, The University of Edinburgh (United Kingdom) • Obinna Unigwe, The University of Edinburgh (United Kingdom) • Aristides Kiprakis, The University of Edinburgh (United Kingdom)

Poster Tour PT35

Block 1: Operation (Part 3)

6 June 2019 from 14:30 to 16:00

Poster Area

136 **Phase Detection in PLC-based Advanced Metering Infrastructures**

Cédric LAVENU, EDF (France) • Thierry ALDEBERT, ENEDIS (France) • Mickaël CAQUEUX, Fameca Electronics (France) • David BRETAND, Fameca Electronics (France) • Alexandre CHAPOULIE, Fameca Electronics (France)

220 **Augmented Reality in Grid Operation - a new Approach to Support Manual Switching Operations**

Robert Schmaranz, KGN-Kärnten Netz GmbH (Austria) • Stefan Schöner, OMICRON electronics GmbH (Austria) • Mario Liesinger, KNG-Kärnten Netz GmbH (Austria) • Daniela Smith, OMICRON electronics GmbH (Austria)

488 **Real-time Image Transmission and Operation Control for Power Transmission Line Patrol using Unmanned Aerial Vehicle**

Liming Chen, China Southern Power Grid, Electric Power Research Institute (China) • Xuzhu Dong, China Southern Power Grid, Electric Power Research Institute (China) • Ying Sun, Guangzhou Power Supply Company Co. Ltd, China Southern Power Grid (China) • Zhipeng Su, Guangzhou Power Supply Company Co. Ltd, China Southern Power Grid (China)

547 **Driving reliability with machine learning and improving operation by digitalization of medium power transformers**

Karsten Viereck, Maschinenfabrik Reinhausen GmbH (Germany) • Anatoli Saveliev, Maschinenfabrik Reinhausen GmbH (Germany)

775 **Measurement, modelling and real-time calculation of medium voltage cable temperatures**

Jan Van de Vyver, Fluvius cvba (Belgium) • Tine Vandoorn, Fluvius cvba (Belgium) • Piet Lauwers, Fluvius cvba (Belgium)

1076 **Comparative Study of Partial Discharge Localization based on UHF Detection Methods**

Hua Chai, University of New South Wales (Australia) • Shibo Lu, University of New South Wales (Australia) • B. T. Phung, University of New South Wales (Australia) • Steve Mitchell, Ampcontrol (Australia)

1080 **Defining a Digitalization Concept for Electricity Distribution Network Maintenance**

Turo Ihonen, Elenia Oy (Finland) • Pauliina Salovaara, Elenia Oy (Finland) • Henri Niemi, Elenia Oy (Finland)

1207 **Augmented Reality Opportunities in EDP Distribuição**

Bernardo Almeida, EDP Distribuição (Portugal) • Ricardo Jorge Santos, EDP Distribuição (Portugal) • António Fonseca, EDP Distribuição (Portugal) • Constança Casquinho, Nova SBE (Portugal) • Filipe Guerreiro, Fujitsu (Portugal)

1452 **Best Practices for Reliability Improvement of LT network in Tata Power, Mumbai**

Pramod Jadhav, Tata Power (India) • Devendra Santani, Tata Power (India) • Parmanand Tendulkar, Tata Power (India) • Gajanan Kale, Tata Power (India) • Shriprakash Joshi, Tata Power (India)

1640 **Design and implementation of an optimal algorithm for urban medium voltage overhead lines preventive Maintenance using neural network and AHP model**

javavd mahjoob, Guilan power distribution Co (Iran, Islamic Republic of) • Aryan Salmanpour, Guilan power distribution Co (Iran, Islamic Republic of) • Sajjad Mohammadian, Daneshmand Co. (Iran, Islamic Republic of) • Esmaeel Khoshmaslak, Guilan power distribution Co (Iran, Islamic Republic of)

1657 **Partial Discharge Assessment with Ultrasound and TEV (Transient Earth Voltage) in Medium Voltage Substation for Power Distribution Systems Reliability of 18th Asian Games 2018**

Agik Promento Yahya, PT PLN (Persero) (Indonesia) • Azkia Azkia, PT PLN (Persero) (Indonesia) • Ricky Cahya Andrian, PT PLN (Persero) (Indonesia)

1790 **Improving Distribution Network Maintenance Process with Self-Driven Maintenance Actions by Contractor Partners**

Pauliina Salovaara, Elenia Oy (Finland) • Otso Karhu, Elenia Oy (Finland) • Turo Ihonen, Elenia Oy (Finland) • Harri Salomäki, Elenia Oy (Finland)

1894 **Relevant experiences of online PD Monitoring of MV and HV cable systems**

Javier Ortego, DIAEL (Spain) • Gonzalo Donoso, Red Eléctrica de España (Spain) • Antonio González, Viesgo (Spain) • Jesús Llandres, Naturgy (Spain) • Pedro Álvarez, Aena (Spain) • Oscar López, Aena (Spain) • Fernando Garnacho, LCOE-FFII (Spain)

2070 **A Camera-based Tracking System for Distribution Network Inspection Based on Unmanned Aerial Vehicles**

Zhai Ruicong, Guangdong Power Grid Co.,Ltd (China) • Chen Hao, Guangdong Power Grid Co.,Ltd (China) • Zhang Feng, Guangdong Power Grid Co.,Ltd (China) • Xu Zhihai, Guangdong Power Grid Co.,Ltd (China) • Yang Chengcheng, Wuhan huzoho Technology Co., (China)

Poster Tour PT36

Block 3: Protection (Part 1)

6 June 2019 from 14:30 to 16:00

Poster Area

19 **Earth fault location in compensated MV network using a hand-held measuring device**

Martin Horák, Západoslovenská distribučná, a.s. (Slovakia) • Tomáš Škumát, Západoslovenská distribučná, a.s. (Slovakia)

65 **New method for identification and localisation of an earthfault in compensated networks**

Gernot DRUML, Sprecher Automation GmbH (Germany) • Oliver SKRBINJEK, Energie Steiermark (Austria) • Uwe Schmidt, University Zittau (Germany) • Karla Frowein, TU-Dresden (Germany) • Peter Schegner, Technische Universitaet Dresden (Germany)

66 **First results concerning localisation of earthfaults in compensated 20-kV-networks based on travelling waves**

Gernot DRUML, Sprecher Automation GmbH (Germany) • Oliver SKRBINJEK, Energie Steiermark (Austria) • Walter HIPP, Energie Steiermark (Austria) • Lothar Fickert, TU-Graz (Austria) • Uwe Schmidt, University Zittau (Germany) • Peter Schegner, Technische Universitaet Dresden (Germany)

114 **Use of Voltage Detection Systems as transducer – Practical return of experience**

Quentin ANTOINE, ENGIE Laborelec (Belgium) • Stijn Uytterhoeven, ENGIE Laborelec (Belgium) • David Lopez Martinez, ENGIE Laborelec (Belgium) • Didier Empain, ENGIE Laborelec (Belgium)

250 **Real Time Fault Level Monitoring**

Geoff Murphy, SP Energy Networks (United Kingdom) • John Outram, Outram Research Ltd (United Kingdom) • Russell Bryans, SP Energy Networks (United Kingdom) • Malcolm Bebbington, SP Energy Networks (United Kingdom) • Valerie Outram, Outram Research Ltd (United Kingdom) • Mourad Khaddoumi, SP Energy Networks (United Kingdom)

292 **Utilization of a mixture of CTs and current sensors in line differential protection applications**

Ontrei Raipala, ABB Oy (Finland) • Petri Hovila, ABB Oy (Finland) • Janne Leminen, ABB Oy (Finland) • Amir Farughian, University of Vaasa (Finland) • Aushiq Memon, University of Vaasa (Finland) • Kimmo Kauhaniemi, University of Vaasa (Finland)

402 **New method of arc suppression coil tuning using truly multifrequency current signal**

Petr Vancata, EGE, spol. s r.o. (Czech Republic) • Ivan Matuljak, EGE, spol. s r.o. (Czech Republic)

490 **Practical Demonstration of High-impedance Fault Detection Technology in MV Distribution Network**

LI Tianyou, Fujian Electricity Power Co. LTd. (China) • Huang Chaoyi, Quanzhou Electric Power Supply Company (China)

531 **Analytical calculation of the neutral point displacement voltage for high impedance earth faults in resonant earthed neutral systems**

Ludwig Döring, Technische Universität Darmstadt (Germany) • Benjamin Braun, Technische Universität Darmstadt (TU DA) (Germany) • Klaus Böhme, Siemens AG (Germany) • Stefan Werben, Siemens AG (Germany) • Matthias Kereit, Siemens AG (Germany) • Jutta Hanson, Technische Universität Darmstadt (Germany)

661 **New solution for detecting single phase-to-ground faults in resonant-grounded systems**

Gergely Pócsi, Protecta Co. Ltd. (Hungary) • Ferenc Radvánszki, Protecta Co. Ltd. (Hungary) • Dr. Ferenc Weingart, Protecta Co. Ltd. (Hungary) • György Csipke, Protecta Co. Ltd. (Hungary)

695 **IMPROVING PERSONAL SAFETY IN MV-NETWORKS THROUGH NOVEL EARTH-FAULT CURRENT BASED FEEDER PROTECTION**

Ari Wahlroos, ABB Oy (Finland) • Janne Altonen, ABB Oy (Finland) • Risto Pitkänen, - (Finland) • Sakari Kauppinen, JE-Siirto Oy, Jyväskylän Energiayhtiöt (Finland)

833 **Loss of Neutral in Low Voltage Electrical Installation with connected DG units – Consequences and Solutions**

Syllas Frantzeskakis, Democritus University of Thrace (Greece) • Dionisis Voglitsis, Democritus University of Thrace (Greece) • Nick Papanikolaou, Democritus University of Thrace (Greece) • Christos Christodoulou, Democritus University of Thrace (Greece) • Ioannis Gonos, National Technical University of Athens (Greece)

837 **IEC 61850: Believe or don´t believe in testing. That is the question!**

Jorge Cardenas, GE Grid Automation (Spain) • Rannveig Løken, Statnett (Norway) • Javier Martin, Red Electrica de España (Spain) • Jose Mendez, GE Grid Automation (Canada) • Joaquin Rodriguez, GE Grid Automation (Spain) • Diego Arribas, Red Electrica de España (Spain) • Daniel Ruiz Ayala, Red Electrica de España (Spain)

863 **Operation Analysis and Improvement Measures of Residual Current Protection of Low Voltage Distribution Network**

Huang Chaoyi, Quanzhou Electric Power Supply Company (China) • LI Tianyou, Fujian Electricity Power Co. LTd. (China) • PAN Guomei, Electric Power Research Institute,SMEPC (China)

917 **Study on Accuracy of Distribution Fault Point Localization by Resonance Frequency Analysis**

Ryota Yamamoto, Tokyo Electric Power Company Power Grid, Inc. (Japan) • Kentaro Hirose, Tokyo Electric Power Company Holdings, Inc. (Japan) • Takaki Yasui, Tokyo Electric Power Company Holdings, Inc. (Japan)

945 **Using Smart Grid SurveillanceTM to detect and localize failures in the overhead medium voltage grid**

Stefan Burström, Exeri AB (Sweden) • Elisabeth Söderström Johansson, Exeri AB (Sweden)

1049 **Locating Single Phase-to-Earth Faults in Compensated and Isolated Distribution Networks Applying Travelling Wave Technology**

Cezary Dzienis, Siemens EM DG (Germany) • Wolfgang Leitner, NetzOOE (Austria) • Andreas Jurisch, Siemens EM DG (Germany) • Andreas Abart, Netz Oberösterreich GmbH (Austria)

1055 **Prognostic failure detection on overhead power distribution grid utilizing TDR measurement method**

Matsui Masakazu, Kansai Electric Power Co.,Inc. (Japan) • Daisuike Taketani, Kansai Electric Power Co.,Inc. (Japan) • Toshihiro Hayashi, Kansai Electric Power Co.,Inc. (Japan) • Tomohiko Morita, Kansai Electric Power Co.,Inc. (Japan) • Matsushima Tohlu, Kyoto University (Japan) • Takashi Hisakado, Kyoto University (Japan) • Wasa Osami, Kyoto University (Japan)

1079 **Application of fuse autopsy methodology to estimate protected element type of failure**

Juan Gómez, Rio Cuarto National University (Argentina) • Daniel Tourn, Rio Cuarto National University (Argentina) • Gabriel Campetelli, Rio Cuarto National University (Argentina) • Germán Zamanillo, Rio Cuarto National University (Argentina)

1307 **Verification of protective measures for safety of DC charging stations for electric vehicles**

Daniel Herbst, Graz University of Technology (Austria) • Robert Schürhuber, Graz University of Technology (Austria) • Ernst Schmautzer, TU Graz (Austria) • Benjamin Jauk, Graz University of Technology (Austria) • Christian Auer, Kristl, Seibt & Co. GesmbH (Austria)

1973 **Real Time detection and localization of self extinguishing defects on a MV network**

Nicolas Grégis, CEA TECH - LIST (France) • François Cochet, Nexans Suisse SA (Switzerland) • Jaume Benoit, CEA TECH - LIST (France) • Nicolas Ravot, CEA TECH - LIST (France) • Gabriel Gobat, Nexans Suisse SA (Switzerland) • Philippe Desbats, CEA TECH - LIST (France)

2110 **SIEMENS Fault Collector Gateway Test On LE “Sandbox” – The First Open National Energy Sandbox In Europe**

Paulius Butkus, Energijos skirstymo operatorius (Lithuania) • Felix Cadelcu, Siemens AG (Germany) • Andrius Stamkauskas, Siemens Osakeyhtioe (Lithuania) • Audrius Grainys, Vilnius Gediminas Technical University (Lithuania)

2323 **Improve your SAIDI with Advanced Fault Passage Indication**

Jean-Yves Pocthier, Schneider Electric (France) • Ludovic Lamberti, Schneider Electric (France) • Yves Chollot, Schneider Electric (France)

Poster Tour PT37

Block 2: Control (Part 3)

6 June 2019 from 16:30 to 18:00

Poster Area

46 **Enhanced Feeder Reconfiguration in Primary Distribution Networks using Backtracking Search Technique**

Abdullah Shaheen, SDEDCo, Ministry of Electricity (Egypt) • Ragab El sehiemy, Faculty of Engineering, Kafrelsheikh University (Egypt)

47 **Operation of extensive grid automation: Challenges on the example of voltage control**

Christina Süfke, Westnetz GmbH (Germany) • Nele Schlenker, innogy SE (Germany) • Ralf Heilemann, Westnetz GmbH (Germany)

138 **Site acceptance testing of a Duke Energy automation project utilizing a simulation based test approach**

Peter Hoffman, Duke Energy (USA) • Erich Keller, G&W Electric Company (USA) • Frederic Dunet, OMICRON electronics (France)

232 **Applications of Phasor Measurement Units in distribution grids - Practical return of experience**

Quentin ANTOINE, ENGIE Laborelec (Belgium) • Stijn Uytterhoeven, ENGIE Laborelec (Belgium) • Loriano Pellichero, ORES (Belgium)

395 **Adaptive Service Restoration Strategy of Distribution Networks with Distributed Energy Resources and Soft Open Points**

Chengwei Lou, Aston University (United Kingdom) • Jin Yang, Aston University (United Kingdom)

552 **Implementation Techniques of Multistation Line Transfer Function with Fault Tolerance in MEA's Distribution System**

Pichit Jintagosonwit, Metropolitan Electricity Authority (Thailand)

869 **Implementation and trial of centralised voltage control in 33kV and 11kV electricity distribution networks**

Yiango Mavrocostanti, Western Power Distribution (United Kingdom) • Jonathan Berry, Western Power Distribution (United Kingdom)

998 **IoT-PMU. How to improve the observability on the Distribution Networks**

Juan Manuel Montes, Schneider Electric (Spain) • Jose Pinilla, Schneider Electric (Spain) • Francisco Ramos, Schneider Electric (Spain)

1083 **Self-healing distribution grid based on adaptive protection and IEC61850 decentralized architecture**

Tomislav Sinjeri, HEP DSO Elektra Koprivnica (Croatia) • Josip Tosic, Siemens d.d. (Croatia) • Vladimir Gagić, Siemens d.d. (Croatia) • Zvonimir Livaić, Siemens d.d. (Croatia) • Rodrigo Braga, Siemens AG (Germany)

1097 **The Need Case and Benefits of an Autonomously Controlled Active Distribution Network**

Jonathan Berry, Western Power Distribution (United Kingdom) • Yiango Mavrocostanti, Western Power Distribution (United Kingdom) • Neil Murdoch, GHD (United Kingdom) • Daniel Hardman, GHD (United Kingdom)

1138 **Advanced Decentralized Protection, Control and Monitoring Strategies for Distribution Automation**

Pedro Alves, EDP Distribuição-Energia, S.A. (Portugal) • João Basílio, EDP Distribuição-Energia, S.A. (Portugal) • Rui Dias Jorge, EFACEC (Portugal) • Ana Cristina Aleixo, EFACEC (Portugal) • Rogério Dias Paulo, EFACEC (Portugal) • Aurélio Blanquet, EDP Distribuição-Energia, S.A. (Portugal) • Bruno Espírito Santo, EDP Distribuição-Energia, S.A. (Portugal)

1195 **EDGE Digital Substation – A disruptive automation field project**

Paulo Santos, EDP Distribuição-Energia, S.A. (Portugal) • Hélder Barbosa, EDP Distribuição-Energia, S.A. (Portugal) • Aurélio Blanquet, EDP Distribuição-Energia, S.A. (Portugal) • Bastian Fischer, Locamation B.V. (Netherlands) • Bruno Espírito Santo, EDP Distribuição-Energia, S.A. (Portugal)

1222 **Soft-open points for medium voltage networks – A case study**

Patrick Favre-Perrod, University of Applied Sciences and Arts Western Switzerland (Switzerland) • Chloé Dour, University of Applied Sciences Western Switzerland (Switzerland) • Mohamed Allani, University of Applied Sciences Western Switzerland (Switzerland) • Arnoud Bifrare, Romande Energie SA (Switzerland) • Mauro Carpita, University of Applied Sciences Western Switzerland (Switzerland) • Thomas Pidancier, University of Applied Sciences Western Switzerland (Switzerland) • Sébastien Wasterlain, University of Applied Sciences Western Switzerland (Switzerland)

1362 **Operation and Optimization Technologies of Active Distribution Network with Multi-terminal Soft Open Points**

Haoran Ji, Tianjin University (China) • Chengshan Wang, Tianjin University (China) • Peng Li, Tianjin University (China) • Guanyu Song, Tianjin University (China) • Hao Yu, Tianjin University (China) • Shiqian Ma, State Grid Tianjin Electric Power Research Institute (China)

1850 **Enhancing Operational Awareness of Distribution System Operators with a Semi-Autonomous Intelligent Grid Control Suite**

Andreas Kubis, PSI Software AG (Germany) • Markus Boller, PSI Software AG (Germany) • Julian Kemper, PSI Nentec GmbH (Germany) • Roman Uhlig, PSI Nentec GmbH (Germany) • Martin Stiegler, PSI Nentec GmbH (Germany) • Marcus Stötzel, PSI Nentec GmbH (Germany)

2162 **Application of Centralized Self-Healing Architecture in a Distribution Network – Case Study**

Tiago Torres dos Santos, Powersyslab (Brazil) • Lucas Lorensi dos Santos, Powersyslab (Brazil) • Felipe Farinon, Powersyslab (Brazil) • Flavio Antonio Becon Lemos, Universidade Federal do Rio Grande do Sul (Brazil) • Rubem Netto Dias, Elipse Software (Brazil) • Aluisio Leite, Energisa S.A. (Brazil)

Poster Tour PT38

Block 3: Protection (Part 2)

6 June 2019 from 16:30 to 18:00

Poster Area

341 **5G networks enabling new smart grid protection solutions**

Petri Hovila, ABB Oy (Finland) • Petri Syväluoma, ABB (Finland) • Heli Kokkoniemi-Tarkkanen, VTT (Finland) • Seppo Horsmanheimo, VTT (Finland) • Seppo Borenius, Aalto University (Finland) • Zexian Li, Nokia Bell Labs (Finland) • Mikko Uusitalo, Nokia Bell Labs (Finland)

403 **Investigating adaptation of line protection means to low-voltage-ride-through requirements in low-voltage distribution feeders with photovoltaic generators**

Aristotelis Tsimtsios, Democritus University of Thrace (Greece) • Dionisis Voglitsis, Democritus University of Thrace (Greece) • Ioannis Perpinias, Democritus University of Thrace (Greece) • Christos Korkas, Democritus University of Thrace (Greece) • Nick Papanikolaou, Democritus University of Thrace (Greece)

454 **Minimizing Distributed Generation Impacts on Protection Systems using Fault Current Limiters Experimentally**

nader sherbilla, Beheira Co. for Electricity Distribution (Egypt)

801 **Frequency & ROCOF protections: toward a better evaluation of their rapidity**

Olivier ARGUENCE, INPG SA (France) • Florent CADOUX, Fondation Partenariale de Grenoble INP (France)

851 **FAULT DETECTION IN LOW VOLTAGE NETWORKSWITH SMART METERS AND MACHINE LEARNING TECHNIQUES**

TANIA VAZQUEZ, EDP España (Spain) • PABLO PEREZ, OVIEDO UNIVERSITY (Spain) • JORGE DIEZ, OVIEDO UNIVERSITY (Spain) • JESÚS FERNÁNDEZ, EDP España (Spain)

1075 **An Experimental Study of Low-Current DC Series Arc Faults for Condition Monitoring Purpose**

Shibo Lu, University of New South Wales (Australia) • Hua Chai, University of New South Wales (Australia) • B. T. Phung, University of New South Wales (Australia) • Daming Zhang, University of New South Wales (Australia)

1081 **Return paths of earth faults current in medium voltage grids with underground shielded cables**

Quentin ANTOINE, ENGIE Laborelec (Belgium) • Blandine Hennuy, ENGIE-Laborelec (Belgium) • David Valmacco, RESA (Belgium) • Walter Finotto, Fluvius (Belgium)

1093 **Scales and Objectives for Under-frequency Load Shedding**

Barnabé Potel, Univ. Grenoble Alpes, CNRS, Grenoble INP, G2Elab (France) • Vincent Debusschere, Univ. Grenoble Alpes, CNRS, Grenoble INP, G2Elab (France) • Florent CADOUX, Fondation Partenariale de Grenoble INP (France) • Leticia De Alvaro Garcia, Enedis (France)

1141 **Current based Distance Protection in Closed-Ring Grids with Distributed Generation**

Martin Biller, Friedrich-Alexander University Erlangen-Nuremberg (FAU) (Germany) • Johann Jaeger, Friedrich-Alexander University Erlangen-Nuremberg (FAU) (Germany)

1194 **Characterising Grid Connection Stability of Low Voltage PV Inverters through Real-time Hardware Testing**

Panagiotis Bountouris, Power Networks Demonstration Centre (United Kingdom) • Ibrahim Abdulhadi, Power Networks Demonstration Centre (United Kingdom) • Adam Dysko, University of Strathclyde (United Kingdom) • Federico Coffele, University of Strathclyde (United Kingdom)

1341 **Exploring IED data management and IEC 61850 features to introduce a condition based maintenance approach in the Portuguese DSO**

Luís Candeias, EDP Distribuição (Portugal) • Carlos Cura, EDP Distribuição (Portugal) • Helder Heitor, EDP Distribuição (Portugal) • Miguel Veríssimo, EDP Distribuição (Portugal) • Paulo Ribeiro, EDP Distribuição (Portugal)

1351 **Functional Testing of Distribution Systems with High Penetration ofDistributed Energy Resources**

Alexander Apostolov, OMICRON electronics (USA) • Frederic Dunet, OMICRON electronics (France) • Juan Parra, OMICRON electronics (Suriname)

1386 **Touch voltages and earth fault currents in a rural large-scale underground cable network with connected earthing systems**

Jyrki Reikko, Caruna Oy (Finland) • Antti Keskinen, Caruna Oy (Finland) • Rauno Ristimäki, Caruna Oy (Finland)

1391 **Research and application of active protection technology in LVDC system**

Zou Xueyi, Nanjing Golden Cooperate DC Power Distribution Technology. Co.,Ltd. (China) • Zhu Xuezhong, Nanjing University of Aeronautics & Astronautics (China) • Li Zhong , Nanjing Golden Cooperate DC Power Distribution Technology. Co.,Ltd. (China) • Tong Hao, Nanjing Golden Cooperate DC Power Distribution Technology. Co.,Ltd. (China) • Chen Wenbo, Nanjing Golden Cooperate DC Power Distribution Technology. Co.,Ltd. (China) • Yan Jianhai, Nanjing Golden Cooperate DC Power Distribution Technology. Co.,Ltd. (China)

1499 **New faulted phase selector solution for dealing with the effects of Type-4 Wind Turbine on present protection relaying algorithms**

Eduardo Martinez Carrasco, Fundacion CIRCE (Spain) • Maria Teresa Villén Martínez, Fundacion CIRCE (Spain) • Samuel Borroy Vicente, Fundacion CIRCE (Spain) • David López Cortón, Red Eléctrica de España (Spain) • Marjan Popov, TU Delft (Netherlands) • Henri Grasset, Schneider Electric (France)

1537 **Smart Grid Protection and Automation Enabled by IEC 61850 Communications Over 5G Networks**

Ana Cristina Aleixo, EFACEC (Portugal) • José Cabaça, Altice Labs (Portugal) • Pedro Neves, Altice Labs (Portugal) • Rui Dias Jorge, EFACEC (Portugal) • Rogério Dias Paulo, EFACEC (Portugal) • Alberto Rodrigues, EFACEC (Portugal)

1570 **Protection Coordination in DC Shipboard Power Systems: Challenges, Current Status and New Technologies**

Seongil Kim, École Polytechnique Fédérale de Lausanne (EPFL) (Switzerland) • Soo-Nam Kim, Hyundai Electric & Energy Systems (Korea, Republic of) • Drazen Dujic, École Polytechnique Fédérale de Lausanne (EPFL) (Switzerland)

1583 **Enel grid digitalization through multifunctional control and protection devices**

Christian Noce, Enel Global Infrastructure and Networks Srl (Italy) • Antonio Cammarota, E-distribuzione Spa (Italy) • Luca Delli Carpini, E-distribuzione Spa (Italy) • Fabio Giammanco, Enel Global Infrastructure and Networks Srl (Italy) • Pietro Paulon, E-distribuzione Spa (Italy) • Gianluca Sapienza, E-distribuzione Spa (Italy)

1620 **The Benefits and Design of a Dynamic Protection System for the Distribution Network**

Daniel Hardman, GHD (United Kingdom) • Neil Murdoch, GHD (United Kingdom) • Jonathan Berry, Western Power Distribution (United Kingdom)

1761 **Smart fault selection through smart protection devices using IEC61850**

Luca Delli Carpini, E-distribuzione Spa (Italy) • Antonio Cammarota, E-distribuzione Spa (Italy) • Gianluca Sapienza, E-distribuzione Spa (Italy) • Pietro Paulon, E-distribuzione Spa (Italy)

2002 **Protection and Earthing Requirements of Low Voltage AC and DC Distribution Networks Interfaced by Smart Transformers**

Abdullah Emhemed, Department of Electronic and Electrical Engineering, University of Strathclyde (United Kingdom) • Kyle Smith, Department of Electronic and Electrical Engineering, University of Strathclyde (United Kingdom) • Graeme M. Burt , University of Strathclyde (United Kingdom) • Paul Black, WSP (United Kingdom) • Ali Kazerooni, WSP (United Kingdom) • Anthony Donoghue, SP Energy Networks (United Kingdom) • Michael Eves, SP Energy networks (United Kingdom)

2004 **Digital System Protection Design – A new Toolchain for Protection System Automation**

Georg Janick Meyer, Friedrich-Alexander University Erlangen-Nuremberg (FAU) (Germany) • Martin Biller, Friedrich-Alexander University Erlangen-Nuremberg (FAU) (Germany) • Christian Romeis, Siemens AG (Germany) • Li Shang-Jaeger, Siemens AG (Germany) • Maximilian Dauer, Siemens AG (Germany) • Benjamin Braun, Technische Universität Darmstadt (TU DA) (Germany) • Nils Schäkel, Leibniz Universität Hannover (LUH) (Germany) • Johann Jaeger, Friedrich-Alexander University Erlangen-Nuremberg (FAU) (Germany)

2084 **Improved Control System for Hybrid AC/DC microgrids considering Transient Short Circuit Faults**

Meisam Sadeghi, Tabriz Electric Power Distribution Company (Iran, Islamic Republic of) • Mojtaba Khederzadeh, Shahid Beheshti University (Iran, Islamic Republic of) • Sheida Mohammadzadeh Jasour, Tabriz Electric Power Distribution Company (Iran, Islamic Republic of)

2142 **Comparison of decentralised and centralised under-frequency loadshedding**

Karel Maslo, CEPS, a.s. (Czech Republic) • Petr Toman, Brno University of Technology (Czech Republic) • Jan Koudelka, Brno University of Technology (Czech Republic)

2217 **Reliable Rate of Change of Frequency (RoCoF) Measurements: Use Cases, Operational Parameters and Test Conditions**

Gert Rietveld, VSL (Netherlands) • Paul Wright, NPL (United Kingdom) • Kevin Johnstone, Strathclyde University (United Kingdom) • Andrew Roscoe, Strathclyde University (USA)

Session 4 Distributed energy resources and efficient utilisation of electricity

Poster Tour PT41

Block 1: Co-ordination, flexibility and services

6 June 2019 from 09:00 to 10:30
6 June 2019 from 11:00 to 12:30

Poster Area

199 **From Flexible Connections to Enabling Flexibility: The Evolution of Active Network Management at SP Energy Networks**

Euan Norris, Iberdrola (United Kingdom) • Laura Kane, ScottishPower (United Kingdom) • Euan Davidson, ScottishPower (United Kingdom)

666 **Flexibility Hub – Multi service framework for coordination of decentralised flexibilities**

José Villar, INESCTEC (Portugal) • João Aguiar, INESCTEC (Portugal) • Fabio Retorta, INESCTEC (Portugal) • Bernardo Silva, INESCTEC (Portugal) • Nuno Fulgêncio, INESCTEC (Portugal) • Nuno Lopes Filipe, EDP CENT / Labelec (Portugal) • Miguel Marques, EDP CNET (Portugal) • Miguel Louro, EDP Distribuição (Portugal)

684 **Coordinated Volt/Var Control for Smart Distribution Grids**

Roberta Biazzi, Federal University of Santa Maria (Brazil) • Daniel Pinheiro Bernardon, Federal University of Santa Maria (Brazil) • Alzenira Da Rosa Abaide, Federal University of Santa Maria (Brazil) • Pedro Marcolin, Federal University of Santa Maria (Brazil) • Ana Paula Carboni de Mello, Federal University of Pampa (Brazil) • Rafael Gomes Bento, CPFL Power Utilit (Brazil)

870 **A Smart Contracting Framework for Aggregators of Demand-Side Response**

Sergio Elizondo, Heriot-Watt University (United Kingdom) • Stephen Wattam, Upside Energy Ltd (United Kingdom) • Valentin Robu, Heriot-Watt University (United Kingdom) • Rachel Jones, Upside Energy Ltd (United Kingdom) • Graham Oakes, Upside Energy Ltd (United Kingdom)

879 **Charges for Producers connected to Distribution Systems**

Sophia Politopoulou, HEDNO S.A. (Greece) • Antonis Spyropoulos, HEDNO S.A. (Greece) • Paul Wilczek, Eurelectric (Belgium) • Jan Bocora, Východoslovenská distribučná (Slovakia) • Jan Budke, German Association of Energy and Water Industries – BDEW (Germany) • Manuel Martinez, ENEL (Spain)

1044 **Assessing the Impact of Distributed Energy Resources' Incentive Designs on Network Expansion Using a Spatial Technology Diffusion Model**

Fabian Heymann, MITEI/ INESC TEC/ FEUP (Portugal) • Pablo Duenas, MITEI (USA) • Filipe Joel Soares, INESC TEC (Portugal) • Vladimiro Miranda, INESC TEC/ FEUP (Portugal)

1158 **Testing TSO-DSO Interaction Schemes for the Participation of Distribution Energy Resources in the Balancing Market: the SmartNet Simulator**

Marco Rossi, RSE (Italy) • Giacomo Viganò, RSE (Italy) • Gianluigi Migliavacca , RSE SpA (Italy) • Yelena Vardanyan, Technical University of Denmark (Denmark) • Razgar Ebrahimy, Technical University of Denmark (Denmark) • Guillaume Leclercq, N-SIDE (Belgium) • Peter Sels, N-SIDE (Belgium) • Marco Pavesi, N-SIDE (Belgium)

1164 **Transformation of a microgrid in a distribution grid support asset**

Gregorio Fernández Aznar, CIRCE Foundation (Spain) • Miguel Ángel Oliván Monge, CIRCE Foundation (Spain) • José Sediles Ortiz, CIRCE Foundation (Spain) • Andreas Muñoz Zuara, CIRCE Foundation (Spain) • Jorge Bruna Romero, CIRCE Foundation (Spain) • Hans Bludszuweit, CIRCE Foundation (Spain) • Inmaculada Prieto Borrero, Endesa Distribución (Spain)

1186 **Adaptive Energy Resource Management System – scaling out microgrid basedsolutions in electrical power systems**

Luis Marques, EFACEC (Portugal) • Filipe Campos, Efacec (Portugal) • Marta Ribeiro, Efacec Energia (Portugal) • Alberto Bernardo, Efacec Energia (Portugal) • Ismael Miranda, Efacec (Storage) (Portugal)

1208 **The EU-SysFlex French industrial-scale demonstrator: coordinating distributed resources for multi-services provision**

Ye Wang, EDF (France) • Hugo Morais, EDF (France) • Bettina Lenz, ENERCON (Germany) • Victor Gomes, ENERCON (France) • Thomas Godlewski, EDF (France) • Heloise Baraffe, EDF R&D (France)

1215 **Net Metering in Brazil: Setting the Scene for the Regulatory Framework Review**

João Marcelo Cavalcante de Albuquerque, Brazilian Electricity Regulatory Agency – ANEEL (Brazil) • Daniel Vieira, Brazilian Electricity Regulatory Agency – ANEEL (Brazil) • Hugo Lamin, Brazilian Electricity Regulatory Agency – ANEEL (Brazil)

1295 **Provision of flexibility services through energy communities**

Massimiliano Garella, DTU (Denmark) • Tiago Sousa, DTU (Denmark) • Pierre Pinson, DTU (Denmark)

1394 **Optimal Operation of a Community Integrated Energy System Considering Tie-line Smoothing**

Hao Yu, Tianjin University (China) • Chaoxian Lv, Tianjin University (China) • Chengshan Wang, Tianjin University (China) • Peng Li, Tianjin University (China) • Guanyu Song, Tianjin University (China) • Shuquan Li, State Grid Customer Service Center (China)

1416 **Blockchain-based self-consumption optimization in local energy communities**

Regina Hemm, AIT Austrian Institute of Technology GmbH (Austria) • Mark Stefan, AIT Austrian Institute of Technology GmbH (Austria) • Friederich Kupzog, AIT Austrian Institute of Technology GmbH (Austria) • Michael Niederkofler, Energie Kompass GmbH (Austria) • Andreas Schneemann, Energie Kompass GmbH (Austria)

1502 **Aggregation of thermostatically controlled loads for flexibility markets**

Joseba Jimeno, Tecnalia (Spain) • Nerea Ruiz, Tecnalia (Spain) • Carlos Madina, Tecnalia (Spain)

1506 **Assessing the energetic self-sufficiency of a residential district**

James Garzon-Real, Bergische Universität Wuppertal (Germany) • Björn Uhlemeyer, Institute of Power System Engineering, University of Wuppertal (Germany) • Markus Zdrallek, University of Wuppertal (Germany) • Jörn Benthin, Gas und Wärme Institut Essen e.V. (Germany) • Nadine Lucke, Gas und Wärme Institut Essen e.V. (Germany) • Ben Wortmann, Gas und Wärme Institut Essen e.V. (Germany) • Carsten Stabenau, Westnetz GmbH (Germany) • Ulrich Dirkmann, innogy SE (Germany)

1632 **Cost-Benefit Analysis of TSO-DSO coordination to operate flexibilitymarkets**

Carlos Madina, Tecnalia (Spain) • Sandra Riaño, Tecnalia (Spain) • Inés Gómez, Tecnalia (Spain) • Pirkko Kuusela, Technical Research Centre of Finland, Ltd. (Finland) • Hamid Aghaie, AIT (Austria) • Joseba Jimeno, Tecnalia (Spain) • Nerea Ruiz, Tecnalia (Spain) • Marco Rossi, RSE (Italy)

1652 **Use of radio base stations to provide ancillary services to the DSO through local flexibility markets**

Miguel Pardo, Endesa (Spain) • Miguel Duarte, Endesa (Spain) • Carlos Madina, Tecnalia (Spain) • Miguel Marroquin, Our New Energy (Spain) • Eric Estrade, Vodafone (Luxembourg)

1662 **Coordination and data exchange between DSO and TSO as key factors for optimizing DER management in the future energy system.**

Christian D'Adamo, e-distribuzione SpA (Italy) • fabio cazzato, e-distribuzione SpA (Italy) • marco di clerico, e-distribuzione SpA (Italy) • simone ferrero, e-distribuzione SpA (Italy)

1688 **Holistic coordination of smart technologies for efficient LV operation, increasing hosting capacity and reducing grid losses**

ALENA ULASENKA, ORMAZABAL CORPORATE TECHNOLOGY (Spain) • LUIS DEL RIO ETAYO, ORMAZABAL CORPORATE TECHNOLOGY (Spain) • PABLO CIRUJANO, ORMAZABAL COTRADIS (Spain) • ALVARO ORTIZ, ORMAZABAL COTRADIS (Spain) • RON BRANDL, FRAUNHOFER IEE / DERlab e.V. (Germany) • Juan Montoya, Fraunhofer IEE (Germany)

1721 **UK Power Networks Providing Power Services from Distributed Energy Resources to Transmission System Operator via a Centralised DERMS platform**

Ali R. Ahmadi, UK Power Networks (United Kingdom) • Inma Martinez, National Grid ESO (United Kingdom) • Biljana Stojkovska, National Grid ESO (United Kingdom) • Tim Manandhar, UK Power Networks (United Kingdom) • Sotiris Georgiopoulos, UK Power Networks (United Kingdom)

1732 **Enhanced Transmission and Distribution System Coordination and Control Utilising Distribution Network Capacity and Avoiding Conflicts of Service Offered to Transmission System Operator**

Ali R. Ahmadi, UK Power Networks (United Kingdom) • Michael Gordon, National Grid (United Kingdom) • Matthew White, UK Power Networks (United Kingdom) • Alan Minton, National Grid (United Kingdom) • Sotiris Georgiopoulos, UK Power Networks (United Kingdom) • Dionysios Stamatiadis, UK Power Networks (United Kingdom)

1806 **INNOVATIVE ELECTRICITY NETWORK OPERATION PLANNING TOOL FOR TSOs AND DSOs**

Ataollah Moghim Khavari, DERlab (Germany) • Melios Hadjikypris, UCY (Cyprus) • Giorgio Graditi, ENEA (Italy) • Marialaura Di Somma, ENEA (Italy) • Anna Wakszyńska, IEn (Poland) • Sawsan Henein, AIT (Austria)

1847 **Valuation of harnessing flexibility from decentralized water electrolysis systems for the DSO**

Karl Axel Sträng, Enedis (France) • Jean-Christophe Lanoix, Hinicio (France) • Joel Neave, Hinicio (France) • Frederic Barth, Hinicio (France) • Bruno François, Centrale Lille (France)

1891 **A Transparent Market Design for Balancing and Voltage Control Products**

Irina Oleinikova, NTNU (Norway) • Luciano Martini, RSE (Italy) • Emilio Rodriguez, TECNALIA (Spain)

1900 **Stochastic bottom-up framework for load and flexibility for agent based controls of energy communities**

Arne Surmann, Fraunhofer Institute for Solar Energy Systems (Germany) • Stefan Chantrel, Fraunhofer Institute for Solar Energy Systems (Germany) • David Fischer, Fraunhofer Institute for Solar Energy Systems (Germany) • Robert Kohrs, Fraunhofer Institute for Solar Energy Systems (Germany) • Christof Wittwer, Fraunhofer Institute for Solar Energy Systems (Germany)

1936 **Project SENSIBLE's results from MV/LV coordinated island operation in a distribution grid**

Ricardo Jorge Santos, EDP Distribuição (Portugal) • André Neves, EDP Distribuição (Portugal) • António Araújo, EDP Distribuição (Portugal) • Pedro Castro, EDP NEW (Portugal) • Filipe Guerra, EDP NEW R&D (Portugal) • Clara Gouveia, INESC TEC (Portugal) • José Damásio, Siemens S.A. (Portugal)

1948 **The role of market facilitator: how DSO-owned Energy Storage Systems can support private resources in ancillary services market**

Daniele Clerici, Ricerca sul Sistema Energetico (Italy) • Marco Rossi, RSE (Italy) • Giacomo Viganò, RSE (Italy) • Diana Moneta, RSE (Italy)

1992 **Storage and Energy Management enabling Grid and Market Services: SENSIBLE's Portuguese real demonstration results**

Filipe Guerra, EDP NEW R&D (Portugal) • Ricardo André, EDP NEW R&D (Portugal) • Ricardo Jorge Santos, EDP Distribuição (Portugal) • Alexis Bocquet, MINES-ParisTech, PERSEE (France) • Catherine Murphy-O'Connor, Indra (Portugal) • Clara Gouveia, INESC TEC (Portugal) • José Damásio, Siemens S.A. (Portugal) • Salvador Rodriguez, GPTech (Spain)

2037 **Regional CoordinationControl of Active Distribution Network Based on Bidding Mechanism**

Qiang FAN, Shanghai Jiao Tong University (China) • Dong Liu, Shanghai Jiao Tong University (China) • Xiaochun XU, State Grid Huai'an Power Supply Company (China) • Xiaofei WU, State Grid Huai'an Power Supply Company (China)

2055 **Integration of distributed reactive power sources through Virtual Power Plant to provide voltage control to transmission network**

Danny Pudjianto, Imperial College London (United Kingdom) • Predrag Djapic, Imperial College London (United Kingdom) • Goran Strbac, Imperial College London (United Kingdom) • Biljana Stojkovska, National Grid ESO (United Kingdom) • Ali R. Ahmadi, UK Power Networks (United Kingdom) • Inma Martinez, National Grid ESO (United Kingdom)

2144 **Energy Procurement of Large Industrial Consumers: Real-time Pricing against Time-of-Use Pricing**

Habib Farham, East Azarbaijan Electric Power Distribution company (Iran, Islamic Republic of) • Leila Mohammadian, Islamic Azad University Shabestar Branch (Iran, Islamic Republic of) • Hasan Alipour, Islamic Azad University Shabestar Branch (Iran, Islamic Republic of) • Jaber Pouladi, Islamic Azad University Shabestar Branch (Iran, Islamic Republic of)

2320 **BESS located in Primary Substation for RES integration and ancillary services provision**

Maurizio Delfanti, Politecnico di Milano (Italy) • Filippo Bovera, Politecnico di Milano (Italy) • Davide Falabretti, Politecnico di Milano (Italy) • Marco Merlo, Politecnico di Milano (Italy) • Giuliano Rancilio, Politecnico di Milano (Italy)

2325 **A Collaborative Demand-Side Management Scenario for Liberalized Smart Grids**

Martin Hupez, University of Mons (Belgium) • Zacharie De Grève, University of Mons (Belgium) • François Vallée, University of Mons (Belgium)

Poster Tour PT42

Block 2: Planning for and understanding the impact of DER

6 June 2019 from 09:00 to 10:30
6 June 2019 from 11:00 to 12:30

Poster Area

184 **Filling missing values for AI-based (load) forecasts within the InterFlex micro grid demo in Simris, Sweden**

Roxana Pohlmann, RWTH Aachen (Germany) • Henning Wilms, RWTH Aachen (Germany) • Marco Cupelli, EON Energy Research Center - RWTH Aachen (Germany) • Inko Elgezua Fernandez, E.ON (Germany) • Antonello Monti, EON Energy Research Center - RWTH Aachen (Germany)

390 **Reasonability of "Fit and inform" for sources up to 50 kW within LV networks**

Josef Hrouda, EGC-EnerGoConsult CB (Czech Republic) • Frantisek Kysnar, EGC-EnerGoConsult CB (Czech Republic) • Zdenek Pavlovic, CEZ Distribuce, a.s. (Czech Republic) • Jan Petrasek, EGC-EnerGoConsult CB (Czech Republic) • Karel Prochazka, EGC-EnerGoConsult CB (Czech Republic)

413 **Disaggregating Grid Load into Consumption and Solar Generation**

Frank Kreuwel, Alliander N.V. (Netherlands) • Kasper van Lohuizen, Alliander N.V. & Wageningen University & Research (Netherlands) • Chiel van Heerwaarden, Wageningen University & Research (Netherlands)

421 **A novel scheme of under frequency load shedding for a microgrid integrated with renewable energy resources**

Ahmed Elzawawy, Benha University (Egypt) • Mahmoud Ali, Benha University (Egypt) • Said Mekhemer, Ain Shams university (Egypt) • Fahmy Bendary, Faculty of Engineering Shoubra, Benha University (Egypt) • Wagdy Mansour, Benha University (Egypt)

425 **Mitigation of Faults in Grid-Connected Single Machine Brushless Double-Fed Induction Generator**

Maged Nashed, Electronics Research Institute (Egypt) • Mona Eskander, Electronics Research Institute (Egypt) • Mahmoud Saleh, Electronics Research Institute (Egypt)

427 **Generalized Synthesis Load Model Considering Lithium-ion Battery**

Li Shiming, Guangdong Grid Company Power Dispatching Control Center (China) • Liu Wenzhe, Datang Xianyi Technology Co. Ltd (China) • Tan Zuoyun, Hunan University (China) • Lin Yueting, Guangdong Grid Company Power Dispatching Control Center (China)

524 **Experimental Study of the Isolated Operation of a Home DC Link System**

Teru Miyazaki, Waseda University (Japan) • Wataru Hirohashi, Waseda University (Japan) • Jun Yoshinaga, Waseda University (Japan) • Yasuhiro Hayashi, Waseda University (Japan) • Kosuke Kobayashi, Tokyo Gas Co., Ltd (Japan) • Tatsuya Tsukada, Tokyo Gas Co., Ltd (Japan)

549 **Flexibility Determination of Distributed Energy Resources, Storage Systems and Heating Units considering Load and Feed-In Uncertainty**

Martin Zimmerlin, Karlsruhe Institute of Technology (Germany) • Ovidiu Popa, Karlsruhe Institute of Technology (Germany) • Lukas Held, Karlsruhe Institute of Technology (Germany) • Felicitas Mueller, Karlsruhe Institute of Technology (Germany) • Michael Suriyah, Karlsruhe Institute of Technology (Germany) • Thomas Leibfried, Karlsruhe Institute of Technology (Germany)

598 **Voltage management in the presence of Distributed Energy Resources - Field implementation of a robust Distribution State Estimator with errors in sensor data**

Keddy KAMGA, EDF R&D (France) • Olivier Carré, Enedis (France) • Benoît Bouzigon , Enedis (France)

624 **Study on Voltage Stability Limit of 6.6 kV Distribution System by Reverse Power Flow from a Group of Photovoltaic Generators**

Hideki Iwatsuki, Nagoya Institute of Technology (Japan) • Hiroyuki Ishikawa, Chubu Electric Power Company (Japan) • Ippei Matsuura, Polytechnic University (Japan) • Hirotaka Shimizu, Polytechnic University (Japan) • Toshiro Matsumura, Aichi Institute of Technology (Japan) • Kento Tatewaki, Nagoya University (Japan) • Yasunobu Yokomizu, Nagoya University (Japan)

671 **The influence of voltage-controlled transformers on PV-Park Inverters.**

Werner Hofer, Maschinenfabrik Reinhausen GmbH (Germany) • Markus Riepl, Maschinenfabrik Reinhausen GmbH (Germany)

702 **The Introduction of Voltage Stabilization System according to the Increased DERs in KOREA**

Hak-Yeol Park, KEPCO KDN (Korea, Republic of) • Deok-Chul Kim, KEPCO KDN (Korea, Republic of)

726 **Optimization of network planning based on hourly classification of consumed energy**

Amir Khazaee, Mashhad Electric Energy Distribution Co. (Iran, Islamic Republic of) • Hossein Delavaripour, Mashhad Electric Energy Distribution Co. (Iran, Islamic Republic of) • Hossein Hooshmandi Safa, Mashhad Electric Energy Distribution Co. (Iran, Islamic Republic of) • Mehran Ghasempour, Mashhad Electric Energy Distribution Co. (Iran, Islamic Republic of)

729 **CVR in PV-Rich Distribution Networks: A Customer Perspective**

Luis Gutierrez-Lagos, The University of Manchester (United Kingdom) • Luis F. Ochoa, The University of Melbourne (Australia)

982 **A risk-based framework to optimize distributed generation investment plans considering incentive reliability regulations**

Mohammad Jooshaki, Sharif University of Technology (Iran, Islamic Republic of) • Hossein Farzin, Shahid Chamran University of Ahvaz (Iran, Islamic Republic of) • Ali Abbaspour, Sharif University of Technology (Iran, Islamic Republic of) • Mahmud Fotuhi-Firuzabad, Sharif University of Technology (Iran, Islamic Republic of) • Matti Lehtonen, Aalto University (Finland)

1020 **Modelling of Stationary and Dynamic Demand Behavior considering Sectoral and Regional Characteristics**

Daniel Stenzel, Technical University of Munich (Germany) • Lorenz Viernstein, Technical University of Munich (Germany) • Dominic Hewes, Technical University of Munich (Germany) • Thomas Würl, Technical University of Munich (Germany) • Rolf Witzmann, Technical University of Munich (Germany) • Sascha Altschäffl, TenneT TSO GmbH (Germany) • Jörg Michael Schmidt, TenneT TSO GmbH (Germany)

1058 **Combining distributed synchronized high frequency measurements with a control system for smart low voltage grids**

Gerwin Hoogsteen, University of Twente (Netherlands) • Marco E. T. Gerards, University of Twente (Netherlands) • Johann L. Hurink, University of Twente (Netherlands) • Gerard J. M. Smit, University of Twente (Netherlands) • Omar Mansour, Smart State Technology (Netherlands) • Dennis Bijwaard Smart State Technology, Smart State Technology (Netherlands)

1134 **Assessment of the Reliability of Power Balance and Flexibility Forecasts from Distribution Networks**

Lukas Kalisch, FGH e.V. (Germany) • Dirk Lehmann, FGH e.V. (Germany) • Hendrik Vennegeerts, FGH e.V. (Germany) • Albert Moser, FGH e.V. / RWTH Aachen (Germany)

1319 **Conditions for increasing DER anti-islanding protection frequency range**

Miguel Veríssimo, EDP Distribuição (Portugal) • André Neves, EDP Distribuição (Portugal) • Miguel Louro, EDP Distribuição (Portugal) • Nuno Lopes Filipe, EDP CENT / Labelec (Portugal) • Andreia Leiria, EDP Labelec (Portugal) • Luís Marcelino Ferreira, Ambertree (Portugal) • Pedro Carvalho, AmberTREE (Portugal) • Fernando Carvalho, Ambertree (Portugal)

1330 **Real case islanding detection on the Distribution network by using microPMU units**

Miguel Veríssimo, EDP Distribuição (Portugal) • Pedro Aleixo, EDP Distribuição (Portugal) • André Falcão, EDP Distribuição (Portugal) • André Neves, EDP Distribuição (Portugal) • Miguel Louro, EDP Distribuição (Portugal) • Celso Filipe Silva, EDP Distribuição (Portugal) • João Carvalho, EDP Distribuição (Portugal) • Fernando Pimenta, Infocontrol (Portugal)

1419 **Development of Electricity Demand Estimation Modelin Distribution Network Based on Grid-Square Statistics**

Yasuyuki Kunii, Chubu Electric Power Co.,Inc. (Japan) • Junzou Takemura, Chubu Electric Power Co.,Inc. (Japan) • Tetsuya Matsuki, Nagoya University (Japan) • Masaki Imanaka, Nagoya University (Japan) • Muneaki Kurimoto, Nagoya University (Japan) • Shigeyuki Sugimoto, Nagoya University (Japan) • Takeyoshi Kato, Nagoya University (Japan)

1531 **Automated Detection of Electric Vehicles in Hourly Smart Meter Data**

Volker Hoffmann, SINTEF AS (Norway) • Bjørn Ingeberg Fesche, SINTEF AS & University of Oslo (Norway) • Karoline Ingebrigtsen, SINTEF Energy Research AS (Norway) • Ingrid Nytun Christie, Eidsiva Nett AS (Norway) • Morten Punnerud, Eidsiva Energi AS (Norway)

1569 **Recursive estimation of flexibilities in a radial distribution network**

Pacco Bailly, Mines ParisTech, PSL University, PERSEE (France) • Andrea Michiorri, Mines ParisTech, PSL University, PERSEE (France) • Georges Kariniotakis, Mines ParisTech, PSL University, PERSEE (France)

1588 **Data Driven Approach to Decentralized Control: A Primary Frequency Control Study**

Mazheruddin Hussain Syed, University of Strathclyde (United Kingdom) • Efren Guillo-Sansano, University of Strathclyde (United Kingdom) • Eleftherios Kontis, Aristotle University of Thessaloniki (Greece) • Steven M Blair, University of Strathclyde (United Kingdom) • Yan Xu, Nanyang Technological University (Singapore) • Graeme M. Burt , University of Strathclyde (United Kingdom)

1669 **Impact of the correct modeling of low voltage grid with high DG share on the medium voltage grid calculations**

Christian Schirmer, TU Wien (Austria) • Lukas Kloibhofer, TU Wien (Austria) • Christoph Groiß, Salzburg Netz GmbH (Austria) • Albana Ilo, TU Wien (Austria)

1713 **Mathematical modelling and evaluation of a control algorithm for speed control of DFIGs using model-based predictive control**

Rahim Ajabi-Farshbaf, Tabriz Electric Distribution Company (Iran, Islamic Republic of) • Mohammad Reza Azizian, Sahand University of Technology (Iran, Islamic Republic of) • Ataollah Mokhberdoran, Vestas Wind Systems A/S, Porto Area (Portugal)

1738 **A Three-phase Four-wire State Estimator Algorithm for Low Voltage Network Management**

Ferréol BINOT, CentraleSupelec – GeePs (France) • Trung Dung LE, CentraleSupelec – GeePs (France) • Marc Petit, GeePs-CentraleSupélec (France)

1818 **Regionalized Aggregation of Distributed Energy Resources and Distribution Networks for Large-scale Dynamic Simulations**

Thomas Würl, Technical University of Munich (Germany) • Dominic Hewes, Technical University of Munich (Germany) • Lorenz Viernstein, Technical University of Munich (Germany) • Daniel Stenzel, Technical University of Munich (Germany) • Rolf Witzmann, Technical University of Munich (Germany) • Sascha Altschäffl, TenneT TSO GmbH (Germany) • Jörg Michael Schmidt, TenneT TSO GmbH (Germany) • Jörg Jahn, TenneT TSO GmbH (Germany)

1861 **A comprehensive study for evaluation of the energy losses in distribution systems with high penetration of distributed generations**

Chenjie Ma, Fraunhofer Institute for Energy Economics and Energy System Technology (IEE) (Germany) • Simon Ruben Drauz, Fraunhofer IEE (Germany) • Roman Bolgaryn, Fraunhofer IEE (Germany) • Jan-Hendrik Menke, University of Kassel (Germany) • Florian Schäfer , University of Kassel (Germany) • Johannes Dasenbrock, Fraunhofer IEE (Germany) • Martin Braun, Fraunhofer IEE (Germany)

1978 **Scalable Power System Communications Emulation with OPC UA**

Marius Stübs , University of Hamburg (Germany) • Paulius Dambrauskas , University of Strathclyde (United Kingdom) • Mazheruddin Hussain Syed, University of Strathclyde (United Kingdom) • Kevin Köster , University of Hamburg (Germany) • Hannes Federrath, University of Hamburg (Germany) • Graeme M. Burt , University of Strathclyde (United Kingdom) • Thomas Strasser , Austrian Institute Of Technology (Austria)

1983 **Dynamic Modelling Approach to Assess Control Strategies of Distributed Energy Resources**

Marek Kopicka, Brno University of Technology (Czech Republic) • Petr Toman, Brno University of Technology (Czech Republic) • Jiří Drápela, Brno University of Technology (Czech Republic) • Michal Ptacek, Brno University of Technology (Czech Republic) • Vojtech Novak, E.ON Distribuce (Czech Republic)

1994 **Coordinated operation of a grid scale energy storage system with tap changer for voltage control on primary substations**

Alejandro Nieto, UK Power Networks Services (United Kingdom) • Maria-Aliki Efstratiadi, UK Power Networks Services (United Kingdom) • Kieran Coughlan, UK Power Networks Services (United Kingdom) • Alastair Currie, UK Power Networks Services (United Kingdom) • Sam Do, UK Power Networks (United Kingdom)

2016 **Impact of forecast on control methods for customer-sited battery storage**

Andres Cortes, Electric Power Research Institute (EPRI) (USA) • Aditie Garg, Electric Power Research Institute (EPRI) (USA)

2062 **Computational Diagnostics of Photovoltaic Smoothing Potential for Composite Orientations**

NIDA RIAZ, Tampere University (Finland) • Sami Repo, Tampere University of Technology (Finland)

2210 **Sizing of a battery energy storage system to minimize underfrequency load shedding in island power systems**

Lukas Sigrist, Universidad Pontificia Comillas (Spain) • Luis Rouco, Universidad Pontificia Comillas (Spain) • Clara Jiménez, Universidad Pontificia Comillas (Spain)

2251 **Multi-dimensional energy consumption scheduling for an event-based demand response.**

Rohit Rana, university of ottawa (Canada) • Javad Fattahi, university of ottawa (Canada) • Henry Schriemer, university of ottawa (Canada)

Poster Tour PT43

Block 3: Optimising DER (Part 1)

6 June 2019 from 14:30 to 16:00
6 June 2019 from 16:30 to 18:00

Poster Area

20 **Analysis of the optimum allocation of BESS for contingency support**

Pablo Eguia, University of the Basque Country (Spain) • Esther Torres, University of the Basque Country (Spain) • Javier Garcia, University of the Basque Country (Spain) • Agurtzane Etxegarai, University of the Basque Country (Spain) • Inmaculada Zamora, University of the Basque Country (Spain)

21 **Stochastic Generation of Aggregated Charging Profiles of PEVs for the Operation Analysis of Low Voltage Networks**

Andres Cortes, University of the Basque Country (Spain) • Julia Merino, Tecnalia (Spain) • Esther Torres, University of the Basque Country (Spain)

75 **Multi-objective Active Network Management Scheme Studied in Sundom Smart Grid with MV and LV Network Connected DER Units**

Hannu Laaksonen, University of Vaasa (Finland) • Katja Sirviö, University of Vaasa (Finland) • Samuli Aflecht, University of Vaasa (Finland) • Petri Hovila, ABB Oy (Finland)

81 **Distributed Storage and Solar Study**

Paris Hadjiodysseos, Northern Powergrid (United Kingdom) • Siem Van Limpt, Element Energy (United Kingdom) • Alexey Alexeev, Moixa (United Kingdom)

91 **Autonomous and cost-efficient operation of a stationary battery energy storage in low voltage networks**

Lukas Specht, TU Dortmund University (Germany) • Kalle Rauma, TU Dortmund University (Germany) • Alfio Spina, TU Dortmund University (Germany) • Christian Rehtanz, TU Dortmund university - Institute of Energy Systems, Energy Efficiency and Energy Economics (Germany)

104 **TECHNICAL PERFORMANCE ENHANCEMENT OF DISTRIBUTION SYSTEMS VIA OPTIMAL DG DEPLOYMENT**

Mohamed Attia Saad, Behera Company for electricity distribution (Egypt) • Hossam Abd el-Ghany, Faculty of Engineering, Tanta University (Egypt) • Ahmed Azmy, Faculty of Engineering, Tanta University (Egypt)

196 **Scheduled charging of electric vehicles and the increase of hosting capacity by a stationary energy storage**

David Kröger, TU Dortmund University (Germany) • Kalle Rauma, TU Dortmund University (Germany) • Alfio Spina, TU Dortmund University (Germany) • Christian Rehtanz, TU Dortmund university - Institute of Energy Systems, Energy Efficiency and Energy Economics (Germany)

334 **SPORE multifluid microgrid tests and results in the tropics**

Jean Wild, Schneider Electric Industries SAS (France) • Xiaoyong Peng, ENGIE Lab Singapore (Singapore) • Antoine Ballereau, ENGIE Lab Singapore (Singapore) • Quentin ANTOINE, ENGIE Laborelec (Belgium) • Laurie PAZIENZA, ENGIE Laborelec (Belgium) • Soni Wibisono, Schneider Electric Singapore (Singapore) • Tushar Menon, Schneider Electric Singapore (Singapore)

430 **Optimal Capacity Design for Solar-assisted CCHP System Integrated with Energy Storage**

Chen Jun, Electric Power Test&Research Institute Of Guangzhou Power Supply Co.,Ltd (China) • Li Shiming, Guangdong Grid Company Power Dispatching Control Center (China) • Huang Huihong, Electric Power Test&Research Institute Of Guangzhou Power Supply Co.,Ltd (China) • Wang Yong, Electric Power Test&Research Institute Of Guangzhou Power Supply Co.,Ltd (China) • Wenxiong Mo , Guangzhou Power Supply Bureau (China) • Zheng Jiehui, South China University of Technology (China)

480 **Optimal Power Load Control Strategy Considering End-user Comfort**

Kejun Qian, Suzhou Power Supply Company, State Grid Corporation of China (China) • Chengke Zhou, Glasgow Caledonian University (United Kingdom) • Juping Gu, Nantong University (China) • Xinsong Zhang, Nantong University (China) • Wenjun Zhou, Wuhan University (China)

518 **MPPT and Dead-Beat Control for Power Management of Hybrid Micro-Grid Applications**

Ahmed. A.Hossam-Eldin, Faculty of Engineering, Alexandria University (Egypt) • Hamdy. A.Ashour, Faculty of Engineering, Arab Academy for Science & Technology (Egypt) • Mohamed. Maghraby, Faculty of Engineering, Alexandria University (Egypt)

539 **Flexibility for congestion management: An operational decision making process**

Rik Fonteijn, Eindhoven University of Technology (Netherlands) • Raoul Bernards, Enexis Netbeheer (Netherlands) • Phuong Hong Nguyen, TU Eindhoven (Netherlands) • Johan Morren, Eindhoven University of Technology / Enexis Netbeheer (Netherlands) • Han Slootweg, Eindhoven University of Technology / Enexis Netbeheer (Netherlands)

566 **Optimized economical and technical sector coupling under consideration of defined incentives**

Nicola Gast, Institut für Elektrische Energiesysteme (Germany) • Tamara Schröter, Institut für Elektrische Energiesysteme (Germany) • Klabunde Christian, Institut für Elektrische Energiesysteme (Germany) • Jari Rossberg, Institut für Thermische Verfahrenstechnik (Germany) • Martin Wolter, Institut für Elektrische Energiesysteme (Germany)

627 **Optimal DG allocation in LV distribution networks considering repairing fault periods**

Abd El-Fattah Hamad, Behira Electricity Distribution Company (Egypt) • Hossam Abd el-Ghany, Faculty of Engineering, Tanta University (Egypt) • Ahmed Azmy, Faculty of Engineering, Tanta University (Egypt)

644 **Integrating Smart Storage and Aggregators for Network Congestion Management & Voltage Support in a Pilot Project in Eindhoven**

Sharmistha Bhattacharyya, Enexis (Netherlands) • Ton van Cuijk, Enexis (Netherlands) • Rik Fonteijn, Eindhoven University of Technology (Netherlands)

993 **Control of EV charging to reduce peak powers in domestic real estate**

Toni Simolin, Tampere University (Finland) • Antti Rautiainen, Tampere University (Finland) • Pertti Järventausta, Tampere University of Technology (Finland)

1065 **Two Years of Battery Energy Storage System performance in automatic islanding in the Portuguese MV network**

André Neves, EDP Distribuição (Portugal) • André Falcão, EDP Distribuição (Portugal) • Miguel Louro, EDP Distribuição (Portugal) • José Manuel Terras, EDP Distribuição (Portugal) • Bernardo Almeida, EDP Distribuição (Portugal) • Miguel Veríssimo, EDP Distribuição (Portugal) • José Ferreira Pinto, EDP Distribuição (Portugal) • José Damásio, Siemens S.A. (Portugal)

1120 **A Proposal of Average-Consensus-Based Load Control Reducing Unfairness in Use of Customers' Loads**

Hiroumi Saitoh, Tohoku University (Japan) • Junichi Toyoda, Tohoku University (Japan)

1150 **Electric Vehicles as flexibility providers for distribution systems. A techno-economic review.**

Felipe Gonzalez-Venegas, PSA Groupe/CentraleSupélec-GeePs (France) • Marc Petit, GeePs-CentraleSupélec (France) • Yannick Perez, LGI-CentraleSupélec (France)

1156 **Uniform Web of Things based Access to Distributed Energy Resources via Metadata Registry**

Aleksei Mashlakov, LUT University (Finland) • Antti Keski-Koukkari, VTT Technical Research Centre of Finland (Finland) • Ville Tikka, Lappeenranta University of Technology (Finland) • Anna Kulmala, VTT Technical Research Centre of Finland (Finland) • Sami Repo, Tampere University of Technology (Finland) • Samuli Honkapuro, LUT University (Finland) • Matti Aro, VTT Technical Research Centre of Finland (Finland) • Peyman Jafary, Tampere University (Finland)

1217 **A centralized control for the operation of low voltage distribution networks with multiple Distributed Energy Resources**

Konstantinos Kotsalos, Efacec (Portugal) • Ismael Miranda, Efacec (Storage) (Portugal) • Nuno Silva, Efacec (T&I) (Portugal) • Helder Leite, University of Porto (FEUP) (Portugal)

1334 **Smart hubs – DC interconnection and management of PV, EV and ESS**

Neal Wade, Newcastle University (United Kingdom) • Chris Mullen, Newcastle University (United Kingdom) • Mansoureh Zangiabadi, Newcastle Uinversity (United Kingdom) • Martin Feeney, Newcastle University (United Kingdom) • Rob Carpenter, Flexisolar (United Kingdom) • Nigel Jakeman, Turbo Power Systems (United Kingdom) • Olivia Carpenter, Ricardo (United Kingdom)

1365 **Energy storage capacity configuration of electric vehicle charging station with PV under peak shaving mode**

Shanshan Shi, State Grid Shanghai Electric Power Research Institute (China) • Yu Zhang, State Grid Shanghai Electric Power Research Institute (China) • Hailong Bao, State Grid Shanghai Electric Power Research Institute (China) • Yang He, Shanghai University of Electric Power (China) • Yufei Wang, Shanghai University of Electric Power (China) • Li Zhu, Shanghai University of Electric Power (China)

1413 **Impact and Value of Energy Storage on a High-DER Penetration Distribution Feeder in Southern California**

Jouni Peppanen, Electric Power Research Institute (USA) • Jorge Araiza, Jr, Southern California Edison (USA) • Ramakrishnan Ravikumar, Electric Power Research Institute (USA) • Tanguy Hubert, Electric Power Research Institute (USA) • Giovanni Damato, Electric Power Research Institute (USA) • Loic Gaillac, Southern California Edison (USA) • Matthew Kedis, Southern California Edison (USA)

1481 **Experience from Deployment of Battery Storage in Czech Distribution Grid**

Michal Jurík, E.ON Distribuce (Czech Republic) • Martin Kurfiřt, E.ON Distribuce (Czech Republic) • Petr Vaculík, E.ON Distribuce (Czech Republic)

1496 **Technical Solutions for Increasing DER Hosting Capacity in Distribution Grids in the Czech Republic in Terms of European Project InterFlex**

Stanislav Hes, CEZ Distribuce, a.s. (Czech Republic) • Jan Kula, CEZ Distribuce, a.s. (Czech Republic) • Jan Svec, CEZ Distribuce, a.s. (Czech Republic)

1505 **Potential Analysis for the Integration of Renewables and EV Charging Stations within a Novel LVDC Smart-Trolleybus Grid**

Mahjar Wazifehdust, Bergische Universität Wuppertal (Germany) • Dirk Baumeister, Bergische Universität Wuppertal (Germany) • Mohammed Salih, Bergische Universität Wuppertal (Germany) • Philippe Steinbusch, Bergische Universität Wuppertal (Germany) • Markus Zdrallek, University of Wuppertal (Germany) • Stan Mour, SWS Netze Solingen GmbH (Germany) • Conrad Troullier, Stadtwerke Solingen GmbH (Germany)

1517 **Voltage Control in Distribution Feeders with High Solar PV Penetration: Case Study for Different Approaches.**

Neshwin Rodrigues, The Energy and Resources Institute (India) • Alekhya Datta, The Energy and Resources Institute (India) • Shashank Vyas, The Energy and Resources Institute (India)

1526 **LISCOOL – A Demonstration Project of an Automated Fast Demand Response Management System: Main Outcomes**

Luis Marques, EFACEC (Portugal) • Filipe Campos, Efacec (Portugal) • RUI Fonseca, DAIKIN (Japan) • KOICHI NAKAGAWA, DAIKIN (Japan) • RYOH MASUDA, DAIKIN (Japan)

1542 **A rolling horizon approach for the optimal real-time dispatch of energy sources in smart residential buildings**

Mohammad Ali Fotouhi Ghazvini, Chalmers University of Technology (Sweden) • David Steen, Chalmers University of Technology (Sweden) • Anh Tuan Le, Chalmers University of Technology (Sweden)

1571 **Results from the project “eTaxi for Vienna” concerning the integration of EVs in the distribution grid**

Dominik Fasthuber, TU Wien (Austria) • Johannes Asamer, AIT (Austria) • Martin Reinthaler, AIT (Austria)

Poster Tour PT44

Block 3: Optimising DER (Part 2)

6 June 2019 from 14:30 to 16:00
6 June 2019 from 16:30 to 18:00

Poster Area

1577 **Case study for understanding impact of residential batteries on LV grids**

Parvathy Chittur Ramaswamy, Tractebel (Belgium) • Damien Schyns, Tractebel (Belgium) • Louise De Vos, Tractebel Engie (Belgium) • Christian Czajkowski, InnogySE (Germany) • Michael Wilch, Innogy SE (Germany) • Armin Gaul, InnogySE (Germany)

1599 **Combined Solar Photovoltaic and Energy Storage Sizing in Constrained Distribution Networks**

Matthew Deakin, University of Oxford (United Kingdom) • Jouni Peppanen, Electric Power Research Institute (USA) • Tanguy Hubert, Electric Power Research Institute (USA) • Ramakrishnan Ravikumar, Electric Power Research Institute (USA) • Andres Cortes, Electric Power Research Institute (EPRI) (USA)

1607 **IntegratingDER Management Systems into Industrial Energy Management - Deployment Results**

Graham Ault, Smarter Grid Solutions (United Kingdom) • Rachael Taljaard, Smarter Grid Solutions (United Kingdom) • Robert Swan, Smarter Grid Solutions (United Kingdom) • Robert MacDonald, Smarter Grid Solutions (United Kingdom) • Finlay McNicol, Smarter Grid Solutions (United Kingdom) • Hugo Gil, Smarter Grid Solutions (USA) • Sam Ashfield Murphy, Laing O'Rourke (United Kingdom) • Torsten Hildebrandt, SimPlan (Germany)

1615 **Grid Flexibility 4 Chile**

Ricardo Pérez Sánchez, Enel (Spain) • Hans Christian Rother Salazar, Enel (Chile) • Juan Refoyo Mayoral, Enel (Spain) • Ammi Amarnath, EPRI (USA) • Mukesh Khattar, EPRI (USA) • Antonio Parejo, University of Seville (Spain) • Carlos Leon de Mora, University of Seville (Spain)

1647 **INTEGRATION OF ELECTRIC VEHICLES AND RAILTHROUGH PARK-AND-RIDE INFRASTRUCTURE**

Christopher Webb, Newcastle Uinversity/ ARUP (United Kingdom) • Mansoureh Zangiabadi, Newcastle Uinversity (United Kingdom) • Roberto Palacin, Newcastle Uinversity (United Kingdom) • Neal Wade, Newcastle University (United Kingdom)

1687 **MITIGATING IMPACT OF LARGE-SCALE PV INTEGRATION ON MV DISTRIBUTION NETWORK WITH SEQUENTIAL CONTROL FUNCTIONS: A CASE STUDY IN NOORDWOLDE GRID, THE NETHERLANDS**

Firstian Kautsar Adiguno, Eindhoven University of Technology (Netherlands) • Tam Mai, Eindhoven University of Technology (Netherlands) • Phuong Hong Nguyen, TU Eindhoven (Netherlands)

1716 **Case study on commercial sized MW-level microgrid**

Lasse Peltonen, Tampere University of Technology (Finland) • Pertti Järventausta, Tampere University of Technology (Finland) • Joni Rintala, Lempäälän Energia Oy (Finland)

1740 **Inner current control loop influence on islanded microgrid dynamic behavior**

Guy Wanlongo Ndiwulu, Université catholique de Louvain (UCLouvain) (Belgium) • Emmanuel De Jaeger, Université catholique de Louvain (UCLouvain) (Belgium) • Angelo Kuti Lusala, Université Kongo (UK) (Congo, the Democratic Republic of the)

1745 **Demonstrating the Control of Aggregated Domestic Battery Energy Storage Systems for LV Network Efficiency**

David Dale, Nortech Management Ltd (United Kingdom) • Samuel Jupe, Nortech Management Ltd (United Kingdom) • Ricky Duke, Western Power Distribution (United Kingdom)

1751 **Maximizing the utilization of DERs with the Interflex Aggregation Platform for Flexibility**

Bob Ran, TNO (Netherlands) • Michiel Klever, Priogen (Netherlands) • Wilco Wijbrandi, TNO (Netherlands) • Jorrit Nutma, TNO (Netherlands) • Joost Laarakkers, TNO (Netherlands)

1763 **Incorporating Ageing parameters into Optimal Energy Management of Distribution Connected Energy Storage**

Adib Allahham, Newcastle University (United Kingdom) • David Greenwood, Newcastle University (United Kingdom) • Charalampos Patsios, Newcastle University (United Kingdom)

1764 **Utilisation of Energy Storage to Improve Distributed Generation Connections and Network Operation on Shetland Islands**

Fulin Fan, University of Strathclyde (United Kingdom) • Han Xu, University of Strathclyde (United Kingdom) • Ivana Kockar, University of Strathclyde (United Kingdom)

1766 **Small-Signal Stability Optimization of LV microgrids with Grid-forming and Grid-supporting Inverters**

Simon Eberlein, University of Stuttgart (Germany) • Krzysztof Rudion, University of Stuttgart (Germany) • Marius Radloff, University of Stuttgart (Germany)

1769 **Energy Storage and Energy Management in Distribution Grids, Communities and Buildings: Results from SENSIBLE, a Flagship Project**

Ricardo André, EDP NEW R&D (Portugal) • Eldar Naghiyev, Univ. Nottingham (United Kingdom) • Andre Leonide, Siemens AG (Germany) • Stefan Langemeyer, Siemens AG (Germany) • Clara Gouveia, INESC TEC (Portugal) • Arno Dentel, Univ. Nuremberg (Germany) • Catherine Murphy-O'Connor, Indra (Portugal) • Olli Kilkki, Empower (Portugal)

1816 **Local Voltage Control Strategies for Storage Systems in Distribution Networks with a High Penetration of Inverter-Based Generation**

Eleni Daridou, Department of Electrical and Computer Engineer, National Technical University of Athens (Greece) • Vasilakis Athanasios, Department of Electrical and Computer Engineer, National Technical University of Athens (Greece) • Nikos Harziargyriou, National Technical University of Athens (Greece)

1830 **Resilience improvement from P2P EMS in microgrids considering faults, carbon emissions and economic benefits**

Nikolas Spiliopoulos, Newcastle University (United Kingdom) • Uma Rajarathnam, Enzen Global Solutions (India) • Damian Giaouris, Newcastle University (United Kingdom) • Phil Taylor, Newcastle University (India) • Neal Wade, Newcastle University (United Kingdom)

1853 **Model Predictive Control for the Management of DC Microgrids**

Marcel Pendieu Kwaye, RSE S.p.A (Italy) • Riccardo Maria Vignali, RSE S.p.A (Italy) • Riccardo Lazzari, RSE S.p.A (Italy) • Carlo Sandroni, RSE S.p.A (Italy)

1854 **Transactive Demand Response—Hydro Ottawa Experience**

Marc Lacroix, eMcREY (Canada) • Raed Abdullah, Hydro Ottawa (Canada)

1855 **Economic Feasibility Study of the Implementation of PEVs Charging Stations at a Brazilian University**

Wanessa Guedes, Federal University of Juiz de Fora - UFJF (Brazil) • José Carlos Martins, Federal University of Juiz de Fora - UFJF (Brazil) • Bruno Dias, Federal University of Juiz de Fora - UFJF (Brazil) • Leonardo de Oliviera, Federal University of Juiz de Fora - UFJF (Brazil) • Matheus de Souza, Federal University of Juiz de Fora - UFJF (Brazil) • José Luiz Pereira, Federal University of Juiz de Fora - UFJF (Brazil) • Jairo Quirós-Tortós, University of Costa Rica - UCR (Costa Rica)

1916 **Vehicle-To-Grid Based Frequency Regulation Method In An Isolated Microgrid Considering Charging Requests Of Electric Vehicles**

Hoyong Jeong, Hyundai Electric & Energy Systems (Korea, Republic of) • Mugu Jeong, Hyundai Electric & Energy Systems (Korea, Republic of) • Sangjin Lee, Hyundai Electric & Energy Systems (Korea, Republic of)

1946 **Demand response field trial experiences**

Pekka Koponen, VTT Technical Research Centre of Finland (Finland) • Robert Weiss, VTT Technical Research Centre of Finland (Finland) • Jaakko Ketomäki, VTT Technical Research Centre of Finland (Finland)

1956 **RESOLVD - Renewable penetration levered by efficient Low Voltage Distribution grids. Specifications and use case analysis.**

Joaquim Melendez Frigola, Universitat de Girona (Spain) • Isidoros Kokos, INTRACOM TELECOM (Greece) • Heidi Tuiskula, Smart Innovation Norway (Norway) • Stefan Marksteiner, JOANNEUM RESEARCH (Austria) • Andreas Sumper, UNIVERSITAT POLITÈCNICA DE CATALUNYA (Spain) • Ramon Gallart, ESTABANELL DISTRIBUCIÓ (Spain) • Miha Smolnikar, COMSENSUS (Slovenia) • Ferran Torrent Fontbona, Universitat de Girona (Spain)

2043 **MV microgrids –case study**

Emil Constantinescu, Electrica S.A. (Romania) • Dorel Stanescu, SDEE Transilvania Sud (Romania) • Mihai Sanduleac, Romanian Energy Centeri (Romania)

2069 **Impact of batteries in the hosting capacity of a grid with photovoltaic generation**

Marc Cañigueral Maurici, Universitat de Girona (Spain) • Joaquim Melendez Frigola, Universitat de Girona (Spain) • Ferran Torrent Fontbona, Universitat de Girona (Spain)

2080 **Active Response to Distribution Network Constraints**

Nathaniel Bottrell, Ricardo Energy and Environment (United Kingdom) • Simon Terry, Ricardo Energy and Environment (United Kingdom) • Nick Ash, Ricardo Energy and Environment (United Kingdom) • Luca Grella, UK Power Networks (United Kingdom)

2135 **Optimal allocation of energy storage and conversion technologies in an urban distributed energy system**

Christoph Maier, TU Wien, Institute of Energy Systems and Electrical Drives (Austria) • Sabina Nemec-Begluk, TU Wien, Institute of Energy Systems and Electrical Drives (Austria) • Wolfgang Gawlik, TU Wien, Institute of Energy Systems and Electrical Drives (Austria)

2238 **DC-Based Interconnected-Modified Nanogrids within an Open Energy Distributed System (OEDS)**

Nourhan Ahmed, Electronic research institute (Egypt) • Essamudin Ali, Electronic research institute (Egypt) • Naser Abdel-rahim, Future university (Egypt) • Fahmy Bendary, Faculty of Engineering Shoubra, Benha University (Egypt)

2274 **DER Flexible Interconnection Framework and Case Study**

Devin Van Zandt, Electric Power Research Institute (USA) • Matthew Rylander, Electric Power Research Institute (USA) • Brian Seal, Electric Power Research Institute (USA) • Dean Weng, Electric Power Research Institute (USA)

2285 **DERMS Reference Control Methods for DER Group Management**

Dean Weng, Electric Power Research Institute (USA) • Ajit Renjit, Electric Power Research Institute (USA) • Tanguy Hubert, Electric Power Research Institute (USA) • Brian Seal, Electric Power Research Institute (USA)

2286 **Evaluating the Value of DERMS: Methods and Mitigation to Increase Feeder Hosting Capacity**

Ajit Renjit, Electric Power Research Institute (USA) • Alison O'Connell, Electric Power Research Institute (Ireland) • Devin Van Zandt, Electric Power Research Institute (USA) • Brian Seal, Electric Power Research Institute (USA)

2309 **Optimization of distribution network configuration: an experimental testbed in the InteGRIDy project framework**

Davide Falabretti, Politecnico di Milano (Italy) • Maurizio Delfanti, Politecnico di Milano (Italy) • Marco Merlo, Politecnico di Milano (Italy) • Aitazaz Ali Raja, Politecnico di Milano (Italy)

Session 5 Planning of power distribution systems

Poster Tour PT51

Block 1: Risk Assessment and Asset Management & Block 2: Network Development

5 June 2019 from 09:00 to 10:30
5 June 2019 from 11:00 to 12:30

Poster Area

31 **Rural electrification in Brazil based on microgrids**

Cristina Vilá, Iberdrola (Spain) • María Martínez, Iberdrola (Spain) • Heron Fontana, Iberdrola (Brazil) • Débora Rodrigues, Iberdrola (Brazil) • Jon Anduaga, Tecnalia (Spain) • David Vila, Indra (Spain)

44 **Providing flexibility in the distribution network – challenges and solutions**

Matthias Hable, ENSO NETZ GmbH (Germany) • Robert Knoll, ENSO NETZ GmbH (Germany) • Thomas Darda, ENSO AG (Germany) • Maximilian Schmidt, TU Dresden (Germany) • Peter Schegner, Technische Universitaet Dresden (Germany) • Joerg Laessig, HS Zittau / Görlitz (Germany)

60 **A Planning Method of On-load Capacity Regulating Distribution Transformers in Urban Distribution Networks after Electric Energy Replacement**

Lin GAN, China Southern Power Grid (China) • Wenxiong MO, China Southern Power Grid (China) • Jian FANG, China Southern Power Grid (China) • Yi RAO, China Southern Power Grid (China) • Yu TAN, China Southern Power Grid (China) • Hang ZHANG, China Southern Power Grid (China)

107 **Distribution Planning System in Vietnam for Multi-divided and Multi-connected System**

Kenichi Suzuki, TEPCO Power Grid, Inc (Japan)

118 **Identifying reliability-driven asset management strategies in active distribution grids**

Iraklis-Marios Katsolas, ETH Zurich (Switzerland) • Stavros Karagiannopoulos, ETH Zurich (Switzerland) • Thilo Krause, ewz (Switzerland) • Carsten Schroeder, ewz (Switzerland) • Gabriela Hug, ETH Zurich (Switzerland)

375 **A Combined Planning and Simulation Approach for Smart Grid Reliability Analysis**

Marcelo Pelegrini, Sinapsis Inovação em Energia (Brazil) • Diogo Serra Baldissin, Sinapsis Inovação em Energia (Brazil) • Gustavo Travassos, Neoenergia (Brazil) • Gustavo Himeno, Sinapsis Inovação em Energia (Brazil) • Henrique Kagan, Sinapsis Inovação em Energia (Brazil) • Ricardo Padilha, Neoenergia (Brazil) • Daniel Duarte, Sinapsis Inovação em Energia (Brazil)

577 **Hybrid AC and DC Distribution Networks Modelling and Planning using EPSL Modelica Library : Preliminary Results**

Mathieu Caujolle, EDF R&D (France) • Markus ANDRES, DASSAULT Systèmes (Germany) • Gabriel GAU, EDF R&D (France) • Clément COIC, DASSAULT Systèmes (Germany) • Naji NASSAR, EDF R&D (France) • Victor-Marie LEBRUN, DASSAULT Systèmes (France)

623 **Multi-dimension Evaluation and Investment Route for Next-generation Smart Distribution Network**

Hongjun Gao, Sichuan Univerisity (China) • Junyong Liu, Sichuan Univerisity (China) • Youbo Liu, Sichuan Univerisity (China) • Lin Lv, Sichuan Univerisity (China) • Jiayi Wang, Sichuan Univerisity (China) • Zhihui Feng, Sichuan Univerisity (China)

631 **Asset simulation in distribution network using tools for evaluation of technical condition**

Adam Teringl, ČEZ Distribuce, a.s. (Czech Republic) • Daniel Kašpar, ČEZ Distribuce, a.s. (Czech Republic) • Ondřej Tupý, ČEZ Distribuce, a.s. (Czech Republic)

640 **Distribution network observation based on security region geometry**

Jun Xiao, Tianjin University (China) • Baoqiang Zhang, Tianjin University (China) • Fangxing LI, The University of Tennessee (USA)

673 **Upgrade and refurbishment methodologies apply to Gibraltar Electric Authority's power distribution system project**

Tyrone FA, Gibraltar Electricity Authority (Gibraltar) • Yann-Eric BOUFFARD-VERCELLI, Schneider Electric (France) • Bruno ANDRÉ, Schneider-Electric (France)

754 **Clustering and determination of relevant network operating points in analytical reliability calculations**

Fabian Möhrke, University of Wuppertal (Germany) • Kristof Kamps, University of Wuppertal (Germany) • Markus Zdrallek, University of Wuppertal (Germany) • Philipp Awater, Power Technologies International Siemens AG (Germany) • Michael Schwan, Power Technologies International Siemens AG (Germany) • André Osterholt, MVV Netze GmbH (Germany)

866 **Assessing Topology Efficiency in Residential Microgrids**

Sergio Motta, VTT (Finland) • Antti Alahäivälä, VTT (Finland) • Anna Kulmala, VTT Technical Research Centre of Finland (Finland) • Kari Mäki, VTT Research Center of Finland (Finland) • YoungPyo Cho, KEPCO Research Institute (Korea, Republic of) • HongJoo Kim, KEPCO Research Institute (Korea, Republic of) • JinTae Cho, KEPCO Research Institute (Korea, Republic of) • JuYoung Kim, KEPCO Research Institute (Korea, Republic of)

898 **Optimal Resource Allocation for Reducing Distribution System Risk Induced by Hurricane**

HANG ZHANG, Guangzhou Power Supply Bureau Co., Ltd. (China) • LIN GAN, Guangzhou Power Supply Bureau Co., Ltd. (China) • WENXIONG MO, Guangzhou Power Supply Bureau Co., Ltd. (China) • HONGBIN WANG, Guangzhou Power Supply Bureau Co., Ltd. (China) • YU QIN, Guangzhou Power Supply Bureau Co., Ltd. (China) • LINHUAN LUO, Guangzhou Power Supply Bureau Co., Ltd. (China) • JIAXING HE, Guangzhou Power Supply Bureau Co., Ltd. (China) • ZEJUN YANG, Tsinghua University (China)

903 **Efficient power outage perception and recovery processing solution in low voltage power grid**

Ying Sun, Guangzhou Power Supply Company Co. Ltd, China Southern Power Grid (China) • Zhipeng Su, Guangzhou Power Supply Company Co. Ltd, China Southern Power Grid (China) • Ying Zhao, Guangzhou Power Supply Company Co. Ltd, China Southern Power Grid (China) • Chun Zhou, Guangzhou Power Supply Company Co. Ltd, China Southern Power Grid (China) • Liming Chen, China Southern Power Grid, Electric Power Research Institute (China)

941 **The Shanghai Practice: Improve the Reliability of Urban MV Distribution System with K-station and Its New Network Designs**

Ruochen SONG , State Grid Shanghai Municipal Electric Power Company (China) • Jingjing Lu, State Grid Shanghai Municipal Electric Power Company (China) • Mingze Zhang, State Grid Shanghai Municipal Electric Power Company (China)

973 **Predicting Transformer Health - PATH**

Maria Inês Verdelho, EDP Distribuição (Portugal) • Cristina Carvalho, EDP Distribuição (Portugal) • Luís Pinto Sá, EDP Distribuição (Portugal) • João Vasco Ferreira, EDP Distribuição (Portugal) • Armando Leitão, INESC TEC, Faculdade de Engenharia, Universidade do Porto (Portugal) • Luís Magalhães Dias, INESC TEC, Faculdade de Engenharia, Universidade do Porto (Portugal) • Xavier Andrade, INESC TEC, Faculdade de Engenharia, Universidade do Porto (Portugal) • Luís Guimarães, INESC TEC, Faculdade de Engenharia, Universidade do Porto (Portugal)

980 **Alternative solutions for advanced security of supply**

Henry Lågland, University of Vaasa (Finland) • Kimmo Kauhaniemi, University of Vaasa (Finland) • Lauri Kumpulainen, University of Vaasa (Finland) • Ari Salo, Vaasan Sähköverkko (Finland) • Jarmo Leppinen, Vaasan Sähköverkko (Finland)

988 **Influence of Distributed Decentral Control Units on Reliability of Distribution Networks**

Daniel Schacht, FGH GmbH (Germany) • Patrick Niewerth, FGH GmbH (Germany) • Hendrik Vennegeerts, FGH e.V. (Germany) • Lukas Verheggen, EWE NETZ GmbH (Germany) • Thomas Kumm, EWE NETZ GmbH (Germany)

995 **Power Transformers: Predictive Maintenance**

Sílvio Rodrigues, Jungle (Portugal) • Maria Inês Verdelho, EDP Distribuição (Portugal) • Ana Filipa Ribeiro, EDP Distribuição (Portugal) • Luís Cordeiro, EDP Inovação (Portugal)

1029 **Steering effect of distribution reliability regulation**

Joel Seppälä, Energy Authority (Finland) • Pertti Järventausta, Tampere University of Technology (Finland)

1034 **SORAL - System for condition monitoring and failure risk assessment of MV cable lines based of off line diagnostic methods**

Slawomir Noske, ENERGA-OPERATOR SA (Poland) • Katarzyna Zasada-Chruscinska, ENERGA-OPERATOR SA (Poland) • Krzysztof Kolodziejczyk, Globema sp. z o.o. (Poland) • Sebastian Grzelka, ENERGA-OPERATOR SA (Poland) • Wojciech Grenda, Globema sp. z o.o. (Poland)

1246 **A Genetic Algorithm Based Methodology for Prioritizing Maintenance Actions of Power Distribution Utilities**

Danilo Pereira, ENERQ - USP (Brazil) • Carlos Almeida, ENERQ - USP (Brazil) • Nelson Kagan, ENERQ - USP (Brazil) • Marcos Gouvêa, ENERQ - USP (Brazil) • José Junior, EDP (Brazil) • James Junior, EDP (Brazil) • Fabrício Viana, EDP (Brazil) • Alexandre Dominice, EDP (Brazil)

1348 **EDPD - Increasing DSO's Resilience by Exercising Business Continuity Plan**

Paulo Alberto, EDP Distribuição, SA (Portugal) • Inês Silva, EDP Distribuição, SA (Portugal) • Nuno Duarte, EDP Distribuição, SA (Portugal) • Tiago Rojão, EDP Distribuição, SA (Portugal) • Maria Luísa Pestana, EDP Distribuição (Portugal)

1364 **GA-BASED APPROACH FOR INSPECTION PRIORITIZATION IN ELECTRIC POWER DISTRIBUTION NETWORKS**

Celso Rocha, University of Sao Paulo (Brazil) • Fillipe Vasconcelos, USP (Brazil) • Carlos Almeida, ENERQ - USP (Brazil) • Marcos Gouvêa, ENERQ - USP (Brazil) • Nelson Kagan, ENERQ - USP (Brazil) • José Junior, EDP (Brazil) • Fabrício Viana, EDP (Brazil) • Alexandre Dominice, EDP (Brazil)

1417 **Integration and aggregation of distributed energy resources – operating approaches, standards and guidelines**

Jim Reilly, Reilly and Associates (USA) • Geza Joos, McGill University (Canada)

1493 **Centralized Ageing Asset Dossier database of the electricity networks in the Netherlands**

Irina Melnik, Ksandr (Netherlands) • Tim Ooievaar, Ksandr (Netherlands) • Theo Van Rijn, Liander (Netherlands) • Peter Zonneveld, Stedin (Netherlands)

1592 **Enel GI&N rural electrification solutions and implementations**

Christian Noce, Enel Global Infrastructure and Networks Srl (Italy) • Gianpatrizio Bianco, E-distribuzione Spa (Italy) • Antonio Cammarota, E-distribuzione Spa (Italy) • Fabio Giammanco, Enel Global Infrastructure and Networks Srl (Italy) • Juan Refoyo Mayoral, Enel (Spain) • Giovanni Rizzello, E-distribuzione Spa (Italy)

1598 **Multi-service charging station and/ or onshore energy storage at port for electric ferry– a case study from Norway**

Thomas Martinsen, Norwegian university of life sciences (NMBU) (Norway) • Hilde Elsebutangen, Norwegian university of life sciences (NMBU) (Norway) • helene Solberg, Norwegian university of life sciences (NMBU) (Norway)

1618 **Resilience Enhancement of MV Distribution Grids Against Snowstorms**

Mauro De Masi, e-distribuzione (Italy) • Giovanni Valtorta, e-distribuzione (Italy) • Elvira Amicarelli, e-distribuzione (Italy) • Andrea Suich, e-distribuzione (Italy) • Andrea Danesin, e-distribuzione (Italy) • Francesco Dura, e-distribuzione (Italy) • Ettore De Berardinis, CESI (Italy) • Alessio MARCELLI, e-distribuzione (Italy)

1651 **Increasing resilience against extreme events in distribution networks: the DSO's experience with the new Italian regulatory framework**

Riccardo Abbate, Enel Italia (Italy) • Mariacristina Dota, Enel Italia (Italy) • Mariangela Di Napoli, Enel Italia (Italy)

1869 **Comprehensive risk based methodology and tool for a quantitative resilience assessment of distribution and transmission systems**

Andrea Pitto, Ricerca sul Sistema Energetico RSE S.p.A. (Italy) • Claudio Carlini, Ricerca sul Sistema Energetico RSE S.p.A. (Italy) • Emanuele Ciapessoni, Ricerca sul Sistema Energetico RSE S.p.A. (Italy) • Diego Cirio, Ricerca sul Sistema Energetico RSE S.p.A. (Italy) • Diana Moneta, RSE (Italy)

1874 **Techno-economic analysis of network configuration of PV based off-grid distribution system**

Iurii Demidov, Lappeenranta University of Technology (Finland) • Andrey Lana, Lappeenranta University of Technology (Finland) • Antti Pinomaa, Lappeenranta University of Technology (Finland) • Jarmo Partanen, LUT University (Finland) • Olli Pyrhonen, Lappeenranta University of Technology (Finland)

1968 **Smart Grid Ellevio-Demo Stockholm**

Erik Lejerskog, Ellevio (Sweden) • Joar Johansson, Ellevio (Sweden) • Isbi Felix, Ellevio (Sweden) • Mats Estéen, Ellevio (Sweden) • Stefan Rebner, Ellevio (Sweden) • Lars Selberg, Ellevio (Sweden) • Olle Hansson, Ellevio (Sweden)

1982 **A Multi-Energy Microgrid Integrating Bio-Gas Production for Local and Market Services Provision**

Edoardo Corsetti, RSE (Italy) • Ada Del Corno, RSE (Italy) • Carlo Sandroni, RSE S.p.A (Italy)

1986 **Causes and consequences of batteries' ageing in grid integration scenarios.**

Baptiste Soubra, SINTEF Energy Research (Norway) • Idar Petersen, SINTEF Energy Research (Norway) • Kjersti Berg, SINTEF Energy Research (Norway) • Peter Ahcin, SINTEF Energy Research (Norway)

2042 **Impact of flexibility location in MV distribution – The Nice Smart Valley Case study**

Julien Bruschi, Enedis (France) • Audrey Mulenet, Enedis (France) • Thibaut Wagner, Enedis (France)

2231 **Renewal planning based on asset health data used in cost-benefit analyses**

Eivind Solvang, SINTEF Energy Research (Norway) • Jørn Foros, SINTEF Energy Research (Norway) • Lennart Heggdal, Istad Nett AS (Norway)

Poster Tour PT52

Block 3: Distribution Planning (Part 1)

5 June 2019 from 09:00 to 10:30
5 June 2019 from 11:00 to 12:30

Poster Area

18 **Low voltage feeder clustering based on SOM for determining the capacity of feeders to accept PVs**

Farzad Dehghani, Lorestan Electric Power Distribution Company (Iran, Islamic Republic of)

135 **The representative charging pattern for EVs based on the actual EVs charging data for distribution system planning**

Jun-Hyeok Kim, KEPCO (Korea, Republic of) • Sang-keun Moon, Korea Electric Power Cooperation (KEPCO) (Korea, Republic of) • Byungsung Lee, KEPCO Research Institute (Korea, Republic of)

139 **GENERAL PLANNING AND OPERATIONAL PRINCIPLES IN GERMAN DISTRIBUTION SYSTEMS USED FOR SIMBENCH**

Steffen Meinecke, University Kassel, department of Energy Management and Power System Operation (e²n) (Germany) • Annika Klettke, RWTH Aachen, IAEW (Germany) • Dzanan Sarajlic, Technical University Dortmund,Energy Systems, Energy Efficiency and Energy Economics (ie³) (Germany) • Jörg Dickert, ENSO NETZ GmbH (Germany) • Matthias Hable, ENSO NETZ GmbH (Germany) • Franziska Fischer, Netze BW GmbH (Germany) • Martin Braun, Fraunhofer IEE (Germany) • Albert Moser, RWTH Aachen, IAEW (Germany)

140 **Distribution grid planning and analysing using smart metering data**

Ivan Ramljak, P.U Elektroprivreda HZ HB, Mostar (Bosnia and Herzegovina) • Drago Bago, P.U Elektroprivreda HZ HB, Mostar (Bosnia and Herzegovina)

289 **Optimization of maximum allowed slow voltage variation between medium voltage and low voltage networks**

Jur Erbrink, Qirion (Netherlands) • Peter van Oirsouw, Qirion (Netherlands) • Alex Geschiere, Liander (Netherlands) • Erika Piga-Gehrke, Liander N.V. (Netherlands)

528 **Developmentof an assessment model for DSOs to determine the technical and economicpotential of local energy systems**

Paul Kessler, RWTH Aachen University, E.ON ERC-EBC; E.ON SE (Germany) • Demijan Panic, E.ON Sverige AB (Sweden) • Thomas Schütz, RWTH Aachen University, E.ON ERC-EBC (Germany) • Luis Arturo Hernandez-Salmeron, E.ON SE (Germany) • Dirk Müller, RWTH Aachen University, E.ON ERC-EBC (Germany)

532 **Development of a Bottom-up Scenario Analysis Network Planning Tool**

Raoul Bernards, Enexis Netbeheer (Netherlands) • Ruben Moorlag, Sia Partners (Netherlands) • Edwin Rijksen, Enexis (Netherlands) • Johan Morren, Eindhoven University of Technology / Enexis Netbeheer (Netherlands)

685 **An extensive supply and grid analysis solution using multiscenarios, simulation & optimization applied in a real target grid planning process**

Dominique Giavarra, Westnetz GmbH (Germany) • Andreas Maier, enerVance GmbH (Germany) • Christoph Engels, Univ. of Applied Sciences & Arts Dortmund (Germany)

691 **Evaluation of Flexibility Volumes for Constraint Resolution in LV Distribution Networks – The Nice Smart Valley Case**

Bhargav Swaminathan, EDF R&D (France) • Madeleine Carlier, EDF R&D (France) • Julien Bruschi, Enedis (France) • Olivier Carré, Enedis (France) • Benoît Bouzigon , Enedis (France)

773 **Baselines for evaluating demand response in the EcoGrid 2.0 project**

Emil Larsen, Danish Energy (Denmark) • Kenneth Rosenørn, Danish Energy (Denmark) • Anna Jónasdóttir, Danish Energy (Denmark)

784 **Reliability Calculations with Smart Grid Technologies in Distribution Grids**

Kristof Kamps, University of Wuppertal (Germany) • Fabian Möhrke, University of Wuppertal (Germany) • Markus Zdrallek, University of Wuppertal (Germany) • Philipp Awater, Power Technologies International Siemens AG (Germany) • Michael Schwan, Power Technologies International Siemens AG (Germany) • André Osterholt, MVV Netze GmbH (Germany) • Frank Aschenbroich, EWR GmbH (Germany)

855 **Shaping the Future Croatian Distribution Network with the Ten-Year Network Development Plan**

Sandra Hutter, Croatian Energy Regulatory Agency (HERA) (Croatia) • Lahorko Wagmann, Croatian Energy Regulatory Agency (HERA) (Croatia)

892 **Teaching-Learning Based Optimization Method for PEV Scheduling Incorporating PV Units in a Distribution Power Network**

Kaveh Pourmostadam, California State University Northridge (CSUN) (USA) • Kourosh Sedghisigarchi, California State University Northridge (CSUN) (USA)

938 **Evaluation of grid relieving measures for integrating electric vehicles in a suburban low-voltage grid**

Bernd Thormann, Montanuniversitaet Leoben (Austria) • René Braunstein, Energienetze Steiermark GmbH (Austria) • Johannes Wisiak, Energienetze Steiermark GmbH (Austria) • Franz Strempfl, Energienetze Steiermark GmbH (Austria) • Thomas Kienberger, Montanuniversitaet Leoben (Austria)

939 **Value optimization of existing MV grids through a continuous cost benefit analysis**

Evert de Haan, Liander (Netherlands) • Frans Campfens, Qirion (Netherlands)

949 **Impact of Voltage and Network Losses on Conductor Sizing and Topology of MV Networks with High Penetration of Renewable Energy Resources**

John Millar, Aalto University (Finland) • Eero Saarijärvi, Trimble Solutions (Finland) • Udo Müller, Mitteldeutsche Netzgesellschaft Strom mbH (Germany) • Stephan Fettke, LEW Verteilnetz GmbH (Germany) • Marko Filler, Mitteldeutsche Netzgesellschaft Strom mbH (Germany)

955 **Time Series Based Power System Planning Including Storage Systems and Curtailment Strategies**

Florian Schäfer , University of Kassel (Germany) • Jan-Hendrik Menke, University of Kassel (Germany) • Frank Marten, Fraunhofer IEE (Germany) • Martin Braun, Fraunhofer IEE (Germany)

961 **Impact of Prosumer Growth on Flexible DER Through Curtailment Assessment**

Robert MacDonald, Smarter Grid Solutions (United Kingdom) • Finlay McNicol, Smarter Grid Solutions (United Kingdom) • Kjersti Berg, SINTEF Energy Research (Norway) • Hanne Sæle , SINTEF Energy Research (Norway) • Rachael Taljaard, Smarter Grid Solutions (United Kingdom)

966 **Evaluation of the long-term impact of EV development on French distribution networks: technical characterization and integration costs evaluation**

Florence Robin, Enedis (France) • Guillaume PLATTNER, EDF R&D (France)

977 **Multi-Objective Stochastic Expansion Planning of Multi-Carrier Energy Distribution Networks Considering Customer-Owned DG Units**

Mohammad Jooshaki, Sharif University of Technology (Iran, Islamic Republic of) • Hossein Farzin, Shahid Chamran University of Ahvaz (Iran, Islamic Republic of) • Ali Abbaspour, Sharif University of Technology (Iran, Islamic Republic of) • Matti Lehtonen, Aalto University (Finland) • Mahmud Fotuhi-Firuzabad, Sharif University of Technology (Iran, Islamic Republic of)

1002 **A Monte-Carlo approach for quality of supply simulation**

Hicham Farah Semlali, Enedis (France) • Florence Robin, Enedis (France) • Cecile Donde, EDF R&D (France) • Thomas Chaudonneret, EDF R&D (France)

1010 **Regularly Optimized Medium Voltage Network As A Target For Planners: A Case of Helsinki City**

Juhani Lepistö, Helen Electricity Network Ltd. (Finland)

1026 **Using stochastic modelling for long-term network planning of LV distribution grids at Dutch DNO**

Hugo Vergnes, Stedin (Netherlands) • Michiel Nijhuis, Phase to Phase (Netherlands) • Edward Coster, Stedin (Netherlands)

1056 **Stochastic Electric Vehicle Load Modeling for HV/MV SubstationConstraint Assessment**

Anouar Bouallaga, ENEDIS (France) • Bafalikou Doumbia, ENSAM (France)

1057 **Reactive Power Optimizaztion Method Incorporating Economic And Action Number Constraints of Control Devices**

Zhixuan Pi, Shanghai Jiao Tong University (China) • Dong Liu, Shanghai Jiao Tong University (China) • Xiaofei WU, State Grid Huai'an Power Supply Company (China) • Xiaochun XU, State Grid Huai'an Power Supply Company (China)

1071 **Increase Photo Voltaic hosting capacity using datadriven network modeling**

Michel Clemence, odit-e (France) • David Valmacco, RESA (Belgium) • Rémi Pellerej, Odit-e (France) • Philippe Deschamps, odit-e (Spain)

1092 **Automated Planning of Smart Low Voltage Networks Using an Evolutionary Algorithm**

Julian Wruk, University of Wuppertal (Germany) • Kevin Christopher Cibis, University of Wuppertal (Germany) • Markus Zdrallek, University of Wuppertal (Germany) • Henrik Landsverk, Skagerak Nett AS (Norway)

1099 **Large scale agent based simulation of distribution grid loading and its practical application**

Chris Kittl, TU Dortmund university - Institute of Energy Systems, Energy Efficiency and Energy Economics (Germany) • Johannes Hiry, TU Dortmund university - Institute of Energy Systems, Energy Efficiency and Energy Economics (Germany) • Christian Wagner, TU Dortmund university - Institute of Energy Systems, Energy Efficiency and Energy Economics (Germany) • Christian Pfeiffer, TU Dortmund university - Institute of Energy Systems, Energy Efficiency and Energy Economics (Germany) • Christoph Engels, Univ. of Applied Sciences & Arts Dortmund (Germany) • Christian Rehtanz, TU Dortmund university - Institute of Energy Systems, Energy Efficiency and Energy Economics (Germany)

1116 **Grida: introducing a self-learning artificial intelligence for autonomous network planning**

Age van der Mei, Duinn (Netherlands) • Jan-Peter Doomernik, Enexis Netbeheer (Netherlands)

1117 **Artificial Intelligence planning of two real-life microgrids**

Age van der Mei, Duinn (Netherlands) • Jan-Peter Doomernik, Enexis Netbeheer (Netherlands)

1118 **Optimal Integration of Electric Vehicles, PV, Heat Pumps in Existing Distribution Grids in the Netherlands**

Louise De Vos, Tractebel Engie (Belgium) • Niels Leemput, Tractebel Engie (Belgium) • Nazir Refa, ElaadNL (Netherlands) • Raoul Bernards, Enexis Netbeheer (Netherlands) • Henk Fidder, Stedin (Netherlands) • Frans de Rijke, Alliander (Netherlands)

1121 **Stakeholder Engagement in the Revision of ESB Networks' Planning & Security of Supply Standards**

Ivan Codd, ESB Networks (Ireland) • Neassa McCabe, ESB Networks (Ireland)

1133 **Low voltage electrification approach in rural areas: arbitration between on and off-grid solutions**

Mehdi Othmani, Engie (Belgium) • Ibrahim Abada, Engie (Belgium) • Léa Tatry, Engie (Belgium) • Tanguy Port, Tractebel (Belgium) • Gauthier Roig, Tractebel (Belgium) • Midas Caubergs, Tractebel (Belgium)

1142 **Automated time series based grid extension planning using a coupled agent based simulation and genetic algorithm approach**

Johannes Hiry, TU Dortmund university - Institute of Energy Systems, Energy Efficiency and Energy Economics (Germany) • Chris Kittl, TU Dortmund university - Institute of Energy Systems, Energy Efficiency and Energy Economics (Germany) • Christian Römer, TU Dortmund University / Institute of Energy Systems, Energy Efficiency and Energy Economics (Germany) • Christian Rehtanz, TU Dortmund university - Institute of Energy Systems, Energy Efficiency and Energy Economics (Germany) • Sebastian Schimmeyer, intulion solutions GmbH (Germany) • Lars Willmes, intulion solutions GmbH (Germany)

1321 **A Life Cycle Cost study on the impact of the energy transition on the choice of voltage levels in the distribution grid**

Vladimir Cuk, Eindhoven University of Technology (Netherlands) • Alex Geschiere, Liander (Netherlands) • Erika Piga-Gehrke, Liander N.V. (Netherlands)

Poster Tour PT53

Block 3: Distribution Planning (Part 2)

5 June 2019 from 14:30 to 16:00
5 June 2019 from 16:30 to 18:00

Poster Area

1345 **Reliability and security of unbalanced distribution grids based on probabilistic (N-1)-Criterion with distributed renewable energy resources**

Jesús Serrano, Universidad Carlos III de Madrid (Spain) • Ana Morales, DIgSILENT Ibérica (Spain) • Mª Ángeles Moreno, Universidad Carlos III de Madrid (Spain) • Xavier Robe, DIgSILENT Ibérica (Spain)

1556 **Case Study on the Effects of Increasing Electric Vehicle and Heating Loads on a Distribution Network in Stockholm**

Monika Topel, KTH Royal Institute of Technology (Sweden) • Monica Arnaudo, KTH Royal Institute of Technology (Sweden) • Josefine Grundius, Ellevios AB (Sweden) • Björn Laumert, KTH Royal Institute of Technology (Sweden)

1565 **Data-driven asset management with the NGIN analytics platform: Assessing EV and PV impact on the Flemish LV grid**

Joris Lemmens, Fluvius (Belgium) • Bruno Macharis, Fluvius (Belgium) • Roy Gys, Deloitte (Belgium) • Dieter Vonken, Deloitte (Belgium)

1566 **Results of the KALAMEUS Project: A Comprehensive Measurement Campaign for a more efficient Planning and Operation of the Distribution Grid**

Yamshid Farhat, BKW Energie AG (Switzerland) • Peter Esslinger, BKW Energie AG (Switzerland) • Efstratios Taxeidis, BKW Energie AG (Switzerland) • Ladislau Reider, BKW Energie AG (Switzerland)

1581 **Predicting the impact of electric bus charging on distribution power grids**

Renaud Guyot, EDF (France) • Alban Jeandin, EDF (France) • Bertrand Lasserre, EDF (France) • Laurent Torcheux, EDF (France) • Matthieu Rubion, ENEDIS (France)

1638 **Assessment of Flexibilities and Smart Grid Technologies in the Planning and Operation of Congested European Distribution Networks**

Bruna Tavares, INESC TEC (Portugal) • Kevin Christopher Cibis, University of Wuppertal (Germany) • Julian Wruk, University of Wuppertal (Germany) • Markus Zdrallek, University of Wuppertal (Germany) • Robert MacDonald, Smarter Grid Solutions (United Kingdom) • Hanne Sæle , SINTEF Energy Research (Norway) • Kjersti Berg, SINTEF Energy Research (Norway) • Henrik Landsverk, Skagerak Nett AS (Norway)

1660 **Review of transmission and distribution investment decision making processes under increasing energy scenario uncertainty**

Federico Silvestro, DITEN - University of Genoa (Italy) • Fabrizio Pilo, University of Cagliari (Italy) • Juan Carlos Araneda, Coordinador Eléctrico Nacional (Chile) • Mario Duarte, EirGrid (Ireland) • Martin Braun, Fraunhofer IEE (Germany) • Jason Taylor, EPRI (USA)

1673 **Local e-mobility prediction and deviated grid development based on data analysis**

Florian Schaber, Westnetz GmbH (Germany) • Helmut Lührsen, Westnetz GmbH (Germany) • Dieter Juchem, Westnetz GmbH (Germany)

1681 **Effects of the future trends in distribution networks**

Jukka Lassila, LUT University (Finland) • Juha Haakana, LUT University (Finland) • Jouni Haapaniemi, LUT University (Finland) • Jarmo Partanen, LUT University (Finland) • Arto Gylén, PKS Sähkönsiirto Oy (Finland) • Arto Pajunen, Järvi-Suomen Energia Oy (Finland)

1726 **EV DIFFUSION IN SOUTH TYROL: DEVELOPMENT OF THE CHARGING INFRASTRUCTURE AND ASSESSMENT OF ITS IMPACT ON THE DISTRIBUTION NETWORK**

Bruno Fasoli, Edyna srl (Italy) • Marco Birello, Edyna srl (Italy) • Arnold Rofner, Edyna srl (Italy) • Giacomo Viganò, RSE (Italy) • Michelangeli Chiara, RSE SpA (Italy) • Massimo Gallanti, RSE SpA (Italy) • Giovanni Paolucci, Alperia SpA (Italy) • Dieter Theiner, Alperia SpA (Italy)

1743 **Automated Planning of High Voltage Grids for DER Integration Studies – Results of a study for the German state of Hesse**

Roman Bolgaryn, Fraunhofer IEE (Germany) • Alexander Scheidler, Fraunhofer IEE (Germany) • Johannes Dasenbrock, Fraunhofer IEE (Germany) • Martin Braun, Fraunhofer IEE (Germany)

1778 **Optimal Planning of High Voltage Distribution Grids under a Combined Use of Energy Storage Systems and Dynamic feed-in Management**

Ouafa Laribi, University of Stuttgart (Germany) • Krzysztof Rudion, University of Stuttgart (Germany) • Tobias Lübbe, Netze BW GmbH (Germany)

1877 **Recommendations for Distribution Network Planning Based on Benchmarking of Energy Losses in Croatian DSO Network**

Tomislav Baricevic, Energy Institute Hrvoje Pozar (Croatia) • Minea Skok, Energy Institute Hrvoje Pozar (Croatia) • Danko Vidovic, Energy Institute Hrvoje Pozar (Croatia)

1885 **Comprehensive framework for PV integration with an OLTC in a rural distribution grid within the SMAP project**

Mahana BERNIER, Univ. Grenoble Alpes, CNRS, Grenoble INP, G2Elab (France) • Marie-Cecile Alvarez-Herault, Univ. Grenoble Alpes, CNRS, Grenoble INP, G2Elab (France) • Florent CADOUX, Fondation Partenariale de Grenoble INP (France) • Nouredine HADJSAID, Univ. Grenoble Alpes, CNRS, Grenoble INP, G2Elab (France) • Alexis LAGOUARDAT, Enedis (France)

1955 **Taming uncertainty in distribution grid planning – A scenario-based methodology for the analysis of impact of electric vehicles.**

Damiano Toffanin, Adaptricity AG (Switzerland) • Andreas Ulbig, Adaptricity AG (Switzerland)

1988 **Effectivity of active voltage control concepts in distribution grids**

Christian Aigner, TU Muenchen (Germany) • Rolf Witzmann, Technical University of Munich (Germany)

1993 **A Distribution System Expansion Planning method Considering Integrated Energy Service Providers' Revenue on Energy Storage Investment**

Yuquan Liu, China Southern Power Grid Corp. Limited (China) • Xinyi Zhao, Tsinghua-Berkeley Shenzhen Institute, Tsinghua University (China) • Xinwei Shen, Tsinghua-Berkeley Shenzhen Institute, Tsinghua University (China) • Wen Xiong, China Southern Power Grid Corp. Limited (China) • Li Wang, China Southern Power Grid Corp. Limited (China) • Shunqi Zeng, China Southern Power Grid Corp. Limited (China) • Zhiwen Yu, China Southern Power Grid Corp. Limited (China) • Xin Li, Guangzhou Power Supply Co. Ltd. (China)

2018 **Novel Analysis Techniques for LV Network Planning using Smart Meter Data**

Diptargha Chakravorty, TNEI Services (United Kingdom) • Charlotte Higgins, TNEI Services (United Kingdom) • Gruffudd Edwards, TNEI Services (United Kingdom) • Gordon McFadzean, TNEI Services Ltd (United Kingdom) • Francis Shillitoe, WSP (United Kingdom) • Alan Creighton, Northern Powergrid (United Kingdom)

2030 **Investigation of the Impacts of Primary Substation's OLTC on Voltage Regulators Placement in Distribution Systems**

Mehdi Attar, Tampere university (Finland) • Sami Repo, Tampere University of Technology (Finland) • Omid Homaee, Iran university of science and technology (Iran, Islamic Republic of)

2035 **Economic Evaluation of Energy Storage used for Reliability Improvement in Distribution Networks**

Alberto Escalera, IMDEA Energy/University Carlos III de Madrid (Spain) • Milan Prodanovic, IMDEA Energy (Spain) • Edgardo D. Castronuovo, University Carlos III de Madrid (Spain)

2051 **Application of dynamic transformer ratings to increase the reserve of primary substations for new load interconnection**

Ildar Daminov, Tomsk Polytechnic University (Russian Federation) • Anton Prokhorov, Tomsk Polytechnic University (Russian Federation) • Tatiana Moiseeva, Tomsk Distribution Company (Russian Federation) • Marie-Cecile Alvarez-Herault, Univ. Grenoble Alpes, CNRS, Grenoble INP, G2Elab (France) • Raphael Caire, Univ. Grenoble Alpes (France)

2079 **Long-term Economically Efficient Design of Low and Medium Voltage Distribution Networks**

Predrag Djapic, Imperial College London (United Kingdom) • Goran Strbac, Imperial College London (United Kingdom) • Danny Pudjianto, Imperial College London (United Kingdom)

2090 **An empirical study on risk assessment and reliability improvement of large-scale distribution grids considering chaotic installation of DERs**

Sajad Najafi Ravadanegh, Azarbaijan Shahid Madani University (Iran, Islamic Republic of) • Rahim Ajabi-Farshbaf, Tabriz Electric Distribution Company (Iran, Islamic Republic of) • Adel Kazemi, Tabriz Electric Distribution Company (Iran, Islamic Republic of)

2118 **BI & Analytics for smart planning in distribution systems**

MÁRIO MIGUEL FILHO, DAIMON ENGENHARIA E SISTEMAS (Brazil) • CARLOS CÉSAR BARIONI DE OLIVEIRA, DAIMON ENGENHARIA E SISTEMAS (Brazil) • ANDRÉ MEFFE, DAIMON ENGENHARIA E SISTEMAS (Brazil) • WLADMIR SYBINE, DAIMON ENGENHARIA E SISTEMAS (Brazil) • OLÍVIO CESÁRIO DOS SANTOS, EDP SP (Brazil) • EDUARDO DUTRA DA SILVA, EDP ES (Brazil)

2126 **Exploring the Requirements and Considerations for a Probabilistic Simulation Toolset Leveraging OpenDSS**

Alexander Melhorn, Electric Power Research Institute (USA) • Jason Taylor, EPRI (USA)

2128 **DER Integration Study for the German State of Hesse – Methodology and Key Results**

Alexander Scheidler, Fraunhofer IEE (Germany) • Roman Bolgaryn, Fraunhofer IEE (Germany) • Jan Ulffers, Fraunhofer IEE (Germany) • Johannes Dasenbrock, Fraunhofer IEE (Germany) • Daniel Horst, Fraunhofer IEE (Germany) • Philip Gauglitz, Fraunhofer IEE (Germany) • Carsten Pape, Fraunhofer IEE (Germany) • Holger Becker, Fraunhofer IEE (Germany)

2131 **An Advanced Distribution Planning and Optimization Process**

Jeffrey Roark, Electric Power Research Institute (USA) • Alison O'Connell, Electric Power Research Institute (Ireland) • Jason Taylor, EPRI (USA)

2150 **Planning Integrated Energy Systems in Local Communities under Uncertainty**

Wei SUN, University of Edinburgh (United Kingdom) • Jingjie YANG, University of Edinburgh (United Kingdom) • Gareth HARRISON, University of Edinburgh (United Kingdom)

2198 **Universal procedure for determining the optimal connection to the distribution network**

Marina Cavlovic, HEP ODS d.o.o. (Croatia)

2267 **The Next Generation of Distribution Analysis Tools**

Davis Montenegro, EPRI (USA) • Mobolaji Bello, EPRI (USA) • Roger Dugan, EPRI (USA) • Jason Taylor, EPRI (USA) • Jeff Smith, EPRI (USA)

2301 **Optimal location of energy storage systems with robust optimization**

Nayeem Chowdury, University of Cagliari (Italy) • Fabrizio Pilo, University of Cagliari (Italy) • Giuditta Pisano, University of Cagliari (Italy) • Matteo Troncia, University of Cagliari (Italy)

2308 **Planning Tool for Non-Interconnected Islands**

Georgia Asimakopoulou, National Technical University of Athens (Greece) • Aris Dimeas, National Technical University of Athens (Greece) • Nikos Harziargyriou, National Technical University of Athens (Greece) • Theodora Patsaka, HEDNO (Greece) • Andreas Reppas, HEDNO (Greece) • George Milionis, National Technical University of Athens (Greece) • Eirini Stavropouloy, HEDNO (Greece) • George Tekelis, National Technical University of Athens (Greece)

2317 **Comparison of models and tools for distribution planning**

Gianni Celli, University of Cagliari (Italy) • Fabrizio Pilo, University of Cagliari (Italy) • Simona Ruggeri, University of Cagliari (Italy) • Heloise Baraffe, EDF R&D (France) • Josselin Fournel, EDF R&D (France) • Gilles Malarange, EDF R&D (France) • Juliette Morin, EDF R&D (France)

2326 **Microgrid Value Stacking to Defer Distribution Capacity Upgrades of Radial Feeders**

Hamideh Bitaraf, ABB (USA) • Britta BUCHHOLZ, ABB (Germany) • Pablo ASTORGA, ABB (Spain) • John GLASSMIRE, ABB (USA)

Poster Tour PT54

Block 4: Methods and Tools

5 June 2019 from 14:30 to 16:00
5 June 2019 from 16:30 to 18:00

Poster Area

42 **Application of importance sampling method for non-technical losses detection in electrical distribution systems using smart meters**

Mojtaba Khederzadeh, Shahid Beheshti University (Iran, Islamic Republic of)

131 **Methodology for Load Shedding Actions Planning in Medium Voltage Electric Distribution Systems.**

Guilherme Borges, Daimon (Brazil) • Rogério Lima, University Of Sao Paulo (Brazil) • Fabio Romero, Daimon (Brazil)

133 **Investigating the Impact of representation of MV power lines in the distribution system for the studies of power flow considering DG**

Guilherme Saggioratto, Daimon (Brazil) • Guilherme Borges, Daimon (Brazil) • Vitor Takeda, Daimon (Brazil) • MÁRIO MIGUEL FILHO, DAIMON ENGENHARIA E SISTEMAS (Brazil) • Pablo de Paula e Silva, Energisa (Brazil) • Gustavo Paiva Guedes, Energisa (Brazil)

257 **The Application of NILM in Demand Response**

Tian Liu , Guangzhou Power Supply Bureau (China) • Wenxiong Mo , Guangzhou Power Supply Bureau (China) • Hongbin Wang , Guangzhou Power Supply Bureau (China) • Le Luan , Guangzhou Power Supply Bureau (China) • Zhong Xu, Guangzhou Power Supply Bureau Co. Ltd (China) • Kai Zhou, Guangzhou Power Supply Bureau (China) • Yanjun Feng, Jiangsu Intelever Energy Technology Co., Ltd. (China) • Meng Fu, Southeast University (China)

294 **Survey of Distribution Planners on Current Forecasting Practices and Concerns**

Jason Taylor, EPRI (USA) • Mobolaji Bello, EPRI (USA) • Steven Coley, EPRI (USA)

420 **Applying smart meter data to low voltage network planning**

Michiel Nijhuis, Phase to Phase (Netherlands) • Nard Vermeltfoort, Alliander (Netherlands) • Raoul Bernards, Enexis Netbeheer (Netherlands)

559 **Short-term load forecasting on MV/LV transformer level**

Rik Fonteijn, Eindhoven University of Technology (Netherlands) • Thomas Castelijns, Enexis Netbeheer (Netherlands) • Marinus Grond, Enexis Netbeheer (Netherlands) • Phuong Hong Nguyen, TU Eindhoven (Netherlands) • Johan Morren, Eindhoven University of Technology / Enexis Netbeheer (Netherlands) • Han Slootweg, Eindhoven University of Technology / Enexis Netbeheer (Netherlands)

620 **Analysis of Daily Load Curve by taking into consideration Electric Vehicle by Charging Station in Seoul of South Korea**

sang bong choi, korea electrotechnology research institute (Korea, Republic of)

758 **Research and Application of Project Investment Conversion Prediction Based on Improved BP Neural Network**

Fan Ru Sen, State Grid Shanghai Qingpu Electric Power Supply Company (China) • Li Ya, State Grid Shanghai Qingpu Electric Power Supply Company (China) • Ma Tao Tao, State Grid Shanghai Qingpu Electric Power Supply Company (China)

891 **Data Analytics and Stochastic Simulation Methods for Risk-Controlled Network Planning: Validation Case Study**

André Águas, EDP Distribuição (Portugal) • Vera Pereira, EDP Distribuição (Portugal) • Inês Roça, EDP Distribuição (Portugal) • Luísa Jorge, EDP Distribuição (Portugal) • Ricardo Prata, EDP Distribuição (Portugal) • João Machado, AmberTREE (Portugal) • Pedro Carvalho, AmberTREE (Portugal) • Luís Marcelino Ferreira, Ambertree (Portugal)

978 **Enhancing the Understanding of Distribution Network Losses**

David Greenwood, Newcastle University (United Kingdom) • Ilias Sarantakos, Newcastle University (United Kingdom) • Peter Davison, Newcastle University (United Kingdom) • Charalampos Patsios, Newcastle University (United Kingdom) • Aisha Ahmad, Northern Powergrid (United Kingdom) • Mary Black, Northern Powergrid (United Kingdom)

1053 **Residential Area Spatial Load Forecasting Method Based on Big Data Mining Technology**

Xujun Zhang, Huazhong University of Science and Technology (China) • Yan Li, Huazhong University of Science and Technology (China) • Yiming Liu, Huazhong University of Science and Technology (China) • Xusheng Guo, Huazhong University of Science and Technology (China) • Zhifei Cai, State Grid Xuchang Power Supply Company (China) • Song Ke, State Grid Xuchang Power Supply Company (China)

1063 **GIROSCOP: a generator of consumption and production joint scenarios for the Distribution System Operator (DSO)**

Audrey Pichavant, EDF R&D (France) • Josselin Fournel, EDF R&D (France) • Juliette Morin, EDF R&D (France) • Leticia De Alvaro Garcia, Enedis (France) • Virgile Fritsch, EDF R&D (France) • Thi Thu Huong Hoang, EDF R&D (France) • Gilles Malarange, EDF R&D (France)

1068 **Methodology for Annual Load Profile Estimation at the Outgoing Feeder of Distribution Transformers in Urban Areas**

Simon Kreutmayr, Augsburg University of Applied Sciences (Germany) • Christoph J. Steinhart, Augsburg University of Applied Sciences (Germany) • Michael Finkel, Augsburg University of Applied Sciences (Germany) • Christian Gutzmann, SWM Infrastruktur GmbH & Co. KG (Germany)

1088 **Providing simulation scenarios for the electricity grid in a smart grid environment**

José Gonçalves, EDP Distribuição, Direção Tecnologia e Inovação (Portugal) • Pedro Miguel, INESCC – Institute for Systems Engineering and Computers at Coimbra (Portugal) • Luís Neves, Polytechnic Institute of Leiria (Portugal) • A. Gomes Martins, Energy for Sustainability Initiative, University of Coimbra (Portugal) • Oana Pascu, EDP Distribuição, Direção Gestão de Energia (Portugal)

1102 **Reliability analysis methodology for smart fault handling in MV distribution grids**

Tonje Skoglund Hermansen, SINTEF Energy Research (Norway) • Hanne Vefsnmo, SINTEF Energy Research (Norway) • Gerd Kjølle, SINTEF Energy Research (Norway) • Kjell Anders Tutvedt, Hafslund Nett (Norway) • Stig Simonsen, Skagerak Nett (Norway)

1125 **Probabilistic models in power distribution electrical networks**

João Tavares, Mathematical Department, Faculty of Sciences of University of Porto (Portugal) • Sónia Gouveia , Mathematical Department, University of Aveiro (Portugal) • João Pedro Pedroso, Computer Science Department, Faculty of Sciences of University of Porto (Portugal) • Luís Oliveira, EDP Distribuição (Portugal) • Ricardo Prata, EDP Distribuição (Portugal) • Pedro Cruz, Physics Department, Faculty of Sciences of University of Porto (Portugal) • Miguel Freitas, EDP Distribuição (Portugal) • Ana Lopes, EDP Distribuição (Portugal)

1212 **Big Data challenges - a multidisciplinary team approach**

Isabel Fonseca, EDP Distribuição (Portugal) • João Castro, EDP Distribuição (Portugal) • André Águas, EDP Distribuição (Portugal) • Pedro Gonçalves, EDP Distribuição (Portugal) • Susana Magalhães, EDP Distribuição (Portugal) • Joana Braamcamp, EDP Distribuição (Portugal)

1234 **Simple technique for detection of outliers in one-dimensional numerical data used for point out anomalous consumption**

Davi Mantovani Ricci, Daimon (Brazil) • Paulo Henrique Baumann, Daimon (Brazil) • Fabio Romero, Daimon (Brazil) • ANDRÉ MEFFE, DAIMON ENGENHARIA E SISTEMAS (Brazil) • Armando H. S. G. Jesus, CEMAR (Brazil) • Eliezer S. Oliveira, CEMAR (Brazil) • Lucas A. Pinheiro , CEMAR (Brazil)

1495 **Utilization of augmented reality in underground network visualization on field**

Joona Siivonen, GE Healthcare (Finland) • Ville Kenttämaa, Elenia Palvelut Oy (Finland) • Evgenia Tkachenko, Elenia Palvelut Oy (Finland)

1568 **Scenario Analysis Heating Markets - Effects to Future Energy Grids**

Peters Klaus, Westnetz GmbH (Germany) • Markus Schmies, Vesta GmbH (Germany) • Michael Wilch, Innogy SE (Germany)

1578 **A case study to assess data management and performance of optimal power flow algorithm based tool in a DSO day-ahead operational planning platform**

Parvathy Chittur Ramaswamy, Tractebel (Belgium) • Pierre Garsoux, Tractebel (Belgium) • Christophe Del Marmol, Tractebel (Belgium) • Loriano Pellichero, ORES (Belgium) • David Vangulick, ORES (Belgium)

1630 **Combined Medium Voltage and Low Voltage simulation to accurately determine the location of Voltage Problems in large Grids**

Werner van Westering, Alliander DNO and Delft University of Technology (Netherlands) • Barbera Droste, Alliander DNO (Netherlands) • Hans Hellendoorn, Delft University of Technology (Netherlands)

1633 **PERFORMANCE EVALUATION OF DISTRIBUTION SYSTEM STATE ESTIMATOR USING DIFFERENT MEASUREMENT DEVICES**

Loïc Eggenschwiler, University of Applied Sciences and Arts Western Switzerland (Switzerland) • Patrick Favre-Perrod, University of Applied Sciences and Arts Western Switzerland (Switzerland) • Olivier Nauts, Romande Energie SA (Switzerland) • Omid A.-Mousavi, DEPsys SA (Switzerland) • Jérôme Rampazzo, Swiss Federal Office of Energy (Switzerland)

1672 **Probabilistic load models and Monte Carlo simulations used in distribution system planning**

Erling Tønne, NTE Nett AS (Norway) • Kjell Sand, NTNU (Norway) • Jan Andor Foosnæs, NTE Nett AS (Norway)

1722 **Advanced Modelling of Complex Networks to Reduce Losses**

Russell Bryans, SP Energy Networks (United Kingdom) • Wendy Mantle, SP Energy Networks (United Kingdom) • Matthew Jones, SP Energy Networks (United Kingdom) • Charlotte Higgins, TNEI Services (United Kingdom) • Diptargha Chakravorty, TNEI Services (United Kingdom) • Malcolm Bebbington, SP Energy Networks (United Kingdom)

1728 **Effects of Distribution System Characteristics on TSO-DSO Ancillary Services Exchange**

Giacomo Viganò, RSE (Italy) • Marco Rossi, RSE (Italy) • Diana Moneta, RSE (Italy)

1756 **Electricity demand forecasting 2030 by decomposition analysis of open data**

Otto Räisänen, LUT University (Finland) • Juha Haakana, LUT University (Finland) • Jouni Haapaniemi, LUT University (Finland) • Jukka Lassila, LUT University (Finland) • Jarmo Partanen, LUT University (Finland)

1779 **Using Big Data analytics to improve flood resilience of the distribution grid**

Sébastien Folleville, Enedis (France) • Jérémie Mérigeault, Enedis (France) • Odilon Faivre, Enedis (France) • Alain Tholon, Enedis (France) • Didier Broussard, Enedis (France) • Olivier Aubujeault, Enedis (France)

1785 **Electricity demand profile for residential customer 2030**

Juha Haakana, LUT University (Finland) • Jouni Haapaniemi, LUT University (Finland) • Jukka Lassila, LUT University (Finland) • Jarmo Partanen, LUT University (Finland) • Raimo Härmä, Kymenlaakson Sähköverkko Oy (Finland) • Matti Ryhänen, Savon Voima Verkko Oy (Finland)

1798 **TLC Pointer – THE USE OF GEOSPATIAL DATA FOR NON TECHNICAL LOSSES DETECTION**

Paolo Santi, Senseable City Lab, Massachusetts Institute of Technology (USA) • Massimo Zerbi, Enel Global Infrastructures And Networks (Italy) • Carlo Ratti, Senseable City Lab, Massachusetts Institute of Technology (USA) • Domenico Tresoldi, Enel Global Infrastructures And Networks (Italy) • Carlo Papa, Enel Foundation (Italy) • Giuseppe Montesano, Enel Foundation (Italy)

1819 **Energy losses estimation tool for Low Voltage Smart grids**

Jose Angel Velasco, Universidad Carlos III (Spain) • Hortensia Amaris, Universidad Carlos III (Spain) • Monica Alonso, Universidad Carlos III (Spain) • Marta Casas, Naturgy (Spain)

1825 **Synthesizing Electromobility Charging Profiles**

Noah Pflugradt, Bern University of Applied Sciences (Switzerland) • Urs Muntwyler, Bern University of Applied Sciences (Switzerland)

1857 **PV Predictions Made Easy: Flexibility Through Simplicity**

Marco E. T. Gerards, University of Twente (Netherlands) • Johann L. Hurink, University of Twente (Netherlands)

1939 **Integration of storage and PV in the DSO power losses cost assessment method for LV planning studies**

Ahmed Hadjsaid, Univ. Grenoble Alpes, CNRS, Grenoble INP, G2Elab (France) • Marie-Cecile Alvarez-Herault, Univ. Grenoble Alpes, CNRS, Grenoble INP, G2Elab (France) • Vincent Debusschere, Univ. Grenoble Alpes, CNRS, Grenoble INP, G2Elab (France) • Raphael Caire, Univ. Grenoble Alpes (France)

1972 **Determination of Constant Seasonal Values for the Current Rating of Overhead Lines in the Network Planning**

Markus Miller, University of Stuttgart (Germany) • Pascal Wiest, University of Stuttgart (Germany) • Krzysztof Rudion, University of Stuttgart (Germany) • Franziska Fischer, Netze BW GmbH (Germany)

1987 **An Adaptive Photovoltaic Production Estimator Based on Artificial Neural Networks**

Edoardo Corsetti, RSE (Italy) • Antonio G. Guagliardi, RSE (Italy) • Carlo Sandroni, RSE S.p.A (Italy)

2008 **Game Approaches for joint peak shaving planning in industrial park distribution networks**

Yuquan Liu, Guangzhou Power Supply (China) • Wen Xiong, Guangzhou Power Supply (China) • Li Wang, Guangzhou Power Supply (China) • Ying Cai, Guangzhou Power Supply (China) • Shunqi Zeng, Guangzhou Power Supply (China) • Zhiwen Yu, Guangzhou Power Supply (China) • Xiao Hu, Shanghai Jiao Tong University (China)

2046 **Managing uncertainty in load related investment decisions**

Mary Black, Northern Powergrid (United Kingdom) • Andrew Spencer, Northern Powergrid (United Kingdom) • Mark Nicholson, Northern Powergrid (United Kingdom)

2107 **Modelling of Synthetic Power Distribution Systems in Consideration of the Local Electricity Supply Task**

Jacob Tran, FGH e.V. (Germany) • Pascal Pfeifer, FGH e.V. (Germany) • Christoph Wirtz, FGH e.V. (Germany) • Dominik Wursthorn, FGH e.V. (Germany) • Hendrik Vennegeerts, FGH e.V. (Germany) • Albert Moser, FGH e.V. / RWTH Aachen (Germany)

2196 **Impacts of reactive power and harmonics on LV network losses**

Andrew Urquhart, Loughborough University (United Kingdom) • Murray Thomson, Loughborough University (United Kingdom) • Chris Harrap, Western Power Distribution (United Kingdom)

Session 6 DSO business environment enabling digitalization and energy transition

Poster Tour PT61

Block 1: Flexibility

4 June 2019 from 09:00 to 10:30
4 June 2019 from 11:00 to 12:30

Poster Area

5 **Advanced energy meter with load control based on ESP8266 module and MQTT protocol**

Damir Jakus, University of Split - FESB (Croatia) • Josip Vasilj, University of Split - FESB (Croatia) • Petar Sarajčev, University of Split - FESB (Croatia)

48 **Effects of flexibility market models on grid management tasks and systems**

Christina Süfke, Westnetz GmbH (Germany) • Nele Schlenker, innogy SE (Germany) • Erik Hauptmeier, Westnetz GmbH (Germany)

51 **Pushing the transition towards transactive grids through local energy markets**

Gisela Mendes, EDP NEW R&D (Portugal) • José Rui Ferreira, EDP NEW R&D (Portugal) • Susete Albuquerque, EDP Distribuição (Portugal) • Célia Trocato, EDP Distribuição (Portugal) • Olli Kilkki, Empower (Portugal) • Sami Repo, Tampere University of Technology (Finland)

95 **Flexibility to DSO by VPP – Benefits, Regulatory Barriers, and Potential Solutions**

Jibran Ali, PhD Student - MEAN4SG & DITEN(University of Genova) (Italy) • Stefano Massucco, DITEN - University of Genoa (Italy) • Federico Silvestro, DITEN - University of Genoa (Italy)

288 **An innovative distributed Demand Response strategy in smart grid via BlockChain-enabled bilateral smart contracts**

Hamidreza Mansouri, Tehran Electrical Power Distribution Co (Iran, Islamic Republic of) • MohammadMajid Jalali, Tehran Electrical Power Distribution Co (Iran, Islamic Republic of) • Hossein Sabouri, Tehran Electrical Power Distribution Co (Iran, Islamic Republic of)

382 **Local flexibility markets: An economic solution for the upcoming influence of electrical charging station penetration**

Kevin Kotthaus, University of Wuppertal (Germany) • Sven Pack, University of Wuppertal (Germany) • Jessica Hermanns, University of Wuppertal (Germany) • Frederik Paulat, University of Wuppertal (Germany) • Jan Meese, University of Wuppertal (Germany) • Markus Zdrallek, University of Wuppertal (Germany) • Nils Neusel-Lange, SPIE SAG GmbH (Germany) • Sebastian Raczka, SPIE SAG GmbH (Germany)

411 **System architecture for managing congestions in distributions grids using flexibility**

Ingrid Munne-Collado, Universitat Politècnica de Catalunya (Spain) • Pau Lloret-Gallego, Universitat Politècnica de Catalunya (Spain) • Pol Olivella-Rosell, Universitat Politècnica de Catalunya (Spain) • Roberto Villafafila-Robles, Universitat Politècnica de Catalunya (Spain) • Stig Ø. Ottesen, eSmart Systems (Norway) • Ramon Gallart, ESTABANELL DISTRIBUCIÓ (Spain) • Vera Palma-Costa, Estabanell (Spain) • Andreas Sumper, Universitat Politècnica de Catalunya (Spain)

424 **Self-Supply and regulated tariffs: Dynamic equilibria between photovoltaic market evolution and LV rate structures**

Ricardo Prata, EDP Distribuição (Portugal) • Pedro Carvalho, Instituto Superior Técnico, University of Lisbon (Portugal)

512 **Interoperability Strategy for an AMI deployment in the US**

Iker Urrutia, Iberdrola (Spain) • Iñigo Larumbe, Iberdrola (Spain) • Phil Morneault, Avangrid (USA) • Paul Sisson, Avangrid (USA) • Ed Beroset, EPRI (USA) • Tim Godfrey, EPRI (USA)

556 **Design and Implementation of a Decentralized AMR System using Blockchains, Smart Contracts, and LoRaWAN**

Ioannis Vlachos, National Technical University of Athens (Greece) • Nikos Harziargyriou, National Technical University of Athens (Greece)

576 **Grid Management System to solve local congestion**

Robert Steegh, Enexis BV (Netherlands) • Ton van Cuijk, Enexis (Netherlands) • Dela Pourasghar-khomami, Enexis BV (Netherlands)

583 **Change and change management - unlocking power flexibility meeting Sweden's capacity challenge**

Yvonne Ruwaida, Vattenfall Eldistribution AB (Sweden) • John Backe, E:on Energidistribution AB (Sweden) • David Bjarup, E:on Energidistribution AB (Sweden)

587 **Investigating the impacts of Demand Side Management in Guilan Distribution Company**

Fateme Mohammadi sarsar, guilan power distribution company (Iran, Islamic Republic of) • Ebrahim Khoshnood, guilan power distribution company (Iran, Islamic Republic of) • Mohammad taghi Mehdizade, guilan power distribution company (Iran, Islamic Republic of) • Jamshid Talebi, guilan power distribution company (Iran, Islamic Republic of)

636 **Battery system as a service for a distribution system operator**

Ilari Alaperä, Fortum Power and Heat Oy (Finland) • Tomi Hakala, Elenia Oy (Finland) • Samuli Honkapuro, LUT University (Finland) • Jouni Pylvänäinen, Elenia Oy (Finland) • Tero Kaipia, Zero Hertz Systems Ltd (Finland) • Pekka Manner, Fortum Power and Heat Oy (Finland) • Tatu Kulla, Fortum Power and Heat Oy (Finland)

725 **Demand response pilot experiment and its evaluation on residential and small commercial & industrial customers : A Korean case**

Donsik Jang, Korea Electric Power Corporation (KEPCO) (Korea, Republic of) • Seon-hee Lee, Korea Electric Power Corporation (KEPCO) (Korea, Republic of) • Jiyong Eom, Korea Advanced Institute of Science and Technology (Korea, Republic of) • Changhoon Shin, Korea Electric Power Corporation (KEPCO) (Korea, Republic of)

746 **KEY RESULTS OF THE PROJECT 'POWER-TO-HEAT IN SMART GRIDS'– A MULTI-OBJECTIVE APPROACH FOR A MAXIMIZED VALUE OF FLEXIBILITIES IN GRIDS**

Christopher Fuchs, Westnetz GmbH (Germany) • Stefan Nykamp, Innogy SE (Germany)

816 **Using energy disaggregation to kickstart effective consumer engagement in India**

Puneet Paneri, Fluentgrid Limited (India) • Gideon Praveen, Fluentgrid Limited (India)

832 **Architecture of integrated business platform of distributed energy resources and integration of MultiPower laboratory**

Antti Keski-Koukkari, VTT Technical Research Centre of Finland (Finland) • Aleksei Mashlakov, LUT University (Finland) • Ville Tikka, Lappeenranta University of Technology (Finland) • Anna Kulmala, VTT Technical Research Centre of Finland (Finland) • Sami Repo, Tampere University of Technology (Finland) • Samuli Honkapuro, LUT University (Finland) • Matti Aro, VTT Technical Research Centre of Finland (Finland) • Pertti Järventausta, Tampere University of Technology (Finland)

928 **Heat pumps in multi-family buildings used as a flexibility resource for balancing frequency and congestion management**

Rebecca Grill, WSP (Sweden) • Sabina Oehme, 4CStrategies (Sweden) • Yvonne Ruwaida, Vattenfall Eldistribution AB (Sweden)

1371 **Implementation of Real-time Transfer System of Smart Metering which supports demand-supply balancing**

Naoki Iwamoto, Chubu Electric Power Co.,Inc. (Japan) • Katsuyuki Kariya, Chubu Electric Power Co.,Inc. (Japan) • Takuya Kajikawa, Chubu Electric Power Co.,Inc. (Japan) • Ryuji Shibata, IBM (Japan) • Aki Uchiyama, IBM (Japan) • Hideya Shigematsu, Hitachi,Ltd (Japan)

1421 **New Demand Response Business Models – Opportunities and Risks**

Salla Annala, LUT University (Finland) • Samuli Honkapuro, LUT University (Finland) • Ville Tikka, Lappeenranta University of Technology (Finland) • Gonçalo Mendes, Lappeenranta University of Technology (Finland)

1533 **Smartcharging electric vehicles based on a flexibility market**

Daphne Geelen, Enexis Netbeheer (Netherlands) • Nazir Refa, ElaadNL (Netherlands) • Ralf Spiering, Jedlix (Netherlands)

1590 **Finding Demand Response from Smart Meter Data**

Antti Rautiainen, Tampere University (Finland) • Tomi Turunen, Pohjois-Karjalan sähkö Inc. (Finland) • Veli-Matti Laakkonen, Pohjois-Karjalan sähkö Inc. (Finland) • Antti Mutanen, Tampere University (Finland) • Pertti Järventausta, Tampere University of Technology (Finland)

1680 **Upcoming Changes in Distribution Network Tariffs – Potential Harmonization Needs For Demand Charges**

Kimmo Lummi, Tampere University (Finland) • Antti Mutanen, Tampere University (Finland) • Pertti Järventausta, Tampere University of Technology (Finland)

1692 **Optimal Scheduling of Adjustable Loads in Commercial Building Through Regional Electricity Market**

Esdras Rugira, Rwanda Energy Group (REG) Ltd (Rwanda) • Leon Fidele Nishimwe H., Soongsil University (Korea, Republic of) • Kyung-Bin Song, Soongsil University (Korea, Republic of) • Sung-Guk Yoon, Soongsil University (Korea, Republic of)

1695 **Enabling smart grid features by enhanced utilization of actual Advanced Metering Infrastructure**

Rubén Sánchez Martín-Loeches, Aalborg University (Denmark) • Daniel Vázquez Pombo, Aalborg University (Denmark) • Florin Iov, Aalborg University (Denmark) • Mohammed Seifu Kemal, Aalborg University (Denmark) • Rasmus Løvenstein Olsen, Aalborg University (Denmark)

1697 **Fast Locational Marginal Pricing for Congestion Management in a Distribution Network with Multiple Aggregators**

Koen Kok, TNO (Netherlands) • Arun Subramanian, TNO (Netherlands)

1775 **Smart Metering 2.0 enhancing a new customer experience**

Alessandro Pitì, e-distribuzione (Italy) • Luca Di Stefano, e-distribuzione (Italy) • Daniele Mardero, e-distribuzione (Italy) • Alessandra Boscagin, e-distribuzione (Italy) • Mirco Kildani, e-distribuzione (Italy) • Gianni Ceneri, e-distribuzione (Italy)

1817 **UK Power Network's Flexibility Market Offers New Revenue Stream for Customers & Enhances Active Operation of the Distribution Network**

Sam Do, UK Power Networks (United Kingdom) • Ali R. Ahmadi, UK Power Networks (United Kingdom) • Efstathios Mokkas, UK Power Networks (United Kingdom) • Sotiris Georgiopoulos, UK Power Networks (United Kingdom)

1827 **Evaluation and analysis of the utilization of data from Smart Meter System**

Yasuo Matsuura, The Kansai Electric Power Company (Japan)

1893 **The Traffic Light System to support Flexibility Exploitation from stressed distribution grids**

Julien Le Baut, Austrian Institute of Technology (AIT) GmbH (Austria) • Fabian Leimgruber, Austrian Institute of Technology (AIT) GmbH (Austria) • Clemens Korner, Austrian Institute of Technology (AIT) GmbH (Austria) • Christoph Gutschi, cyberGrid GmbH & Co KG (Austria)

1958 **Simulation Setup for Live Testing Future Distribution Grid Flexibility**

Fabian Erlemeyer, Institute of Energy Systems, Energy Efficiency and Energy Economics (ie³), TU Dortmund University (Germany) • Dennis Schmid, Institute of Energy Systems, Energy Efficiency and Energy Economics (ie³), TU Dortmund University (Germany) • Christian Rehtanz, TU Dortmund university - Institute of Energy Systems, Energy Efficiency and Energy Economics (Germany) • Bengt Lüers, R&D Division Energy OFFIS – Institute for Information Technology Oldenburg (Germany) • Sebastian Lehnhoff, R&D Division Energy OFFIS – Institute for Information Technology Oldenburg (Germany)

1959 **Interoperability for an open energy flexibility market with congestion management services**

Jorrit Nutma, TNO (Netherlands) • Wilco Wijbrandi, TNO (Netherlands) • Bob Ran, TNO (Netherlands) • Joost Laarakkers, TNO (Netherlands)

2029 **DSOs as beneficiaries of innovative contracts and services, facilitated through local electricity market structures**

Iliana Ilieva, Smart Innovation Norway (Norway) • Eivind Gramme, Skagerak Nett (Norway)

2066 **Novel Technical Solutions as an Enabler of the Small-Scale Demand Response Resources**

Ville Tikka, Lappeenranta University of Technology (Finland) • Aleksei Romanenko, LUT University (Finland) • Aleksei Mashlakov, LUT University (Finland) • Salla Annala, LUT University (Finland) • Samuli Honkapuro, LUT University (Finland) • Jarmo Partanen, LUT University (Finland)

2106 **Distribution-Level Flexibility Provision through Simultaneous Ascending Auctions**

Ibtihal Abdelmotteleb, Institute for Research in Technology (IIT), Comillas Pontifical University (Spain) • Tomás Gómez, Institute for Research in Technology (IIT), Comillas Pontifical University (Spain) • José Pablo Chaves Ávila, Institute for Research in Technology (IIT), Comillas Pontifical University (Spain)

2166 **Market models for local flexibility procurement: InterFlex' experience and main challenges**

Christian Dumbs, Enedis (France) • Gregory Jarry, Accenture (France) • Marcel Willems, Enexis (Netherlands) • Thorsten Gross, Avacon (Germany) • Alf Larsen, E.ON (Sweden) • Thibaut Wagner, Enedis (France)

2186 **Power Factor Signature Analysis for Disaggregation of EV Charging Loads From Aggregated Power**

Manuel Nunes, Instituto Superior Técnico (Portugal) • João Fernandes, Instituto Superior Técnico (Portugal) • Paulo Branco, Instituto Superior Técnico (Portugal) • Tiago Cerqueira, Eneida.IO (Portugal) • Flávio Cordeiro, Eneida.IO (Portugal) • José Oliveira, Eneida.IO (Portugal)

2246 **Embedded System for Assessing the Viability of Dynamic Tariffs**

João Pedro Lima, University of São Paulo (USP) (Brazil) • Carlos Almeida, ENERQ - USP (Brazil)

Poster Tour PT62

Block 2: Legacy DSO & Block 3: Future DSO (Part 1)

4 June 2019 from 09:00 to 10:30
4 June 2019 from 11:00 to 12:30

Poster Area

38 **Business Risk Management in DSOs: Asset Performance Management with Overcoming Challenges**

Amir Navidi, Tehran Electrical Distribution Company (Iran, Islamic Republic of) • Ali Mighi, Tehran Electrical Distribution Company (Iran, Islamic Republic of)

84 **How can biomimicry benefit power distribution networks ?**

Georges Barbarin, Schneider Electric (France) • Pierre-Michael Schmitt, Schneider Electric (France)

127 **DSO's Challenges with the Poverty Alleviation Photovoltaic Power Development in China**

Lin XUAN, Tsinghua University (China) • Yiwei ZHANG, Department of Electrical Engineering, Tsinghua University (China) • Hongke ZHANG, Shaanxi Regional Electric Power Group Co., Ltd (China) • Mei HUANG, Shaanxi Regional Electric Power Group Co., Ltd (China)

175 **ETIP-SNET Vision 2050 – Integrating Smart Networks for the Energy Transition**

Ilaria Losa, RSE (Italy) • Michele De Nigris, RSE (Italy) • Raphael Rinaldi, Enel Global Infrastructures and Networks (Italy) • Ricardo Pastor, R&D Nester (Portugal) • Ricardo Prata, EDP Distribuição (Portugal) • Jakub Marecek, IBM (Ireland) • Albana Ilo, TU Wien (Austria) • Antonio Iliceto, TERNA (Italy)

235 **Studyon the New Business Model and the AC-DC System Design of an Island StreetLighting System**

Yonggang GU, Shanghai Fushun Energy Internet Technology Co ., LTD (China) • Shaoping LIN, Zhejiang Zheneng Xingyuan Energy Saving Technology Co ., Ltd (China) • Rui XIANG, Department of Electrical Engineering, Tsinghua University (China) • Siqi HE, Shanghai Fushun Energy Internet Technology Co ., LTD (China) • Yiwei ZHANG, Department of Electrical Engineering, Tsinghua University (China)

295 **Reliability and service in the power industry**

Yulia Zhilkina, Federal Grid Company of Unified Energy System (Russian Federation) • Dmitry Vodennikov, Federal Grid Company of Unified Energy System (Russian Federation)

405 **"Integrated Asset Management" for transmission and distribution networks at Vattenfall**

Markus Taaveniku, Vattenfall Distribution Sweden (Sweden) • Marcus Halvarsson, Vattenfall Distribution Sweden (Sweden) • Alexandra Donners Muhammed, Vattenfall Distribution Sweden (Sweden) • Matthias Hopfensitz, entellgenio GmbH (Germany) • Heiko Spitzer, entellgenio GmbH (Germany)

418 **Asset simulation and indicator calculation – Integrated Link between Asset Management and Regulation**

Andreas Steffen, ENERVIE Vernetzt GmbH (Germany) • René Vormweg, ENERVIE Vernetzt GmbH (Germany) • Terence Dürauer, entellgenio GmbH (Germany) • Heiko Spitzer, entellgenio GmbH (Germany)

431 **Distributed generation management using blockchain concept: Iran power distribution study**

Sajjad Rahmanzadeh, Guilan Power Distribution Company (Iran, Islamic Republic of) • Hamed Daneshvar, Guilan Power Distribution Company (Iran, Islamic Republic of) • Ali Mirzazadeh, Guilan Power Distribution Company (Iran, Islamic Republic of)

481 **Analysing Thai Social Media Content to Improve Customer Satisfaction**

JITRLADA ROJRATANAVIJIT, Metropolitan Electricity Authority (Thailand) • CHINGCHAI EIAMSITHIPAN, Metropolitan Electricity Authority (Thailand)

504 **RATIONAL USE OF CONNECTED CAPACITIES IN PURPOSE OF MORE ELECTRICITY EFFICIENT POWER DISTRIBUTION NETWORK**

Senad Aganovic, Regulatory Commission for energy in Federation of Bosnia and Herzegovina (Bosnia and Herzegovina) • Edina Aganovic, Independent System Operator in Bosnia and Herzegovina (Bosnia and Herzegovina) • Tatjana Konjic, University of Tuzla - Faculty of Electrical Engineering (Bosnia and Herzegovina)

664 **Electricity Market Structure in the Distribution Sector**

Lanqing Shan, University of Bath (United Kingdom) • Zhong Zhang, University of Bath (United Kingdom) • Chenghong Gu, University of Bath (United Kingdom) • Liz Sidebotham, Northern PowerGrid (United Kingdom) • Furong Li, University of Bath (United Kingdom)

756 **Improving the regulatory framework in order to increase the efficiency of electricity distribution and supply**

Vladimir Shiljkut, Public Enterprise “Electric Power Industry of Serbia” (Serbia) • Jelena Milosavljevic, Public Enterprise “Electric Power Industry of Serbia” (Serbia) • Ljiljana Mitrusic, Public Enterprise “Electric Power Industry of Serbia” (Serbia)

762 **ROLE OF DSO IN THE FUTURE OF E MOBILITY IN INDIA**

Swati Mamidi, The Tata Power Company Limited (India) • Nushreen Ahmed, The Tata Power Company Limited (India)

772 **Block-Chain Based Electricity Power Trading System Mechanisms and Operating Methods**

Jung-sung Park, KEPCO Research Institute (Korea, Republic of) • Seong-chul Kwon, KEPCO Research Institute (Korea, Republic of) • Moon-sung Bae, KEPCO Research Institute (Korea, Republic of) • Jong-uk Lee, KEPCO Research Institute (Korea, Republic of) • Dong-joo Kim, KEPCO Research Institute (Korea, Republic of)

798 **Standards assessment of Business Use Cases proposed in TDX-ASSIST**

Eric Lambert, EDF (France) • Jérôme Cantenot, EDF (France) • Francisco Reis, REN (Portugal) • Nermin Suljanovic , EIMV (Slovenia) • Tiago Simão, EDP Distribuição (Portugal) • Nejc Petrovic, Elektro Gorenjska (Slovenia) • Gareth Taylor, Brunel University (United Kingdom) • Hugo Morais, EDF (France)

827 **An ICT cost comparison of different market structures for distributed ancillary services**

Pirkko Kuusela, Technical Research Centre of Finland, Ltd. (Finland) • Pekka Koponen, VTT Technical Research Centre of Finland (Finland) • Han Xu, University of Strathclyde (United Kingdom) • Ivana Kockar, University of Strathclyde (United Kingdom)

878 **Quartierstrom: A Decentralized Local P2P Energy Market Pilot On A Self-Governed Blockchain**

Alain Brenzikofer, Supercomputing Systems AG (Switzerland) • Arne Meeuw, University of St. Gallen (Switzerland) • Sandro Schopfer, ETH Zürich (Switzerland) • Anselma Wörner, ETH Zürich (Switzerland) • Christian Dürr, Wasser- und Elektrizitätswerk Walenstadt (Switzerland)

889 **CNAIM Asset Risk Modelling – Implementation and Opportunities**

Stefan Sadnicki, Copperleaf (Spain) • Sheng Liu, Strategic Asset Management Consulting (United Kingdom)

922 **Alternative Structure of Distribution Sector for Neutral Distribution System Operation in Korea**

Hee Seung Moon, Seoul National University (Korea, Republic of) • Seung Wan KIM, Chungnam National University (Korea, Republic of) • Young Gyu Jin, Jeju National University (Korea, Republic of)

942 **Technical and Economic Impact of Residential BESS on Distribution Systems Under Alternative Tariff Regimes**

Philip Douglass, Danish Energy (Denmark) • Peng Hou, Technical University of Denmark (Denmark) • Sebastian Martens, Danish Energy (Denmark) • Guangya Yang, Technical University of Denmark (Denmark)

946 **Incentive scheme for continuity of supply in the Swedish revenue cap regulation from 2020**

Carl Johan Wallnerström, The Swedish Energy Markets Inspectorate (Sweden) • Yalin Huang, The Swedish Energy Markets Inspectorate (Sweden) • Gustav Wigenborg, The Swedish Energy Markets Inspectorate (Sweden) • Lars Ström, The Swedish Energy Markets Inspectorate (Sweden) • Tommy Johansson, The Swedish Energy Markets Inspectorate (Sweden)

948 **Incentive scheme for efficient grid utilization in the Swedish revenue cap regulation from 2020**

Carl Johan Wallnerström, The Swedish Energy Markets Inspectorate (Sweden) • Gustav Wigenborg, The Swedish Energy Markets Inspectorate (Sweden) • Yalin Huang, The Swedish Energy Markets Inspectorate (Sweden) • Lars Ström, The Swedish Energy Markets Inspectorate (Sweden) • Tommy Johansson, The Swedish Energy Markets Inspectorate (Sweden)

954 **Grid and Market Hub Platform to Enable a Data-driven Smart Grid Economy**

Fábio Coelho, INESC TEC (Portugal) • Xavier Rodrigues, INESC TEC (Portugal) • Ricardo Bessa, INESCTEC (Portugal) • João Castro, EDP Distribuição (Portugal) • Jorge Moreira, EDP Distribuição (Portugal) • Rafael Matos, SAP (Germany) • Nuno Gregório, SAP (Germany) • Manuel Pio, EDP Distribuição (Portugal)

957 **Technical requirements and practical implementation of a dynamic priced electricity tariff**

Benedikt Dahlmann, Bergische Universität Wuppertal (Germany) • Jan Meese, University of Wuppertal (Germany) • Marcel Ludwig, University of Wuppertal (Germany) • Markus Zdrallek, University of Wuppertal (Germany) • Andy Völschow, WSW Energie & Wasser GmbH (Germany) • Jens Müller, WSW Energie & Wasser GmbH (Germany)

1018 **Incentivizing capacity grid tariffs as a building block for the energy transition**

Didier Halkin, ORES (Belgium)

1140 **DSO role in the deployment of Smart Cities solutions: the case of the Lisbon Urban Sharing Platform as a service provider**

Vera Nunes, EDP Distribuição SA (Portugal) • Carolina Carli, CEiiA (Portugal) • Catarina Rolim, Instituto Superior Técnico (Portugal) • Manuel Dordio, EDP Distribuição SA (Portugal) • Telma Mota, Altice Labs (Portugal)

1154 **Digital Foundation; providing the necessary vision and tools to enable a connected energy landscape**

Elwin Koster, Fugro N.V. (Netherlands) • Jan Kema, Fugro N.V. (Netherlands) • Chris Boreland, Fugro N.V. (Netherlands)

1487 **Implementation of Statistical Measures for Operation and Renewal of Distribution Network in PREdistribuce, a.s.**

Martin Hejhal, PREdistribuce, a.s. (Czech Republic) • Zbyněk Brettschneider, PREdistribuce, a.s. (Czech Republic) • Radek Hanuš, PREdistribuce, a.s. (Czech Republic)

1518 **Leveraging industry standards to build an architecture for asset management and predictive maintenance**

Vincent Gliniewicz, Vattenfall R&D (Sweden) • David Erol, Vattenfall R&D (Sweden) • Anders Johnsson, Vattenfall Eldistribution (Sweden)

1530 **Nexans Strategic Asset Management Solution: The powerful decison making platform dedicated to DSOs.**

Olivier PINTO, NEXANS (France) • Franck BLONBOU, NEXANS (France) • Thomas LACROIX, COSMO TECH (France) • Thierry DE LUMLEY, COSMO TECH (France)

1595 **DIGITAL ASSET CAPTURING: an innovative approach to improve and automate power lines surveillance through AI-enabled image recognition technologies**

Enrico Valigi, Enel (Italy)

1645 **MONICA: Advanced Monitoring and Control in MV and LV Distribution Network**

Francisco Javier Leiva, Endesa (Spain) • Susana Carillo, Endesa (Spain) • Rubén Carmona, ENDESA DISTRIBUCION (Spain)

1723 **Enhancements and digitization of Mobile power supply assets to meet DSOs requirements**

Álvaro Puertas de la Morena, EDP Distribuição (Portugal) • Ricardo Jorge Santos, EDP Distribuição (Portugal) • Alexandre Barroso Sousa, EDP Distribuição (Portugal) • Carlos Oliveira, EDP Distribuição (Portugal) • José Ferreira Pinto, EDP Distribuição (Portugal) • Rita Pires, EDP Distribuição (Portugal) • José João Cardoso, EDP Distribuição (Portugal) • Pedro Vidal, EDP Distribuição (Portugal)

1777 **National reporting of faults and interruptions using CIM and MADES/ECP**

Jørn Heggset, Statnett (Norway) • Ketil Johannessen, Statnett (Norway) • Arnt Ove Eggen, SINTEF (Norway) • Ketil Sagen, Energi Norge AS (Norway)

1849 **A DSO Support Framework for Assessment of Future-Readiness of Distribution Systems: Technical, Market, and Policy Perspectives**

Ankur Srivastava, Chalmers University of Technology (Sweden) • David Steen, Chalmers University of Technology (Sweden) • Anh Tuan Le, Chalmers University of Technology (Sweden) • Ola Carlson, Chalmers University of Technology (Sweden) • Joni Rossi, RISE (Sweden) • Sylvain Berlioz, SOREA (France) • Phuong Hong Nguyen, TU Eindhoven (Netherlands) • Muhammad Babar, TU Eindhoven (Netherlands)

1867 **Optimising Asset Risk Profiles by Balancing Investment Requirements with Skills Availability**

Tracy Pears, EA Technology (United Kingdom) • Joanne Peacock, EA Technology (United Kingdom) • Linda Hull, EA Technology (United Kingdom)

1897 **Applied health and risk assessment on a large asset base**

Anna Lilly Brodersson, Vattenfall Eldistribution AB (Sweden) • Elin Andreasson, Vattenfall Eldistribution AB (Sweden)

1947 **A model of Asset Management in Electric Distribution Companies considering the Strategic Thinking and Corporate Governance Pattern**

Taghi Vahidi, Khorasan Electric Distribution Company (KEDC) (Iran, Islamic Republic of)

2149 **Development, applications and benefits of the network digital twin**

marina lombardi, enel global infrastructure and networks (Italy) • Antonio Cammarota, E-distribuzione Spa (Italy) • Juan Refoyo Mayoral, Enel (Spain)

2312 **Implementation of ISO 55.000 at MITNETZ and lean management processes**

Adolf Dr. Schweer, Mitteldeutsche Netzgesellschaft Strom mbH (MITNETZ STROM) (Germany) • Hanjo During, Mitteldeutsche Netzgesellschaft Strom mbH (MITNETZ STROM) (Germany) • Ulf Aleit, Mitteldeutsche Netzgesellschaft Strom mbH (MITNETZ STROM) (Germany) • Mareen Schmidt, Mitteldeutsche Netzgesellschaft Strom mbH (MITNETZ STROM) (Germany) • Tom Lux, Mitteldeutsche Netzgesellschaft Strom mbH (MITNETZ STROM) (Germany) • Maurice Kakuschke, Mitteldeutsche Netzgesellschaft Strom mbH (MITNETZ STROM) (Germany)

Poster Tour PT63

Block 3: Future DSO (Part 2)

4 June 2019 from 14:30 to 16:00
4 June 2019 from 16:30 to 18:00

Poster Area

1144 **An Industry Survey: Artificial Intelligence Potential Disruptiveness And Usefulness for Electricity Distribution**

Age van der Mei, Duinn (Netherlands) • Jan-Peter Doomernik, Enexis Netbeheer (Netherlands)

1152 **The perfect storm for monopoly grids: the dual disruptive impact of distributed generation and local competition**

Age van der Mei, Duinn (Netherlands) • Lennart Lalieu, Enexis Netbeheer (Netherlands) • Jan-Peter Doomernik, Enexis Netbeheer (Netherlands)

1174 **Engaging Prosumers in Local Energy Market Business Models**

Wilhelm Cramer, Fraunhofer FIT (Germany) • Maria Vasconcelos, Fraunhofer FIT (Germany) • Carlo Schmitt, Fraunhofer FIT (Germany) • Andreas Armstorfer, Hochschule Kempten (Germany) • Nauman Beg , Hochschule Kempten (Germany) • Florian Heringer, AllgäuNetz GmbH & Co. KG (Germany)

1192 **New business models enabled by smart grid technology and their implications for DSOs**

Leandro Lind, IIT - Comillas University (Spain) • Rafael Cossent, IIT - Comillas University (Spain) • Pablo Frías, IIT - Comillas University (Spain)

1197 **HOW DOES THE ENERGY SECTOR EXPLORE DISRUPTIVE INNOVATION: A BLOCKCHAIN CASE STUDY**

Jan-Peter Doomernik, Enexis Netbeheer (Netherlands) • Lennart Lalieu, Enexis Netbeheer (Netherlands) • Marcel Brouwer, Duinn (Netherlands)

1313 **The PEBBLES project – enabling blockchain based transactive energy trading of energy & flexibility within a regional market**

Maria Vasconcelos, Fraunhofer FIT (Germany) • Wilhelm Cramer, Fraunhofer FIT (Germany) • Carlo Schmitt, Fraunhofer FIT (Germany) • Arvid Amthor, Siemens AG (Germany) • Stefan Jessenberger, Siemens AG (Germany) • Christian Ziegler, ALLGÄUER Überlandwerke GmbH (Germany) • Andreas Armstorfer, Hochschule Kempten (Germany) • Florian Heringer, AllgäuNetz GmbH & Co. KG (Germany)

1331 **Profitability Assessment of PV Rooftop Implementation for Prosumer Under Net Metering Scheme in Indonesia**

Andri Yanuar Rosyad, PT PLN (Persero) (Indonesia) • Catherine Noakes, University of Leeds (United Kingdom)

1347 **Feasibility study on the adoption of peer-to-peer trading integrated on existing retail market and distribution grid**

Tiago Sousa, DTU (Denmark) • Ehsan Fallahi, DTU (Denmark) • Andrea RadoszynskiI, DTU (Denmark) • Pierre Pinson, DTU (Denmark)

1381 **Research on Distributed Renewable Energy Transaction Decision-making Based on Multi-Agent Bilevel Cooperative Reinforcement Learning**

Zhangyu Chen, Shanghai Jiaotong University (China) • Dong Liu, Shanghai Jiao Tong University (China) • Xiaofei WU, State Grid Huai'an Power Supply Company (China) • Xiaochun XU, State Grid Huai'an Power Supply Company (China)

1448 **Control of Reactive Power in Electricity Distribution Companies**

Suvi Takala, Helen Ltd. (Finland) • Atte Pihkala, Helen Electricity Network Ltd. (Finland) • Pirjo Heine, Helen Electricity Network Ltd. (Finland)

1543 **Research on Distributed Transaction Strategy Based on Cooperative Game Nucleolus Method**

Jie Yu, Southeast University (China) • Saite Yang, Hohai University (China) • Qian Chen, Hohai University (China) • Hongwei Du , NARI Technology Development Limited Company (China)

1544 **Impact of System Services Deployment in Distribution Systems: NIE Networks Case Study**

Avinash Aithal, EA Technology (United Kingdom) • Paul Morris, EA Technology (United Kingdom) • Jonathan Pollock, Northern Ireland Electricity Networks (United Kingdom) • Ian Bailie, Northern Ireland Electricity Networks (United Kingdom)

1547 **Digitalization of Smart Cities with Blockchain Technology**

Meltem Civlez, Enerjisa Electricity Distribution Company (Turkey) • Ozden Ercin, Enerjisa Electricity Distribution Company (Turkey) • Hulya Erdener Akinc, Enerjisa Electricity Distribution Company (Turkey)

1579 **An Innovative Business Model to provide Services to Distribution Companies through an Automatic Meter Reading System**

Marcelo Tardio, CESI (Italy) • Mahmoud Jallad, Nama Holding (Oman) • Mansoor Al Hinai, Nama Holding (Oman) • Pierluigi Vicini, CESI (Italy)

1629 **Understanding Future Scenarios to facilitate the DSO Transition**

Randolph Brazier, Energy Networks Association (United Kingdom) • Stewart Reid, Scottish & Southern Electricity Networks (United Kingdom) • Tim Manandhar, UK Power Networks (United Kingdom) • Manuel Castro, EA Technology (United Kingdom) • Mark Sprawson, EA Technology (United Kingdom)

1653 **Driving forces for intelligent distribution system innovation - results from a foresight process**

Tonje Skoglund Hermansen, SINTEF Energy Research (Norway) • Hanne Vefsnmo, SINTEF Energy Research (Norway) • Gerd Kjølle, SINTEF Energy Research (Norway) • Kjell Sand, NTNU (Norway)

1679 **Blockchain local markets for the distributed control of microgrids**

Matteo Troncia, University of Cagliari (Italy) • Marco Galici, University of Cagliari (Italy) • Emilio Ghiani, University of Cagliari (Italy) • Fabrizio Pilo, University of Cagliari (Italy) • Simona Ruggeri, University of Cagliari (Italy)

1702 **The role of TSO-DSO cooperation towards the energy transition**

Julija Vasiljevska, European Commission, Joint Research Centre (Netherlands) • Antonios Marinopoulos, European Commission, Joint Research Centre (Netherlands)

1715 **Leveraging DERs for Network and Commercial Dispatch – Lessons Learned and a Path Forward**

Pierre Mullin, Siemens AG (Germany) • Erich Fuchs, Siemens AG Österreich (Austria)

1719 **Impact Assessment Criteria of Distribution System Architecture**

Wangwei Kong, University of Bath (United Kingdom) • Kang Ma, University of Bath (United Kingdom) • Furong Li, University of Bath (United Kingdom) • Edmund Thompson, University of Bath (United Kingdom) • Liz Sidebotham, Northern PowerGrid (United Kingdom)

1748 **Modelling the transition to Distribution System Operator using the Smart Grid Architecture Model**

Manuel Castro, EA Technology (United Kingdom) • Elaine Meskhi, EA Technology (United Kingdom) • Ray Burns, EA Technology (United Kingdom) • Randolph Brazier, Energy Networks Association (United Kingdom) • Tim Manandhar, UK Power Networks (United Kingdom)

1786 **Unleashing surveillance and control potential in Smart Distribution Systems – The Net2DG approach.**

Daniel Vázquez Pombo, Aalborg University (Denmark) • Florin Iov, Aalborg University (Denmark) • Rubén Sánchez Martín-Loeches, Aalborg University (Denmark) • Nuno Silva, Grid Data (Germany)

1807 **What should be done to make revolution in smart distribution grids?**

Sami Repo, Tampere University of Technology (Finland) • Davide Della Giustina, Unareti Spa (Italy) • Ferdinanda Ponci, RWTH Aachen University (Germany)

1839 **Load Models for Electricity Distribution Price Regulation**

Antti Mutanen, Tampere University (Finland) • Kimmo Lummi, Tampere University (Finland) • Pertti Järventausta, Tampere University of Technology (Finland)

1840 **Going beyond the AI hype with a bottom-up holistic approach focused on improving business processes and services**

Karl Axel Sträng, Enedis (France) • Claude Bouquet, Enedis (France) • Maxime Dupont, Enedis (France) • Stéphane Gosswiller, Enedis (France) • Richard Bavarin, Enedis (France) • Stéphanie Delaunay, Enedis (France)

1844 **Investment Decision of Households in Distributed Energy Resources with regard to Price Degression of PV and Battery Systems**

Maximilian Rose, Schleswig-Holstein Netz AG (Germany) • Torsten Sowa, Schleswig-Holtstein Netz AG (Germany) • Imke Hebbeln, Schleswig-Holstein Netz AG (Germany) • Sonja Spille, Schleswig-Holstein Netz AG (Germany) • Wilhelm Cramer, Fraunhofer FIT (Germany)

1870 **Econometric Estimation of a Cost Function of the Power Distribution Grid**

Mathieu Bordigoni, Enedis (France) • Laurent Gilotte, Enedis (France)

1876 **DSO tariff driven customer grid defections – Techno-economical risks for DSO?**

Jouni Haapaniemi, LUT University (Finland) • Juha Haakana, LUT University (Finland) • Otto Räisänen, LUT University (Finland) • Jukka Lassila, LUT University (Finland) • Jarmo Partanen, LUT University (Finland)

1880 **Power-based distribution tariffs for residential customers – A risk for overloading of network in areas with high penetration of Time-of-Use DSO tariffs?**

Jouni Haapaniemi, LUT University (Finland) • Juha Haakana, LUT University (Finland) • Otto Räisänen, LUT University (Finland) • Jukka Lassila, LUT University (Finland) • Jarmo Partanen, LUT University (Finland)

1929 **The embedding of Energy Communities in the unified LINK-based holistic architecture**

Albana Ilo, TU Wien (Austria) • Ricardo Prata, EDP Distribuição (Portugal) • Antonio Iliceto, TERNA (Italy) • Goran Strbac, Imperial College London (United Kingdom)

1999 **Energy Data Flow in Smart Grids - A Conceptual Model for Addressing Various Use Cases**

Mohammed Radi, Brunel University London (United Kingdom) • Gareth Taylor , Brunel University London (United Kingdom) • Mathias Uslar, OFFIS (Germany) • Julia Köhlke, OFFIS Institute for Information Technology (Germany) • Nermin Suljanovic , EIMV (Slovenia)

2010 **Elektro Ljubljana: Big Data Challenges In The Field Of Advanced Electricity Metering**

Maja Savinek, Elektro Ljubljana (Slovenia) • Tadej Šinkovec, Elektro Ljubljana (Slovenia) • Danijel Davidović, Elektro Ljubljana (Slovenia)

2026 **Business Models for Electricity Distribution in Europe: Evidence from the JRC DSO Observatory 2018**

Nikoleta Andreadou, Joint Research Centre, European Commission (Italy) • Marco Flammini, Joint Research Centre, European Commission (Italy) • Silvia Vitiello, Joint Research Centre, European Commission (Italy)

2027 **Value-added Electricity Services: Role of Microgrid Services In Distribution Network Planning**

Milad Hoseinpour, Tarbiat Modares University (Iran, Islamic Republic of) • Mahmoud-Reza Haghifam, Tarbiat Modares University (Iran, Islamic Republic of)

2028 **SP Energy Networks: Our Vision of Future DSOs**

Sofia Cobo de Guzman, SP Energy Networks (United Kingdom) • Wendy Mantle, SP Energy Networks (United Kingdom) • Julian Wayne, Culan Strategy Ltd (United Kingdom) • Gerrard Boyd, SP Energy Networks (United Kingdom) • Malcolm Bebbington, SP Energy Networks (United Kingdom) • Russell Bryans, SP Energy Networks (United Kingdom)

2083 **Identification and validation of new business models for DSO business environment using business model canvas and stakeholder groups**

Heidi Tuiskula, Smart Innovation Norway (Norway) • Sanket Puranik, Smart Innovation Norway (Norway) • Iliana Ilieva, Smart Innovation Norway (Norway) • Christian Kuntze, Smart Innovation Norway (Norway)

2148 **Relevance and boundaries of innovation cooperation in the Smart Grid and its influence on energy transition**

Julia Köhlke, OFFIS Institute for Information Technology (Germany)

2157 **Time-based and locational distribution use of system tariffs with selective consideration of network components**

Neusa Antunes, Escher Consultoria (Brazil) • Jan Morse Teixeira Koole, Escher Consultoria (Brazil) • Diego Boff, Consultar (Brazil) • Iara Lenuzza de Oliveira Sobrosa, Consultar (Brazil) • Alexsandre Leite Ferreira, Empresa de Força e Luz Santa Maria - ELFSM (Brazil) • Renato Zampiroli de Medeiros, Empresa de Força e Luz Santa Maria - ELFSM (Brazil)

2192 **Regulatory incentives for improving the resilience of electricity distribution grids in Italy**

Luca Lo Schiavo, ARERA (Italian Regulatory Authority) (Italy) • Ferruccio Villa, ARERA (Italian Regulatory Authority) (Italy) • Carlo Turconi, ARERA (Italian Regulatory Authority) (Italy)

2213 **Evaluating the value proposition of microgrids for utilities**

Dino Ablakovic, Siemens AG (Germany) • Markus Reischboeck, Siemens AG (Germany) • Stefan Jessenberger, Siemens AG (Germany)

2232 **Stakeholder alignment: Key to enable renewably powered electric mobility on island states - a Caribbean island state case study**

Benedikt Roemer, Siemens AG (Germany) • Ken Aldonza, Consultant (Barbados) • Ellsworth Dacon, Energy Unit (Saint-Vincent and the Grenadines) • Simon Zellner, GIZ TAPSEC (Barbados)

2254 **Binomial tariff: an alternative modality to Brazilian low voltage consumer**

Lorena Cardoso Borges dos Santos , CPFL (Brazil) • Jairo Eduardo de Barros Alvares, CPFL (Brazil) • Rafael de Oliveira Gomes, CPFL (Brazil) • Carlos Cesar Barioni de Oliveira , Daimon (Brazil) • Cristiano da Silva Silveira, Daimon (Brazil) • Denis Antonelli, Daimon (Brazil)

2264 **Introducing the Concept of Technical Debt to Smart Grids: a System Engineering Perspective**

Johann Schütz, OFFIS – Institute for Information Technology (Germany) • Mathias Uslar, OFFIS (Germany)

Poster Tour PT64

Block 4: Information Management

4 June 2019 from 14:30 to 16:00
4 June 2019 from 16:30 to 18:00

Poster Area

50 **Trial application of SDN(Software Defined Network) technology under Cloud environment in State Grid Shanghai Data Center**

HU Junyi, Information & Communication Company. SMEPC (China) • Fang Xiaorong, Information & Communication Company. SMEPC (China) • Wu Yuanxin, Information & Communication Company. SMEPC (China)

78 **Research on Enterprise Cloud Platform Security System**

Nan Chen, State Grid Shanghai Municipal Electric Power Company Information and Communication Company (China)

117 **Implementing an ISA/IEC-62443 and ISO/IEC-27001 OT Cyber Security Management System at Dutch DSO Enexis**

Carlos Montes Portela, Enexis Netbeheer B.V. (Netherlands) • Maarten Hoeve, European Network for Cyber-Security (Netherlands) • Fook Hwa Tan, Northwave (Netherlands) • Han Slootweg, Eindhoven University of Technology / Enexis Netbeheer (Netherlands)

141 **Managing OT cyber security risks using BowTies and Risk & Opportunity Based Asset Management at Dutch DSO Enexis**

Maarten Hoeve, European Network for Cyber-Security (Netherlands) • Carlos Montes Portela, Enexis Netbeheer B.V. (Netherlands) • Gido Brouns, Enexis Netbeheer B.V. (Netherlands)

272 **The principle of Information security protection on “State Grid Cloud” in State Grid Shanghai Data Center**

HU Junyi, Information & Communication Company. SMEPC (China) • Liu Wenyi, Information & Communication Company. SMEPC (China) • Wu Yuanxin, Information & Communication Company. SMEPC (China)

655 **A HOLISTIC REVIEW OF CYBER RISK FOR THE DISTRIBUTION OF POWER**

Steve Little, AFIMA (United Kingdom) • Anuj Nayyar, IET (United Kingdom) • David Neilson, SP Energy Networks (United Kingdom)

681 **Using technology and sharing data to improve electricity services**

MR.VATCHARA GUAYSIRIKUL, Metropolitan Electricity Authority - MEA (Thailand)

810 **Global System of Record and Framework to Preserve Energy Consumption with Blockchain**

Gideon Praveen, Fluentgrid Limited (India) • Puneet Paneri, Fluentgrid Limited (India)

813 **Private LTE Field tests and Results for Smart Grid services**

Marta Solaz Hernández, Iberdrola Distribución (Spain) • Juan Sebastián Gómez Guajardo, Iberdrola España (Spain) • Alberto Sendín Escalona, Iberdrola España (Spain) • Javier Noguerol Oliván, Ericsson (Spain)

934 **Implementing CIM model in Distribution System Operator**

Mihael Medved, Elektro Ljubljana d.d. (Slovenia) • Manca Kavšek, Elektro Ljubljana d.d. (Slovenia)

1054 **Data collecting and processing method in distribution system using edge computing technology**

Haizhu Wang, Electric Power Dispatching Control Center of Guangdong Power Grid Co., Ltd (China) • Wenxin Guo, Electric Power Dispatching Control Center of Guangdong Power Grid Co., Ltd (China) • Caishan Guo, School of Electric Power, South China University of Technology (China) • Yuyan Sun, School of Electric Power, South China University of Technology (China) • Jiangang Lu, Electric Power Dispatching Control Center of Guangdong Power Grid Co., Ltd (China) • Ruifeng Zhao, Electric Power Dispatching Control Center of Guangdong Power Grid Co., Ltd (China) • Yang Liu, Electric Power Dispatching Control Center of Guangdong Power Grid Co., Ltd (China)

1060 **Assessment of Cyber Security Requirements for the Future Digital Power System**

Roberta Terruggia, RSE Ricerca Sistema Energetico (Italy) • Giovanna Dondossola, RSE Ricerca Sistema Energetico (Italy) • Mauro Giuseppe Todeschini, RSE Ricerca Sistema Energetico (Italy)

1147 **CROSS-CUTTING ISSUES IN THE EPES DIGITAL ERA:AN OVERVIEW OF PROMINENT SMART GRID USE CASES**

Eduardo Rodrigues, EFACEC (Portugal) • Alberto Rodrigues, EFACEC (Portugal) • Nuno Silva, Efacec (T&I) (Portugal)

1241 **Computational tool to improve the information's quality of the DSO's geographic database (BDGD) for regulatory purposes**

Davi Mantovani Ricci, Daimon (Brazil) • Paulo Henrique Baumann, Daimon (Brazil) • Fabio Romero, Daimon (Brazil) • ANDRÉ MEFFE, DAIMON ENGENHARIA E SISTEMAS (Brazil) • Armando H. S. G. Jesus, CEMAR (Brazil) • Eliezer S. Oliveira, CEMAR (Brazil) • Lucas A. Pinheiro , CEMAR (Brazil)

1340 **Data Platform as an Enabler for Piloting in Smart Otaniemi Ecosystem**

Anna Kulmala, VTT Technical Research Centre of Finland (Finland) • Teemu Vesanen, VTT (Finland) • Kari Mäki, VTT Research Center of Finland (Finland) • Seppo Horsmanheimo, VTT (Finland) • Kimmo Hätönen, Nokia Bell Labs (Finland) • Pekka Kupila, Nokia Bell Labs (Finland) • Jarno Halme, Nokia (Finland)

1436 **Digitalization for Sustainably Smart Electricity Distribution System**

AMITH VIJAYAN, Kerala State Electricity Board Ltd. (India)

1441 **Security Testing for Preventing Backdoor Threat in Smart meter Implementation In Indonesia**

Mukhamad Faiz Fanani, PLN (Indonesia) • Astri Kartika, PLN (Indonesia)

1482 **First of its kind implementation of IOT system in Indian Power Sector**

Yash Kulkarni, OrxaGrid Ltd (India) • Akshat Kulkarni, OrxaGrid Ltd (United Kingdom)

1548 **Implementing Cybersecurity Strategy from Distribution System Operator Perspective**

Ozden Ercin, Enerjisa Electricity Distribution Company (Turkey) • Meltem Civlez, Enerjisa Electricity Distribution Company (Turkey)

1616 **Capturing Post Transactional Customers Feedback across key customer touch-points using online and real time platform.**

Manoj Gupta, The Tata Power Company Limited. (India) • Sunny Puthran, The Tata Power Company Limited. (India) • Vishwas R Shrikhande, The Tata Power Company Limited (India)

1621 **Implementation of IVR for Complaint Management.**

Manoj Gupta, The Tata Power Company Limited. (India) • Sunny Puthran, The Tata Power Company Limited. (India) • Vishwas R Shrikhande, The Tata Power Company Limited (India)

1655 **CheckIn – Work Force Management Platform**

José Sousa, EDP Distribuição (Portugal) • Diogo Lopes, EDP Distribuição (Portugal) • David Fonseca, EDP Distribuição (Portugal) • Carlos Oliveira, EDP Distribuição (Portugal) • Patrick Mendes, EDP Distribuição (Portugal) • Vera Pereira, Do It Lean (Portugal) • Tiago Gafeira, Do It Lean (Portugal)

1797 **(ADMS4LV) – Improved observability of LV grids based on advanced analytics**

Konstantinos Kotsalos, Efacec (Portugal) • André Simões, Efacec (Portugal) • Luis Marques, EFACEC (Portugal) • Filipe Campos, Efacec (Portugal) • Clara Gouveia, INESC TEC (Portugal) • Henrique Teixeira, INESC TEC (Portugal) • Gil Sampaio, INESC TEC (Portugal) • Jorge Pereira, INESC TEC & FEP (Portugal)

1803 **Implementation of Chat bot & Voice Bot**

Deepak Ojha, Tata Power Company Limited (India)

1822 **Privacy Issues in Smart Buildings by examples in Smart Metering**

Stephan Cejka, Siemens AG (Austria) • Felix Knorr, Siemens AG (Austria) • Florian Kintzler, Siemens AG (Austria)

1883 **CIM-based systems integration project at Elektro Celje DSO**

Andrej Souvent, Elektroinstitut Milan Vidmar - EIMV (Slovenia) • Timotej Kodek, Elektroinstitut Milan Vidmar - EIMV (Slovenia) • Mateja Kavčič, GDI d.o.o. (Slovenia) • Viki Petrovič, GDI d.o.o. (Slovenia) • Dušan Rauter, Bintegra, d.o.o. (Slovenia) • Nikola Risteski, Bintegra, d.o.o. (Slovenia) • Rene Benassi, Iskratel, d.d. (Slovenia) • Peter Lubej, Elektro Celje, d.d. (Slovenia)

2086 **Cybersecurity in Distribution Automation: approach for common referential leveraging Standardization**

Batard Jean-Luc, Schneider Electric (France) • Lamberti Ludovic, Schneider Electric (France) • Salles Matthieu, Schneider Electric (France) • Suptitz Eric, Schneider Electric (France)

2105 **The role of distribution network in promoting cost-effective Smart City based on IoT**

Forough Alsadat Khatami, Tehran Electrical Distribution Company (Iran, Islamic Republic of) • Amir Navidi, Tehran Electrical Distribution Company (Iran, Islamic Republic of)

2261 **A LOW-COST LORAWAN WIRELESS IoT SOLUTION FOR REMOTE MANAGEMENT AND ANALYSIS OF CONSUMERS' MEASUREMENT DATA**

ANDRÉ MEFFE, DAIMON ENGENHARIA E SISTEMAS (Brazil) • Mauricio Andres Paez Prieto, DAIMON (Brazil) • Fabio Romero, Daimon (Brazil) • Álvaro Garcez Neto, SULGIPE (Brazil) • Aldo Santana Jesus, SULGIPE (Brazil) • José Raimundo TEORODO Jr., SULGIPE (Brazil)

2273 **Formal Modeling and Verification Method of Power Grid Cyber Physical System Based on Coupling of Information and Energy Flow**

Boya Qin, Shanghai Jiao Tong University (China) • Dong Liu, Shanghai Jiao Tong University (China)