

## TUESDAY 13 June

### MAIN SESSION 3: Operation, control and protection

Room: Lomond Auditorium

#### Block 1: 09:00 – 10:30hrs - Operation

- 1033 Requirements for coordinated ancillary services covering different voltage levels**  
S Übermasser, *AIT, Austria*, C Groß, *Salzburg Netz GmbH, Austria*, A Einfalt, *Siemens, Austria*, N Thie, *M Vasconcelos, RWTH Aachen, Germany*, J Helguero, *HS-Kempton, Germany*, H Laaksonen, *P Hovila, ABB Oy, Finland*
- 0144 A joint DSO-TSO reactive power management for a HV system considering MV systems support**  
J Morin, *F Colas, X Guillaud, L2EP, France*, J Y Dieulot, *CRISAL, France*, S Grenard, *Enedis, France*
- 0405 The future of flood resilience for electricity distribution infrastructure in Great Britain (GB)**  
J Booth, *P McFarlane, Electricity North West Ltd., United Kingdom*, M Drye, *S McDonald, Northern Powergrid, United Kingdom*, D Whensley, *Energy Networks Association, United Kingdom*
- 0628 Efficient coordination in major power disruption**  
T Kupila, *T Ihonen, T Keränen, Elenia Oy, Finland*, L Anttila, *Futurice Oy, Finland*
- 0784 Adopting smart meter events as key data for low voltage network operation**  
J García Prado, *A González, Iberdrola, Spain*, S Riaño, *Tecnalía, Spain*
- 0770 Enedis field experience of augmented and virtual reality technologies at the service of network operators**  
S Martino, *O Gonbeau, C Boisseau, J P Recapet, F Blanc, Enedis, France*, B Augustin, *EDF R&D, France*

#### Block 2: 11:00 – 12:30hrs – Control part 1

- 0397 Improving smart SCADA data analysis with alternative data sources**  
B Almeida, *M Louro, M Queiroz, A Neves, H Nunes, EDP Distribuição, Portugal*
- 1341 Improving MV grid control, remote operations and reliability through advanced TLC network and SCADA architecture**  
A E P Rondelli, *M Galimberti, e-distribuzione SpA, Italy*
- 1014 Towards the modernization of the SCADA systems of the Hellenic Electricity Distribution Network Operator – considerations and steps forward**  
N Hatzigiorgiou, *C Katsanos, A Zafeirakis, A Tzevelekos, HEDNO, Greece*, V Kleftakis, *F Palaioyiannis, A Dimeas, I Vlachos, NTUA, Greece*
- 0495 Impact of IEC 61850 Edition 2 on the object modeling of distribution protection IEDs**  
A Apostolov, *OMICRON electronics, United States*
- 0057 Rules driven project specifications in the context of IEC 61850 basic application profiles**  
C Bloch, *Schneider Electric, France*, M Sharma, *Schneider Electric, India*, M Haecker, *T Rudolph, Schneider Electric, Germany*
- 1190 Synchro-check in digital switchgear**  
J Starck, *K Hiitälä, ABB Oy, Finland*, K Majer, *ABB sro, Czech Republic*

#### Block 2: 14:00 – 15:30hrs – Control part 2

- 0484 The grid of the future and the need for a decentralized control architecture: the web-of-cells concept**  
L Martini, *RSE, Italy*, H Brunner, *T Strasser, AIT, Austria*, C Caerts, *VITO, Belgium*, E Rodriguez, *Tecnalía, Spain*, G M Burt, *University of Strathclyde, United Kingdom*
- 0143 Smart Substation MV/LV**  
J Jiricka, *M Kaspirek, E.ON Distribution, Czech Republic*, L Kolar, *E.ON Czech Republic, Czech Republic*, M Zahradka, *Siemens, Czech Republic*
- 0966 Enhanced LV supervision by combining data from meters, secondary substation measurements and MV SCADA**  
N Etherden, *A K Johansson, U Ysberg, Vattenfall, Sweden*, K Kvamme, *Powel A/S, Norway*, D Pampliega, *Schneider Electric, Spain*, C Dryden, *General Electric, United Kingdom*
- 1080 Interaction of smart grid applications supporting plug&automate for intelligent secondary substations**  
A Einfalt, *S Cejka, K Diwold, A Frischenschlager, Siemens AG Österreich, Austria*, M Faschang, *M Stefan, F Kupzog, AIT Austrian Institute of Technology, Austria*
- 1192 Smart building potential within heavily utilised networks**  
W Peat, *J Whyte, SP Energy Networks, United Kingdom*, C Higgins, *Derryherk Ltd, United Kingdom*

- 0781**    **Islanded operation of modular grids**  
T Schnelle, A Schweer, *Mitteldeutsche Netzgesellschaft Strom mbH, Germany*, P Schegner,  
*Technische Universität Dresden, Germany*

**Block 3: 16:00 – 17:30hrs – Protection**

- 1250**    **Resonant grounding applied in Brazil**  
C Figueiredo, G Mello, M Silveira, *RGE Sul, Brazil*
- 1282**    **Integrated asset monitoring, personnel safety, and reliability with next generation protection relays for distribution networks**  
M Kanabar, V Muthukrishnan, D Patel, P Parikh, M Pilon, *General Electric, Canada*
- 1205**    **MV high impedance faults detection based on LV measurements**  
I Ojanguren, N Ruiz, J Garcia, *Iberdrola, Spain*, L Marron, C Martinez, T Arzuaga, *ZIV, Spain*
- 0386**    **Implementation of a System Integrity Protection Scheme (SIPS) in the Channel Islands**  
C De Arriba, A Lopez, J Cardenas, *GE Grid Solutions, Spain*, T Woodford, *Guernsey Electricity and CIEG, United Kingdom*, A Bone, *GSS, United Kingdom*
- 0736**    **Feasibility of an efficient add-on protection system for a real world microgrid in islanded mode**  
T Wippenbeck, R Bertram, A Schnettler, *RWTH Aachen University, Germany*, R Köberle, *AllgäuNetz, Germany*, K Böhme, J Weidauer, *Siemens, Germany*
- 0890**    **Location of arc faults on 11 kV overhead lines using radiometry**  
P Moore, P Walker, *Elimpus, United Kingdom*, N Gray, A Park, *SPEN, United Kingdom*

**MAIN SESSION 4: Distributed energy resources and active demand integration**

Room: Hall 5

**Block 1: 09:00 – 10:30hrs – DER concepts, designs, studies, planning, analysis techniques and tools**

- 1075**    **A blueprint for the combinatorial strategy in transactive energy based control mechanism by using energy flexibility platform and interface**  
M Babar, *TU Eindhoven, Netherlands*, I G Kamphuis, *TU Eindhoven, Netherlands/TNO, Netherlands*, Z Hanzelka, *AGH UST, Poland*, M Bongaerts, *Alliander NV, Netherlands*
- 0104**    **SmartNet: a H2020 project analysing TSO-DSO interaction to enable ancillary services provision from distribution networks**  
G Migliavacca, M Rossi, *RSE, Italy*, D Six, *Energy Ville, Belgium*, M Džamarija, *DTU, Denmark*, S Horsmanheimo, *VTT, Finland*, C Madina, *Tecnalia, Spain*, I Kockar, *University of Strathclyde, United Kingdom*, J M Morales, *University of Malaga, Spain*
- 0491**    **Business case for distributed energy storage**  
F Teng, M Aunedi, R Moreira, G Strbac, *Imperial College London, United Kingdom*, P Papadopoulos, *A Laguna, UK Power Networks, United Kingdom*
- 1085**    **UK Power Networks' experience of managing flexible distributed generation from planning to operation**  
A R Ahmadi, T Manandhar, J Barros, M Bernardo, S Georgiopoulos, *UK Power Networks, United Kingdom*
- 1051**    **Laboratory infrastructure driven key performance indicator development using the smart grid architecture model**  
M H Syed, E Guillo, S M Blair, G M Burt, *University of Strathclyde, United Kingdom*, T I Strasser, H Brunner, *Austrian Institute of Technology, Austria*, O Gehrke, *DTU, Denmark*, J E Rodriguez-Seco, *Tecnalia, Spain*

**Block 2: 11:00 – 12:30hrs – DER grid integration enablers and technologies & Block 3: Technical and commercial DER grid integration methods and solutions**

- 0316**    **Using measurements to increase the accuracy of hosting capacity calculations**  
O Lennerhag, S Aceby, M H J Bollen, *STRI AB, Sweden*, G Foskolos, T Gafurov, *MälarEnergi, Sweden*
- 1000**    **Real-time digital co-simulation method of smart grid for integrating large-scale demand response resources**  
J Song, J Zhou, *State Grid Shanghai EPRI, China*, S Jiang, P Zhang, *Shanghai Jiao Tong University, China*
- 0327**    **Field test of a linear three-phase low voltage state estimation system based on smart meter data**  
D Waeresch, R Brandalik, W H Wellssow, *TU Kaiserslautern, Germany*, J Jordan, *IDS GmbH, Germany*, R Bischler, N Schneider, *Stadtwerke Kaiserslautern Versorgungs-AG, Germany*

- 0271 SMAP project or how to integrate crowdfunded DER in a rural distribution grid**  
M Bernier, *Grenoble INP, France*, A Coutarel, *Atos Worldgrid, France*, J Lavaury Geoffroy, *Enedis, Lyon*
- 0403 Studies on the time and locational value of DER**  
B Rogers, *J Taylor, EPRI, United States*, T Mimmagh, *C Tsay, Consolidated Edison, United States*

**Block 3: 14:00 – 15:30hrs – Technical and commercial DER grid integration methods and solutions and Block 4: DER integration field trial results, tests and standards**

- 1083 Integrating photovoltaic and storage systems on distribution feeders**  
A O'Connell, *A Maitra, J Smith, Electric Power Research Institute, Ireland/United States*, B Jordan, *C Cryer, CPS Energy, United States*
- 0733 Cost benefit analysis of MV reactive power management and active power curtailment**  
L De Alvaro Garcia, *F Beauné, M Pitard, L Karsenti, Enedis, France*
- 0937 Creating virtual energy storage systems from aggregated smart charging electric vehicles**  
A M Jenkins, *C Patsios, P Taylor, N Wade, P Blythe, Newcastle University, United Kingdom*, O Olabisi, *Siemens Plc, United Kingdom*
- 0810 Benefits of battery energy storage system for system, market, and distribution network - case Helsinki**  
H P Hellman, *A Pihkala, M Hyvärinen, P Heine, Helen Electricity Network Ltd, Finland*, J Karppinen, *K Siilin, P Lahtinen, Helen, Finland*, M Laasonen, *J Matilainen, Fingrid, Finland*
- 0410 LV state estimation and TSO-DSO cooperation tools: results of the French field tests in the evolVDSO project**  
M Sebastian-Viana, *Enedis, France*, M Caujolle, *B Goncer-Maraver, EDF R&D, France*, J Pereira, *INESC TEC, Portugal/FEP, Portugal*, J Sumaili, *P Barbeiro, J Silva, R Bessa, INESC TEC, Portugal*

**Block 4: 1600 – 17:30hrs – DER integration field trial results, test and standards**

- 1216 Decentralized distribution system operation techniques: results from the meltemi community smart grids pilot site**  
I Kouveliotis-Lysikatos, *D Koukoula, I Vlachos, A Dimeas, NTUA, Greece*, N Hatziargyriou (2,1), *HEDNO, Greece/NTUA, Greece*, S Makrynikas, *HEDNO, Greece*
- 0789 Experiences of demand response in Yokohama demonstration project**  
K Honda, *K Kusakiyo, S Matsuzawa, M Kosakada, Y Miyazaki, Toshiba Corporation, Japan*
- 1238 Demand side management in a field test: lessons learned**  
M E T Gerards, *J L Hurink, University of Twente, Netherlands*, R Hübner, *Innogy SE, Germany*
- 0731 Contribution of a wind park to voltage and system stability: results of a measurement campaign**  
B Heimbach, *M Mangani, B Wartmann, M Oeschger, C Kelm, ewz, Switzerland*, S Krahmer, *M Kreutziger, P Schegner, Technische Universität Dresden, Germany*
- 0996 The smart grid real lab of ewz: findings from a large-scale demonstration project**  
V Poullos, *M Mangani, E Kaffe, F Kienzle, B Loeffle, ewz, Switzerland*

**ROUND TABLE Session 2: Power quality and electromagnetic compatibility**

ROOM: Alsh

**09:00 – 10:30hrs RT 1: Power quality aspects of solar power**

During the last decade a huge increase in the amount of solar power connected to the networks has been observed in many countries around the world. This trend is expected to continue and even intensify during the coming years. Different concerns have been raised with the connection of solar power, especially their potential impact on power quality. During the last 4 years the CIGRE working group C4./C6.29 "Power quality aspects of solar power" has studied, analysed and discussed the impact of photovoltaic (PV) installations on low, medium and high voltage networks with respect to power quality. The final report is expected to be published in 2017. This round table presents the major outcome of the work and aims to contribute to the ongoing discussion about the smooth integration of solar power in the future with respect to power quality phenomena like distortion, flicker or voltage events.

## Panellists

### Coordinator:

Jeff Smith, *EPRI, USA*

### Contributors:

Math Bollen, *Luleå University of Technology, Sweden*

Sarah Rönnberg, *Luleå University of Technology, Sweden*

Jan Meyer, *Technische Universitaet Dresden, Germany*

Kah Leong Koo, *National Grid, UK*

Michael Höckel, *Bern University of Applied Sciences, Switzerland*

## RIF Session 2: Power quality and electromagnetic compatibility

ROOM: A1sh

- 0078 Impact of control-command process in a photovoltaic conversion chain on the power line channel transfer function in the narrowband PLC frequency range**  
C Wawrzyniak, V Moeyaert, F Vallée, *UMONS, Belgium*
- 0240 Power quality measurements in a single house microgrid**  
S Rönnberg, M Bollen, J Nömm, *Luleå University of Technology, Sweden*
- 0458 Survey of supraharmonic emission of household appliances**  
A Grevener, J Meyer, *Technische Universitaet Dresden, Germany*, S Rönnberg, M Bollen, *Luleå University of Technology, Sweden*, J Myrzik, *Technische Universitaet Dortmund, Germany*
- 0834 Detailed power quality measurement of electric vehicle charging infrastructure**  
C Kattmann, K Rudion, S Tenbohlen, *University of Stuttgart, Germany*
- 1074 Ultra fast charging station harmonic resonance analysis in the Dutch MV grid: application of power converter harmonic model**  
Y Sun, V Cuk, J F G Cobben, *TU Eindhoven, Netherlands*, E De Jong, *DNV GL, Netherlands*
- 1359 Discussion on preconditions for reproducible measurements on power conversion harmonics between 2 and 150 kHz**  
J Knockaert, B Vanseveren, J Desmet, *Ghent University Lemcko, Belgium*

## ROUND TABLE Session 6: Challenges for DSOs in new business environments

ROOM: Boisdale

### 09:00 – 10:30hrs RT 2: Cost reflective dynamic tariffs for the future

The electricity distribution systems are going through substantial changes in the transition towards the smart grid.

The Distribution System Operators (DSOs) must ensure security of supply, high quality service and efficient integration of Renewable Energy Sources (RES) in the electricity system through appropriate network development and operation, as the customers pay for these services through their tariffs.

New trends are affecting grid peak power demand, e.g.:

- Prosumers with own generation
- Electrification of transport
- Energy efficient but power demanding devices

Distribution network tariffs are still mostly based on energy use, while the grid infrastructure costs are mainly driven by the topology of the network and by the expected peak power.

To have tariff structures that give appropriate incentives to the costumers will be a key element for optimal development of the electricity distribution system.

This round table will discuss topics and challenges related to introduction of new types of cost reflective dynamic tariffs as seen from different perspectives (DSO's, regulators, academia).

## **Panellists**

### **Coordinator:**

Dag Eirik Nordgård, *SINTEF Energy Research, Norway*

### **Contributors:**

Jarmo Partanen, *Lappeenranta University, Finland*

Laurent Gilotte, *Enedis, France*

## **11:00 – 12:30hrs RT 3: Establishing a decision making framework**

ROOM: **Boisdale**

Realising value from the company assets is fundamental. Most companies have some form of decision making framework influenced by extensive experience of operating the business. However not all of them ensure an alignment through all company processes to maintain a stable and predictable outcome.

There are available open standards like PAS55 and ISO 55000 support and ensure a consistent framework without the need to reinvent the wheel or create business specific solutions.

This round table will discuss decision making framework from different angles (DSO's, framework experts and academia..) and focus primarily on the challenges of establishing an open standard framework. Examples of issues covered are:

- Importance of risk management and creation of an asset management risk register
- What is a business value framework and how do you go about establishing your own?
- Relation between risk, strategy and value and how that can be managed
- How asset portfolio management ties into the decision making framework?
- How does a decision management framework improve business value?
- How does a decision making framework align with Asset Management?
- How do we compare implemented decision making frameworks and how can we learn from each other?
- How will "Big Data" and the Internet of Things impact the framework of the future?
- Experience of practical implementation of the asset management systems (both IT and organisational perspective)
- Results from benchmarking.

## **Panellists**

### **Coordinator:**

Peter Söderström, *Vattenfall Eldistribution, Sweden*

### **Contributors:**

Stefan Sadnicki, *Copperleaf, UK*

Diego Klappenbach, *UMS, Sweden*

Jouni Pylvänäinen, *Elenia, Finland*

## **14.00 – 15.30 hrs RT 4: Societal cost/benefit of smart grids (Sessions 5&6)**

ROOM: **Boisdale**

Smart grids have been a focus and overview solution for a substantial part of the energy transformation that has been happening over the last 10 years.

A significant amount of time and money has been spent on a European level (policies, roadmaps and EC funded projects in various programmes), at a national level (similar spread as on European level), within companies, suppliers, universities and research institutes.

The DSOs have taken a substantial role in promoting smart grids through their engagement in projects and demonstrations in the grids. This engagement has been critical to understand the benefits of smart grids as well as the costs.

Many of the conducted activities have yielded good results measured in selected KPI's, however a formal and complete CBA of smart grids is probably not possible to make, at least on a European or even national level.

This round table focusses on discussing the implicit and explicit cost and benefits of smart grid issues including (but not limited to):

- Which are the significant benefits and costs associated with smart grids?
- Are the cost benefits of smart grids best measured in technical KPIs or should it be measured in more societal ways?
- Can a societal CBA be made on smart grids? If so, which aspects/KPIs are then the most important?
- What are our key lessons learnt regarding societal cost/benefit of smart grids over the last 10 years?
- What is the role of demonstrators for understanding the cost and benefits?
- Are there good examples of projects, roadmaps or similar?
- What is needed to create better societal CBAs for the future?

### **Panellists**

#### **Coordinator:**

Peter Söderström, *Vattenfall Eldistribution, Sweden*  
Fabrizio Pilo, *ISGAN, University of Cagliari, Italy*

#### **Contributors:**

Pedro Godinho Matos, *EDP, EDSO Projects Committee, Portugal*  
Richard Hampton, *European Commission, Belgium*  
Jens Lundgren, *Energimarknadsinspektionen, Sweden*  
Manuel Weindorf, *GE, UK*  
Yoann Desgrange, *Enedis, France*

## **INTERACTIVE POSTERS Session 1: Network components** **09:00 – 17:30hrs**

### **Block 1 – Research and development of network components – cables systems**

#### *Sub-block 1 – New materials & designs*

- 0107 ABC cables in colour other than black**  
Z Pamić, *HEP ODS doo. ELEKTRA ZAGREB, Croatia*
- 0266 External conductive layer on EDP MV underground cables leads to new oversheath requirements**  
E Francisco, J Cruz, J Silva, F Costeira, *EDP Distribuição, Portugal*
- 0272 Design of MV overhead lines to maximise bird safety**  
A Beutel, B McLaren, H Geldenhuys, N Khoza, R Kruger, R Branfied, *Eskom Holdings SOC Ltd, South Africa*, J Van Coller, *University of the Witwatersrand, South Africa*, C Hoogstad, *Endangered Wildlife Trust, South Africa*
- 0279 Anti-ice and snow coating for EDP Distribuição's overhead lines**  
R Bernardo, J Cardoso, R Catalão, *EDP Distribuição, Portugal*, L Ilharco, *IST-CQFM, Portugal*
- 0414 Self-healing materials for autonomous cable repair**  
R Rhodes, German, S Basu, G C Stevens, *Gnosys Global Ltd, United Kingdom*
- 0430 The use of high temperature conductors in existing lines: economic and environmental benefits**  
L Moreira, A Lopes, *EDP-Distribuição, Portugal*
- 0602 An innovative power cable connection of property equivalence and non-joint**  
HJ Zhong, YJ Xia, ZJ Liang, *CYG Electric Co., Ltd., China*
- 0912 New HVDC nanocomposite electrical insulation for improved MV and HVAC performance**  
N Freebody, G Stevens, *Gnosys Global Ltd, United Kingdom*, A Vaughan, *University of Southampton, United Kingdom*, F Perrot, A Hyde, *GE Grid Solutions, United Kingdom*
- 1066 Using nanomaterial to enhance the performance of medium voltage insulators and street lights considering environmental impacts**  
M Fazaee, M Abdoli, *Tehran University, Iran*, B Jamshidieini, *AEPDC/Tehran University, Iran*, N Eskandari, *AEPDC, Iran*
- 1108 Sensitivity analysis of earthing system impedance for single and multilayered soil**  
V Vycital, D Topolanek, P Toman, M Ptacek, *Brno University of Technology, Czech Republic*

*Sub-block 2 – Development of accelerated ageing tests & failure detection methods*

- 0200 Investigations on the mechanical and electrical behavior of HTLS conductors by accelerated ageing tests**  
C Kühnel, S Grossmann, *IEEH TU Dresden, Germany*, R Bardl, D Stengel, *BAM Berlin, Germany*, W Kiewitt, *50Hertz Transmission GmbH, Germany*
- 0260 Medium voltage shielded busbar long term ageing test method**  
K Helal, R Maladen, F Gentils, O Kozlova, *Schneider Electric, France*
- 0418 Determining cables metrics using 3D ultrasonic scanning**  
S Sutton, *University of Southampton, United Kingdom*, P Willmott, *Acuity Products Ltd, United Kingdom*
- 0537 Evaluation of aging degradation of 6kV CV cable (three-layer co-extruded structure)**  
M Kobayashi, M Kuze, *Chubu Electric Power Company, Japan*, T Fuseya, *TOENEC Corporation, Japan*
- 0893 Long-time evaluation of cable joints in water**  
M Dreßler, S Kornhuber, *University of Applied Science Zittau/Görlitz, Germany*, G Jacob, Behr Bircher, *Cellpack BBC Radeberg GmbH, Germany*, B Knüpfer, *Cellpack GmbH, Germany*

*Sub-block 3- Diagnostics methods development*

- 0049 Offline PD diagnostics using several excitation voltages**  
H Putter, F Petzold, P Legler, *Megger, Germany*
- 0532 Investigation of partial discharge frequency dependence in distribution system cables**  
T S Negm, M Refaey, A A Hossam-Eldin, *University of Alexandria, Egypt*
- 0797 Analysis and evaluation of dielectric parameters for design verification and calibration of a newly developed diagnostic system for MV power cables**  
F Epelein, C Weindl, *Coburg University of Applied Sciences, Germany*, I Mladenovic, *Siemens AG, Germany*
- 0813 Measurement results of a spatially-resolved diagnostic method and influencing factors in field environment of MV power cables**  
E Fischer, C Weindl, *Coburg University of Applied Sciences, Germany*
- 1130 Underground and overhead monitoring systems for MV distribution systems**  
F Zavoda, *IREQ (Hydro-Quebec), Canada*, E Rodriguez, *3M, United States*, G C Fofeldea, *3M, Canada*

**Block 2 – Research and development of network components - substations**

*Sub-block 1- SF6 alternatives & vacuum switching*

- 0229 DC vacuum circuit breaker**  
L Liljestrand, M Backman, L Jonsson, *ABB, Sweden*, M Riva, *ABB, Italy*, E Dullni, *ABB, Germany*
- 0230 Environmental and safety aspects of AirPlus insulated GIS**  
M Hyrenbach, *ABB AG, Germany*, T A Paul, *ABB Ltd., Switzerland*, J Owens, *3M Company, United States*
- 0250 Transferred charge: indicator for vacuum applicability**  
M Leusenkamp, *Eaton, China*, G C Schoonenberg, *Eaton, Netherlands*
- 0604 Comparative study on arc extinction process under air, CO<sub>2</sub> and SF<sub>6</sub> gas blasting using two-dimensional electron density imaging sensor**  
Y Inada, *Saitama University, Japan*, S Yamaguchi, A Kumada, H Ikeda, K Hidaka, *The University of Tokyo, Japan*, T Nakano, K Murai, Y Tanaka, *Kanazawa University, Japan*
- 0614 Low-current interruption in SF<sub>6</sub>-alternatives**  
M Saxegaard, E Attar, M Kristoffersen, H Landsverk, O Granhaug, *ABB, Norway*, A Di-Gianni, S Scheel, *ABB, Switzerland*
- 0658 RMU with eco-efficient gas mixtures: field experience**  
M Kristoffersen, T Endre, M Saxegaard, P A Wang, *ABB, Norway*, M Hyrenbach, *ABB, Germany*, D Harmsen, T V Rijn, R Vosse, *Liander, Netherlands*
- 0872 Difference between switching of motors & generators with vacuum technology**  
K R Venna, H Urbanek, N Anger, *Siemens AG, Germany*

*Sub-block 2 – Safety, environment & reliability considerations in the design of network components*

- 0212 New HV/LV Transformer Substation within building intended for other non electrical uses with advanced functionalities**  
J Cormenzana, S Sebastian, *Ormazabal, Spain*
- 0220 Mastering all sub-assemblies of an MV circuit-breaker and racking truck system ensures reliability and robustness**  
D Serve, T Milan, C Mombard, J P Meley, E Frangin, *Schneider-Electric, France*

- 0253 Innovative underground distribution cabinet for low voltage network**  
N Santos, M Lagarto, C Rodrigues, *EDP Distribuição, Portugal*
- 0372 Extreme weather has become the norm - is your MV switchgear ready for it?**  
K Tandel, *Schneider Electric, India*, T Cormenier, *Schneider Electric, France*
- 0475 Meeting ecodesign efficiency requirements: ensuring accuracy in power transformer loss tests via TLM System calibrations**  
G Rietveld, E Houtzager, M Acanski, D Hoogenboom, *VSL, Netherlands*
- 0767 Mitigate arc effects within an e-house**  
J Douchin, A Clavel, *Schneider Electric, France*, A Brown, *Schneider Electric, Singapore*, J Rintala, *Schneider Electric, Finland*
- 1069 How to select auxiliary relays for isolation applications**  
N Calvo Cuadra, S Rementeria, *Arteche, Spain*, R Calister, *Arteche, Brazil*

*Sub-block 3- Testing & numerical simulation methods for development of network components*

- 0091 Comparative advantage of using GRP in compact substations**  
C Martinez Nieto, D Türk, A Palgi, *ABB, Estonia*
- 0270 Integration challenges of high accuracy LPIT into MV recloser**  
B Kerr, N Uzelac, *G&W Electric Co, United States*, L Peretto, *University of Bologna, Italy*, E Scala, *Altea srl, Italy*
- 0345 Influence of heat source location on the air temperatures in sealed MV switchgear**  
E Fjeld, W Rondeel, K Vaagsaether, *University College of Southeast Norway, Norway*, E Attar, *ABB, Norway*
- 0349 Estimating the temperature rise of load break switch contacts in enclosed MV switchgear**  
E Fjeld, W Rondeel, S T Hagen, *University College of Southeast Norway, Norway*, M Saxegaard, *ABB, Norway*
- 0943 Developing testing procedures for high voltage innovation technologies**  
D Hardman, N Murdoch, *WSP | Parsons Brinckerhoff, United Kingdom*, J Berry, *Western Power Distribution, United Kingdom*
- 1100 Power hardware-in-the-loop setup for power system stability analyses**  
R Brandl, T Degner, *Fraunhofer IWES, Germany*, M Calin, *DERlab e.V., Germany*

**Block 3 – Management and architecture evolution of the installed base of network components – cables and their environment**

*Sub-block 1 – Smart Grids solutions & applications in smart metering*

- 0110 Field trial results of power electronics in LV distribution networks**  
C Newton, S C Terry, *Ricardo Energy & Environment, United Kingdom*, P Lang, *UK Power Networks, United Kingdom*
- 0226 Fault sensors**  
M Scarabeli, G Ortenzi, J Aith, *Elektro, Brazil*
- 0391 Compatibility of a G3PLC telecom solution on a three phase 230 V network**  
H Halluin, H Grandjean, *ORES, Belgium*, G Ethève, *Enedis, France*, A Jeandin, *EDF R&D, France*
- 0709 Sensor technology in a medium voltage switchgear for the US market applications**  
P Milovac, *IEM, United States*, R Javora, *ABB, Czech Republic*, V Skendzic, *SEL, United States*
- 0715 Continuous safeguarding of rating accuracy**  
M Olschewski, P Schaefer, W Hill, *LIOS Technology GmbH, Germany*
- 0882 Low-power voltage transformers for use with separable connectors in MV secondary gas insulated switchgear - new challenge for standardization**  
R Javora, V Prokop, *ABB sro, Czech Republic*, E De Ridder, S Mensaert, *Nexans, Belgium*
- 0933 Complete MV-BPL communications solution for large AMI and grid automation deployments**  
J Aguirre Valparis, A Amezua, J A Sanchez, *Ormazabal, Spain*, A Sendin, J Simon, *Iberdrola, Spain*, S Dominiak, *HSLU, Switzerland*
- 1215 Survey of market prospects and standardisation development needs of LVDC technology**  
T Kaipia, *Lappeenranta University of Technology, Finland*, P Sebellin, *International Electrotechnical Commission, Switzerland*, V Mahendru, *Legrand India, India*, K Hirose, *NTT Facilities, Japan*, W De Kesel, *Legrand Group, Belgium*, G Lubert, R Pelta, *Siemens AG, Germany*, D Goswami, *Bureau of Indian Standards, India*

*Sub-block 2 – Applications of methods and tools to asset management of cables & distribution lines*

- 0328 Managing the maturity of decision-support data for extending lives of MV cables**  
Q Zhuang, *GEIRI Europe SGCC, Germany*, J Janssen, N Steentjes, *Liander, Netherlands*
- 0413 Contribution of augmented reality to the maintenance of network equipment**  
M Cordonnier, S Martino, C Boisseau, S Paslier, J P Recapet, F Blanc, *Enedis, France*, B Augustin, *EDF R&D, France*
- 0479 Maintenance of street lights by climbing robots in Alborz Electric Power Distribution Company**  
N Eskandari, M Rafiei, E Abooei, *AEPCS, Iran*, B Jamshidieini, *AEPCS/Tehran University, Iran*



- 0546 Accurate on-line fault location and PD activity location results obtained with SCG - a long term utility experience**  
D Harmsen, S Lamboo, F Van Minnen, *Alliander, Netherlands*, P Wagenaars, *DNV GL, Netherlands*
- 0681 Using smart grid sensors and advanced software applications as an asset management tool at Hydro Ottawa**  
D Sabin, *Electrotek Concepts, United States*, G MacLeod, *Current Power Services, Canada*, M Wojdan, *Hydro Ottawa, Canada*
- 0835 Opportunities to use satellite technologies for asset condition monitoring of power networks under the European Space Agency's Integrated Applications Promotion (IAP) programme**  
I Downey, *ESA IAP Ambassador Platform, United Kingdom*, M Segovia, C Harrison, *University of Strathclyde, United Kingdom*
- 0895 Analysis of failure in power cables for preventing power outage in Alexandria Electricity Distribution Company in Egypt**  
A Attia, *Alexandria Electricity Distribution Company, Egypt*
- 1048 Information and communication architecture for transmission power line inspections using unmanned aircraft system**  
R Z Homma, *Celesc, Brazil*, C Szymanski/*Inerge/Evoluma, Brazil*, R Ávila Faraco, *Inerge/Unisul, Brazil*
- 1104 Improving reliability by focusing on the quality and condition of medium voltage cables and cable accessories**  
O Siirto, J Vepsäläinen, A Hämäläinen, M Loukkalahti, *Helen Electricity Network Ltd, Finland*
- 1193 Analysis of the recognition and localization techniques of power transmission lines components in aerial images acquired by drones**  
R Z Homma, *Celesc, Brazil*, O Sohn, R C Bose, *INERGE, Brazil*

*Sub-block 3 – Enabling solutions and methods for the integration of renewable energy generation*

- 0004 Introducing the new product line of regulated distribution transformer Cooperation of Siemens AG and A. Eberle GmbH & Co. KG.**  
S H Hoppert, *A Eberle GmbH & Co. KG., Germany*, L K Kelemen, Z N Nádudvari, G V Vörös, *Siemens, Hungary*
- 0086 Power router based on conventional three phase bridge inverter and DC-DC converter**  
L Ren, C Zhang, M Du, *Tianjin University of Technology, China*
- 0348 Beyond grid integration of renewables - Voltage Regulation Distribution Transformers (VRDT) in public grids, at industrial sites, and as part of generation units**  
M Sojer, W Hofer, *Maschinenfabrik Reinhausen GmbH, Germany*
- 0832 A new smart distribution transformer with OLTC for low carbon technologies integration**  
L Del Río Etayo, A Soto, A Ulasenka, *Ormazabal Corporate Technology, Spain*, P Lauzevis, *Enedis, France*, P Cirujano, G Perez De Nanclares, *Ormazabal Cotradis, Spain*
- 0922 Cyclic rating of wind farm cable connections**  
R Chippendale, J Pilgrim, *University of Southampton, United Kingdom*, A Kazerooni, *WSP | Parsons Brinckerhoff, United Kingdom*, D Ruthven, *SP Energy Networks, United Kingdom*
- 0941 Steady-state modelling for the integration of a bi-directional AC-DC-AC flexible power link**  
J King, N Murdoch, *WSP | Parsons Brinckerhoff, United Kingdom*, J Berry, *Western Power Distribution, United Kingdom*

**Block 4 – Solutions for managing the installed base of network components - substations**

*Sub-block 1 – Condition assessment, ageing behaviour and maintenance strategy*

- 0042 Dealing with in-field repair tasks of large power transformers**  
J L Martínez, *Edenor, Argentina*
- 0149 Combining statistics and physics to rank circuit breakers on condition**  
E Tazelaar, D Breteler, J van Tongeren, *Alliander, Netherlands*, R Stijl, *Bearing Point, Netherlands*
- 0206 Analysis of rusty closed type switchgears**  
K Morii, *Kansai Electric Power Co Inc Japan*
- 0445 Maximize asset availability and reduce maintenance costs - an integrated approach combining condition assessment with data analytics**  
A Hauser, B Fenski, *ABB AG, Germany*, L Cavalli, *ABB SpA, Italy*
- 0665 Evaluation of lifetime of air insulated switchgear versus service conditions in MV substations**  
Y Tits, H Van Lijsebeth, *Laborelec, Belgium*, W De Maesschalck, W Van Vaerenbergh, *Eandis, Belgium*, P Thiry, *Ores, Belgium*, B Godeau, *Elia, Belgium*, M van den Berg, *Sibelga, Belgium*
- 0796 Switchgear operating personnel safety upgrade solutions for aged installed base**  
C Gemme, P Bassi, G Magno, *ABB, Italy*
- 0846 SPEN switchgear life extension strategy**  
A Santandreu, D Neilson, *SP Energy Networks, United Kingdom*
- 0989 Natural esters for life and capacity enhancement of distribution transformers**  
R Pillai, F Havaladar, C Chitnis, *The Tata Power Company Ltd, India*

- 1001 Economical and practicable condition assessment of MV- and LV- distribution grids**  
C Johae, D Beerboom, E Pawlowski, M Zdrallek, *Wuppertal University, Germany*, N Schultze, *SAG GmbH, Germany*, R Timmreck, *Stadtwerke Iserlohn GmbH, Germany*
- 1078 Teardown of a compact distribution transformer after twelve years of severe loading conditions**  
V Vasconcellos, *CPFL Energia, Brazil*, A Sbravati, *Cargill CIS, Brazil*, K J Rapp, *Cargill CIS, United States*, L C Zanetta Jr, *PEA USP, Brazil*
- 1308 Managing on-load tap changer life cycle in TNB distribution power transformers**  
YZ Yang Ghazali, *Tenaga Nasional Berhad, Malaysia*

*Sub-block 2 – Monitoring solutions for asset management and operation of network components*

- 0263 Smart asset management using online monitoring**  
D Courtney, *Embedded Monitoring Systems, United Kingdom*, J Livie, *Scottish Power Energy Networks, United Kingdom*, T Littler, *Queen's University, United Kingdom*
- 0322 How to control the impact of the severe environments surrounding medium voltage switchgear**  
T Cormenier, P Veuillet, V Ferraro, *Schneider Electric, France*
- 0415 Modular online monitoring system to allow condition based maintenance for medium voltage switchgear**  
K Perdon, M Scarpellini, S Magoni, L Cavalli, *ABB SpA, Italy*
- 0752 A novel approach for wide area real time health condition assessment of the power circuit Breakers**  
L Maruša, A Souvent, S Vižintin, *EIMV, Slovenia*, R Maruša, *ELES doo, Slovenia*
- 0839 Advance control and monitoring in secondary substation - project UPGRID**  
S Noske, D Falkowski, *Energa-Operator SA, Poland*, A Babs, *Institute of Power Engineering, Poland*
- 0840 New soft sensors for distribution transformer monitoring**  
J F Tissier, J Cornet, *Itron, France*
- 0876 Management and easy communication of temperature rise on distribution cast resin transformers connections linked to network during the life of transformer and/or after installation**  
A Hammen, G Ranalletta, C Macri, *Schneider Electric, France*
- 0894 Field testing of a wideband monitoring concept at MV side of secondary substation**  
B A Siddiqui, P Pakonen, P Verho, *TUT, Finland*
- 0952 Power and asset monitoring strategy to facilitate a smart network**  
A Elena de Leonardo, K Lennon, A Beddoes, M Bebbington, *SP Energy Networks, United Kingdom*
- 1053 Application of enhanced thermal ratings to primary substation transformers**  
I Elders, K Bell, *University of Strathclyde, United Kingdom*, K Smith, A Collinson, *Scottish Power Energy Networks, United Kingdom*
- 1098 Improving asset management with online partial discharge monitoring of ring main units and secondary substations**  
C Eastham, D Longo, K Tavernier, L Pickford, *IPEC Ltd, United Kingdom*
- 1102 Experimental study of dynamic thermal behaviour of an 11 kV distribution transformer**  
R Villarroel, Q Liu, Z Wang, *The University of Manchester, United Kingdom*

*Sub-block 3 – Diagnosis tools and methods*

- 0039 Battery anomaly and degradation diagnosis for renewable energy plant**  
J Zhang, L Geng, Y Ma, *Hitachi (China) Research & Development Corporation, China*
- 0283 Experience of the applications of FRA methodology to evaluate short-circuit tests in distribution transformers**  
D Tourn, S Nesci, J C Gomez, L Sanchez, *UNRC, Argentina*
- 0296 Frequency response analysis for exact power transformer impedance**  
M Hiraide, T Nakajima, T Koshizuka, *Tokyo Denki University, Japan*, H Ikeda, Y Taniguchi, E Haginomori, *The University of Tokyo, Japan*, N Harid, N Al Sayari, B Barkat, A Devadiga, *The Petroleum Institute, United Arab Emirates*
- 0326 An innovative approach towards an algorithm for automated defect recognition for on-load tap changers**  
F Riaz, J Wetzler, *DNV GL Energy, Netherlands*, A Rodrigo Mor, *TU Delft, Netherlands*
- 0541 Fault diagnosis of high-voltage circuit breakers using wavelet packet technique and support vector machine**  
W J Jin, W H Tang, T Qian, T Y Ji, *South China University of Technology, Guangzhou, China*, L Gan, Y Q Liu, G J Lu, *Guangzhou Power Supply Co Ltd, China*
- 0657 Data analysis of battery storage systems**  
M Andoni, W Tang, V Robu, D Flynn, *Heriot Watt University, United Kingdom*

**NON-INTERACTIVE POSTERS Session 1: Network components**  
**09:00 – 17:30hrs**

**Block 1: Research and development of network components – cables systems**

*Sub-block 1 – New materials & designs*

- 0917 High performance thermoplastic cable insulation systems**  
A Pye, G Stevens, Gnosys Global Ltd, United Kingdom

*Sub-block 2 – Development of accelerated ageing tests & failure detection methods*

- 0598 10 Years of experience with 3 kHz water tree test**  
M Burceanu, Q De Clerck, Y Tits, Laborelec, Belgium
- 0826 Experiences with cable faults located at metallic screen connections**  
H L Halvorson, S Hvidsten, H Kulbotten, J K Lervik, SINTEF Energy Research, Norway
- 1134 Development of long-term reliability evaluation method for polypropylene insulated MV cables**  
Y Jung, D Kim, B Lee, S Lee, KEPCO, Korea

*Sub-block 3- Diagnostics methods development*

- 0056 On line monitoring of medium voltage overhead distribution lines polluted insulators severity**  
O E Gouda, Cairo University, Egypt, D M Khalifa, Egyptian Electricity Transmission Company, Egypt
- 0291 Sensitivity analysis of cable oscillating wave test system on multi-source defects diagnostics**  
G Lu, G Wu, J Xiong, Y Liu, Guangzhou Power Supply, China

**Block 2: Research and development of network components - substations**

*Sub-block 1- SF6 alternatives & vacuum switching*

- 0385 Hazard study of MV switchgear with SF6 alternative gas in electrical room**  
C Preve, R Maladen, Schneider Electric, France, G Lahaye, T Penelon, INERIS, France, M Richaud, S Galas, Universite De Montpellier, France
- 0389 Application of HFO1234zeE in MV switchgear as SF6 alternative gas**  
C Preve, R Maladen, Schneider Electric, France, D Piccoz, Piccoz SASU, France

*Sub-block 2 – Safety, environment & reliability considerations in the design of network components*

- 0244 Safety features in the design of MV circuit-breakers and switchboards**  
D Fulchiron, J-P Meley, P Pulfer, Schneider-Electric, France
- 0371 Mitigate gas combustion in case of internal arc**  
J Douchin, Schneider-Electric, France, Y Cressault, Toulouse University, France, R Danjoux, FLIR, France
- 0486 Pressure oscillation due to arcs in a closed container filled with air and SF6**  
M Kotari, T Tadokoro, S-I Tanaka, M Iwata, Central Research Institute of Electric Power Industry, Japan

*Sub-block 3- Testing & numerical simulation methods for development of network components*

- 0138 Proven reliability beyond the standards**  
I Oruel Gilbert, J Larrieta, S Sebastian, Ormazabal, Spain
- 0852 Stress on outer cable connection of MV gas insulated switchgear due to cable thermal expansion at rated current**  
J Snajdr, R Huck, P Novak, Schneider Electric, Germany, J P Bentley, Schneider Electric, France
- 1268 A high short-circuit impedance power transformer versus short-circuit limiting reactance**  
M Zouiti, Enedis, France, A Kirche, O Moreau, EDF, France

**Block 3: Management and architecture evolution of the installed base of network components – cables and their environment**

*Sub-block 1 – Smart Grids solutions & applications in smart metering*

- 0137 A novel micro PMU for distribution power lines**  
X Wang, X Xie, S Zhang, L Luo, Y Liu, G Sheng, X Jiang, Shanghai Jiao Tong University (SJTU), China, X Cheng, Beijing Electric Power Research Institute, China
- 0820 Full-scale case study of a road crossing thermal bottleneck in a buried MV cable installation**  
E Eberg, S M Hellesø, S Hvidsten, SINTEF Energy Research, Norway, K Espeland, REN AS, Norway

*Sub-block 2 – Applications of methods and tools to asset management of cables & distribution lines*

- 0737 Improve the reliability of MV underground links by using long cable**  
H Tanzeghti, *Enedis, France*, Y Brument, F Gaillard, *EDF R&D, France*

*Sub-block 3 – Enabling solutions and methods for the integration of renewable energy generation*

- 0207 Line voltage regulator based on magnetic-controlled inductors for low voltage grids**  
M Holt, J Maasmann, C Rehtanz, *TU Dortmund University, German*

#### **Block 4: Solutions for managing the installed base of network components - substations**

*Sub-block 1 – Condition assessment, ageing behaviour and maintenance strategy*

- 0698 Design and successful utilization of the first multi-purpose mobile distributed energy storage system in Iran**  
N Nakhodchi, N Aghli, S Alishahi, M H Pourarab, *MEEDC, Iran*
- 0703 Reliability measures: Failure and Root Cause Analysis (FRCA) for GIS early failure**  
M Lee, M Park, Y Kim, *LSIS, South Korea*
- 0774 Analysis of condition and risk based maintenance planning for MV/LV substations**  
P Köhn, A Schnettler, *RWTH Aachen University, Germany*, N Schultze, *SAG GmbH, Germany*
- 1174 Health index as condition estimator for power system equipment: a critical discussion and case study**  
J H Jürgensen, A Scheutz Godin, P Hilber, *KTH, Sweden*

*Sub-block 2 – Monitoring solutions for asset management and operation of network components*

- 0273 Design and demonstration of a wireless sensor network platform for substation asset management**  
N T Huynh, *ECE Associates Ltd, United Kingdom*, V Robu, D Flynn, *Heriot-Watt University, United Kingdom*, S Rowland, G Coapes, *Siemens, United Kingdom*
- 0539 Comparisons of transformer top oil temperature calculation models using support vector regression optimized by genetic algorithm**  
T Qian, W H Tang, W J Jin, *South China University of Technology, China*, L Gan, Y Q Liu, G J Lu, *Guangzhou Power Supply Co. Ltd., Guangzhou, China*
- 1262 Power transformer's monitoring system for better asset management**  
S Ceferin, G Janc, *Kolektor Sisteh d.o.o., Slovenia*, Z Toroš, T Kastelic, *Elektro Primorska d.d., Slovenia*, B Prašnikar, *Kolektor Etra doo, Slovenia*

*Sub-block 3 – Diagnosis tools and methods*

- 0008 Improvement of Duval Triangle 1**  
S Spremic, *EPS Tehnical Centre Novi Sad, Serbia*

#### **INTERACTIVE POSTERS Session 5: Planning of power distribution systems 09:00 – 17:30hrs**

##### **Block 1: Risk assessment & asset management**

*Sub-block 1 – Risk Assessment*

- 0845 Distribution network operator asset risk management**  
D Neilson, S Bradshaw, A Santandreu, A Elena, *SP Energy Networks, United Kingdom*

*Sub-block 2 – Reliability assessment*

- 0140 Evaluation of the reliability of the electricity distribution systems by DEMATEL method**  
M Rahmanpouri, A mighi, *Electrical Power Distribution of Great Tehran, Iran*, J H Dehavi, *Tehran University, Iran*
- 0251 Experience and tendencies after 40 years outage data registration in The Netherlands**  
H Wolse, *Movares, Netherlands*, G Geist, *Cogas Infra & Beheer BV, Netherlands*, B Hoving, *Enexis BV, Netherlands*, P Oosterlee, *Enduris, Netherlands*, H Polman, *Liander, Netherlands*
- 0780 A reliability and cost assessment methodology for medium voltage feeders**  
C Roduner, E Taxeidis, *BKW Energie, Switzerland*, S Karagiannopoulos, G Hug, *ETH, Switzerland*

*Sub-block 3 – Asset management & maintenance strategies*

- 0274** **Where to replace assets? Spatial analysis on differential aging of low voltage PILC cables**  
R Verweij, D V Houwelingen, A Prein, *Stedin Netbeheer BV, Netherlands*
- 0406** **Innovative analytics to estimate the probability of failure and remaining useful life of medium voltage breakers**  
M Scarpellini, K Perdon, L Cavalli, M Testa, *ABB SpA, Italy*
- 0553** **A mobile application for on-site risk based decision support**  
G Solum, *TrønderEnergi Nett, Norway*, B I Langdal, *Powel, Norway*, D E Nordgård, *SINTEF Energy Research, Norway*
- 0634** **Urban distribution network reliability simulation and strategies of successive refurbishment of distribution transformer stations**  
Z Brettschneider, S Votruba, *PREdistribuce, as, Czech Republic*, P Skala, *EGU Brno, as, Czech Republic*
- 0823** **Improving asset knowledge using system management based on IEC-61850**  
M Gillaux, F Lemenager, T Coste, *EDF, France*
- 0828** **Utilities and smart asset management - challenge of the digital era**  
L Kolar, P Lang, D Kouba, *E.ON, Czech Republic*
- 1115** **Operational excellence in optimal planning and utilization of power distribution network**  
B Jamshidieini, *AEPDC/Tehran University, Iran*, K Rezaie, *Tehran University, Iran*, N Eskandari, A Dadashi, *AEPDC, Iran*

**Block 2: Network development**

*Sub-block 1 – Innovative power distribution*

- 0347** **Reactive power management by distribution system operators – concept and experience**  
W Becker, *Mitteldeutsche Netzgesellschaft Strom mbH, Germany*, M Hable, *ENSO NETZ GmbH, Germany*, M Malsch, *P&M Power Consulting GmbH, Germany*, T Stieger, *WEMAG-Netz GmbH, Germany*, F Sommerwerk, *Thueringer Energienetze GmbH & Co. KG, Germany*
- 0607** **Recognize the need for innovation and smart solutions for distribution**  
D Vornicu, L Predescu, *CEZ Romania, Romania*
- 0728** **Planning 100% renewable energy islands - the case of the Caribbean Island of Montserrat**  
B Römer, Y Julliard, *Siemens AG, Germany*, K Aldonza, *GIZ REETA, Guyana*, O Lewis, *Government of Montserrat, Montserrat*
- 1030** **Measurement concept for efficient planning of distribution grids**  
M Eisenreich, Y Farhat, M Freunek (Müller), *BKW Energie AG, Switzerland*
- 1287** **Challenges, innovative architectures and control strategies for future networks: the web-of-cells, fractal grids and other concepts**  
G Kariniotakis, *MINES ParisTech, PSL-Research University, PERSEE, France*, L Martini, *RSE, Italy*, C Caerts, *VITO, Belgium*, H Brunner, *AIT, Austria*, N Retiere, *G2Elab-UGA, France*

*Sub-block 2 : Smart grid systems & applications*

- 0210** **Capacity management of low voltage grids using universal smart energy framework**  
E Coster, H Fidder, M Broekmans, *Stedin, Netherlands*, C Koehler, *Venios, Germany*
- 0318** **Pioneering smart grids for Indonesia - the case of a smart grid roadmap development**  
B Römer, Y Julliard, *Siemens AG, Germany*, R Fauzianto, M J Poddey, *GIZ, Indonesia*, I Rendroyoko, *PLN, Indonesia*
- 0374** **Challenges and opportunities of 5G in power grids**  
G Bag, L Thrybom, *ABB Corporate Research, Sweden*, P Hovila, *ABB OY, Finland*
- 1272** **Flexible network operation**  
M Istad, H Kirkeby, *SINTEF Energy Research, Norway*, P E Nordbø, O H Eliassen, R A H Hjelme, O J Hatlen, *BKK Nett, Norway*
- 1321** **DMS advanced functions for accommodating high penetration of DER and microgrids**  
A Maitra, T Hubert, *EPRI, United States*, J Reilly, *Reilly Associates, United States*, J Wang, R Singh, N Kang, X Lu, *ANL, United States*, A Pratt, S Veda *NREL, United States*

*Sub-block 3 – DC distribution systems*

- 0974** **Initial designs for ANGLE-DC project: challenges converting existing AC cable and overhead line to DC operation**  
J Yu, K Smith, M Urizarbarrena, M Bebbington, *SP Energy Networks, United Kingdom*, N MacLeod, *WSP | Parsons Brinckerhoff, United Kingdom*, A Moon, *EA Technology, United Kingdom*

### Block 3: Distribution planning

#### Sub-block 1 – Advanced planning

- 0061 A holistic network planning approach: enhancement of the grid expansion using the flexibility of network participants**  
L Jendernalik, D Giavarra, *Westnetz GmbH, Germany*, C Engels, *University of Applied Sciences Dortmund, Germany*, J Hiry, C Kittl, C Rehtanz, *Technical University Dortmund, Germany*
- 0117 OMAP (Organisational Memory Aided Planning): an integrated planning tool using concepts of knowledge management and multi-objective optimisation**  
C C B Oliveira, A Meffe, D Takahata, P H Baumann, R L Marcondes, *Daimon, Brazil*, R H Guembarovski, N Alencastro, D C S Prado, *Celesc, Brazil*
- 0258 Optimal sizing of distribution network transformers considering power quality problems of nonlinear loads**  
S Bahramara, *Islamic Azad University, Iran*, F G Mohammadi, *Kurdistan Electrical Power Distribution, Iran*
- 0393 Suitable methods for neutral grounding of Xining's distribution networks**  
A Ettinger, T Connor, *Siemens AG, Germany*, Q B Liu, *State Grid Qinghai, China*, H B Xue, Y J Tang, G H Song, *State Grid Xining, China*
- 0727 A new approach to large distribution network optimization using modern implementation of benders decomposition**  
N D'Addio, M Forbes, *Queensland University, Australia*, A M A K Abeygunawardana, G Ledwich, M shafiei, *Queensland University of Technology, Australia*
- 0841 A comparison of convex formulations for the joint planning of microgrids**  
B Martin, E De Jaeger, F Glineur, *UCL, Belgium*
- 0868 Assessment of the impact of demand side management on distribution network voltage stability**  
X Tang, J V Milanovic, *University of Manchester, United Kingdom*
- 0947 Key findings of DS2030 - a study in to future GB distribution network operations**  
S Carter, *Ricardo Energy & Environment, United Kingdom*, G Williamson, J King, *WSP | Parsons Brinckerhoff, United Kingdom*, V Levi, *The University of Manchester, United Kingdom*, J McWilliam, *Energy Networks Association, United Kingdom*
- 1025 Grid planning by integrate customer meters**  
N Andersreen, H Vester, T H Bentsen, *SEAS-NVE, Denmark*
- 1237 Economically efficient distribution network design**  
P Djapic, G Strbac, *Imperial College London, United Kingdom*

#### Sub-block 2 – Planning of active networks and smart grids

- 0204 Flexibility options for medium voltage grid planning**  
T Kornumpf, M Zdrallek, *University of Wuppertal, Germany*, M Roch, *Stadtwerke Radevormwald GmbH, Germany*, D Salomon, *Wupperverband, Germany*, P Pyro, I Hobus, *Wupperverbandsgesellschaft für integrale Wasserwirtschaft, Germany*
- 0360 Multi-temporal robust expansion planning of distribution grids considering uncertainties and curtailment of RES**  
J Ziegeldorf-Wächter, A Moormann, S Krahl, A Moser, *FGH eV, Germany*
- 0569 Behaviour analysis of an operational planning tool facing activation probabilities, for near optimal operation of smart grids**  
J Sayritupac, E Vanet, R Caire, C Larios, *G2Elab, France*
- 0571 Planning of flexible power source in power distribution systems with high penetration of dispersed generation**  
W Sun, K Tian, S Jia, *University of Shanghai for Science and Technology, China*
- 0831 Automated smart grid planning considering flexibility options and voltage regulating assets**  
S Koopmann, F Potratz, P Goergens, M Cramer, *RWTH Aachen University, Germany*
- 0848 Evaluation of PV Hosting Capacities of Distribution Grids with Utilization of Solar-Roof-Potential-Analyses**  
F Ebe, B Idlbi, J Morris, G Heilscher, *The Univ. of Applied Sci, Germany*, F Meier, *Stadtwerke Ulm, Germany*
- 1004 Cost/benefit analysis for energy storage exploitation in distribution systems**  
G Celli, F Pilo, G Pisano, G G Soma, *University of Cagliari, Italy*
- 1027 Flexibilities in grid planning : case studies on the French distribution system**  
J Boubert, A Bouorakima, Y Desgrange, *Enedis, France*
- 1093 Technical comparison of measures for voltage regulation in low-voltage grids**  
J Bogenrieder, O Glass, P Luchscheider, C Stegner, J Weller, *ZAE Bayern, Germany*
- 1042 Smart planning: an innovative tool for the investment planning of smart distribution networks**  
P Chittur Ramaswamy, C Del Marmol, D Schyns, F-X Bouchez, S Rapoport, *Tractebel, Belgium*, D Vangulick, *ORES, Belgium*

- 1106 An analytical method to assess the impact of distributed generation and energy storage on reliability of supply**  
A Escalera, *IMDEA Energy, Spain/University Carlos III de Madrid, Spain*, B Hayes, *NUI Galway, Ireland*, M Prodanović, *IMDEA Energy, Spain*
- 1210 Risks of determining the optimal technical solution of power plant connection to distribution network**  
M Cavlovic, *HEP-ODS doo, Croatia*
- 1248 Evolution of electrical distribution grid sizing considering self-consumption of local renewable production**  
A Rogeau, T Barbier, R Girard, *MINES ParisTech, France*, N Kong, *Enedis, France*
- 1367 Towards more cost-effective PV connection request assessments via time-series based grid simulation and analysis**  
A Ulbig, S Koch, *Adaptricity, Switzerland*, C Antonakopoulos, *ETH Zurich, Switzerland*

*Sub-block 3 – Optimal placement of power and control discrete components*

- 0020 Optimal allocation of capacitor devices on MV distribution networks using crow search algorithm**  
A M Shaheen, *South Delta Electricity Distribution Company, Ministry of Electricity, Egypt*, R A El Sehiemy, *Kafrelsheikh University, Egypt*
- 0026 Increase the hosting capacity of 4-wire low voltage supply network for embedded solar generators by optimising generator and load placement on the three supply phases**  
P Wong, A Kalam, R Barr, *Jemena, Australia*
- 0030 Risk based procedure for network automation planning in radial distribution networks with distributed generation**  
Ž Popović, *University of Novi Sad, Serbia*, S Knezević, *Schneider Electric DMS NS, Serbia*
- 1242 A methodology to allocate automatic recloser in large power distribution networks**  
C F M Almeida, J CC Amasifen, R A Spalding, E L Ferrari, N Kagan, *University of Sao Paulo, Brazil*, H Kagan, *Sinapsis Inovacao Em Energia, Brazil*, D Mollica, A Dominice, L Zamboni, M A P Fredes, G H Batista, *EDP, Brazil*
- 1346 Simultaneous optimization of tie switches placement and reserve capacity margin of Sub-Transmission substations considering the conflict between Short-term and Long-term planning**  
M Hoseinpour, M-R Haghifam, S M Miri Larimi, *Tarbiat Modares University, Iran*, M Zangiabadi, *Newcastle University, United Kingdom*

*Sub-block 4 – EV accommodation planning*

- 0802 Impacts of fast charging of electric buses on electrical distribution systems**  
D Steen, L A Tuan, *Chalmers University of Tech, Sweden*
- 1281 Evaluation of the impact of plug-in electric vehicles in Greek distribution network**  
E Voumvoulakis, E Leonidaki, G Papoutsis, N Hatzirygiou, *HEDNO, Greece*

**Block 4: Methods & tools**

*Sub-block 1 – Load/generation modelling & forecasting*

- 0182 Long-term forecasting of reactive power demand in distribution networks**  
C Kaloudas, R Shaw, *Electricity North West Ltd, United Kingdom*
- 0584 Wind power forecasting based on refined LSTAR-GARCH model**  
H Chen, *State Grid Jiangsu Electric Power Company, China*, R Li, *Chinese Society for Electrical Engineering, China*, Y Wang, C Xu, *Southeast University, China*
- 0625 Probabilistic day-ahead forecasting of household electricity demand**  
A Gerossier, R Girard, G Kariniotakis, A Michiorri, *PSL Research University, France*
- 0654 Analysing the ability of smart meter data to provide accurate information to the UK's DNOs**  
G Poursharif, A Brint, *The University of Sheffield, United Kingdom*, M Black, M Marshall, *Northern Powergrid, United Kingdom*
- 0743 Long term forecast of local electrical demand and evaluation of future impacts on the electricity distribution network**  
N Kong, M Bocquel, G Pelton, P Cauchois, *Enedis, France*, T Barbier, R Girard, E Magliaro, G Kariniotakis, *MINES Paris Tech, France*
- 0827 Advancement of load estimation method for LV distribution facilities**  
H Wada, H Nomura, E Umemura, *Chubu Electric Power Company Inc., Japan*
- 0836 Behaviour of street lighting feeders supplying traditional and new LED lamps**  
A Ilo, E Torabi, W Gawlik, *TU Wien, Austria*, G Wötzl, *TU Wien, Austria*, MA 33 - Wien Luechtet, *Austria*
- 0856 Stochastic effects of customer behaviour on bottom up load estimations**  
J Heres, V van Westering, *Alliander N.V, Netherlands/Delft University of Technology, Netherlands*, G van der Lubbe, D Janssen, *Radboud Universiteit Nijmegen, Netherlands*

- 1064 Load criticalities detection on HV/MV Substations in multi-country scenario**  
G Palumbo, S Morel, G Bruno, F Viapiana, *Enel SpA, Italy*, C F Gomez-Arbelaez, *Codensa-Enel, Columbia*
- 1222 Comparing time series clustering approaches for individual electrical load patterns**  
Z De Greve, F Lecron, F Vallee, *University of Mons, Belgium*, G Mor, D Perez, S Danov, J Cipriano *CIMNE, UPC, Spain*
- 1247 A hybrid model approach for forecasting electricity demand**  
J Teixeira, S Macedo, S Gonçalves, A Soares, *EDP Distribuição, Portugal*, M Inoue, *EDP Brasil, Brazil*, P Cañete, *Brazil, HCD, Spain*

*Sub-block 2 : Network modelling and representations*

- 0932 Developing static model of fault current limiter technologies**  
A Kazerooni, G Tsigara, N Murdoch, *WSP | Parsons Brinckerhoff, United Kingdom*, J Berry, *Western Power Distribution, United Kingdom*
- 1229 Using matrix factorization for the prediction of electrical quantities**  
F Lecron, Z De Greve, F Vallee, *University of Mons, Belgium*, G Mor, D Perez, S Danov, J Cipriano *CIMNE, UPC, Spain*

*Sub-block 3 : Load flow & short circuit calculations*

- 0031 Dealing with sparse smart metering data in techno-economic analysis of low voltage networks**  
F Vallée, M Hupez, F Toubeau, Z De Grève, *University of Mons, Belgium*
- 0179 Analysis of probabilistic load flow using point estimation method to evaluate the quantiles of electrical networks state variables**  
G Plattner, *EDF - R&D, France*, H Farah Semlali, N Kong, *Enedis, France*
- 0238 Advancement in state grasping method of MV distribution network for short-term and mid-term planning**  
H Ishikawa, T Yamada, K Sada, *Chubu Electric Power Company Inc., Japan*, T Takano, N Itaya, *Mitsubishi Electric Corp, Japan*, H Ohtsu, *Mitsubishi Electric Information Network Corp, Japan*
- 0294 Resilience of the DSO network near 50.2Hz**  
D Vangulick, T V Cutsem, *ORES, Belgium/University of Liège, Belgium*, D Ernst, *University of Liège, Belgium*
- 0577 A comparative assessment of a quasi-sequential and a sequential approach for distribution network stochastic analysis**  
M Hupez, Z De Grève, F Vallée, *University of Mons, Belgium*
- 0738 The impact of low carbon technologies on short circuit levels at medium voltage networks**  
J Berry, *Western Power Distribution, United Kingdom*, A Kazerooni, M Eves, *WSP | Parsons Brinckerhoff, United Kingdom*
- 0805 Performance assessment of a three-phase distribution network with multiple residential single phase PV systems**  
S Bhagavathy, N Pearsall, G Putrus, *Northumbria University, United Kingdom*, S Walker, *Newcastle University, United Kingdom*
- 0910 Fully automated calculations in both MV and LV networks**  
F Provoost, F Smits, *Alliander, Netherlands*, L W Jansen, *Phase to Phase, Netherlands*
- 0976 Characterisation of 11kV fault level contributions based on substation load profile**  
P Edwards, *WSP | Parsons Brinckerhoff, United Kingdom*, J Berry, *Western Power Distribution, United Kingdom*

*Sub-block 4 – Energy losses*

- 0306 Impact of PV distributed generation on EDP Distribuição LV grid losses**  
M I Verdelho, R Prata, *EDPD, Portugal*, P Carvalho, J Machado, *IST/INESC-Id, Portugal*
- 0489 Improved three phase power flow method for calculation of power losses in unbalanced radial distribution network**  
T Alinjak, K Trupinic, *HEP ODS, Croatia*, I Pavic, *FER, Croatia*
- 1011 Identification and evaluation of energy theft using the state estimator in MV and LV grids with exogenous parameters for planning expansion**  
D Duarte, D Kondo, F Matsuzaki, J Guaraldo, M Souza, *Sinapsis, Brazil*, H Silva, M Ferreira, *Electrobras Alagoas, Brazil*, R Silva, *Eletrobras Rondônia, Brazil*, L Brito, R Ross, *Cepel, Brazil*, N Kagan, *USP, Brazil*
- 1076 Accurate Determination of Distribution Network Losses**  
A Urquhart, M Thomson, *Loughborough University, United Kingdom*, C Harrap, *Western Power Distribution, United Kingdom*
- 1258 Fraud Detection in Low Voltage Electricity Consumers Using Socioeconomic Indicators and Billing Profile in Smart Grids**  
J Pulz, R B Muller, F Romero, A Meffe, *Daimon, Brazil*, A F Garcez Neto, A S Jesus, *Sulgipe, Brazil*



**NON-INTERACTIVE POSTERS Session 5: Planning of power distribution systems**  
**09:00 – 17:30hrs**

**Block 2: Network development**

*Sub-block 1 – Innovative power distribution*

- 0305 Innovative solution of safety corridor design for overhead lines: Increasing resilience to extreme weather events while providing environmental benefits – Results**  
M I Verdelho, R Prata, S Pereira, A Couto, *EDPD, Portugal*, M Vieira, *FloraSul, Portugal*, V Tomás, *EDP Labelec, Portugal*
- 0683 Demonstration of remote microgrid system in Korean Island**  
J Won, W Chae, H Lee, J Park, J Sim, C Shin, *KEPCO, Korea*
- 0750 MV grids development and automation**  
D Kouba, L Kolar, J Celeda, M Jurik, *E.ON Distribution, Czech Republic*
- 0861 Planning of autonomous smart micro grid for electrification of remote villages in MEDC**  
M Sharifzadeh, F Separi, M Heydari, *MEDC, Iran*
- 0975 Control and automation functions at the TSO and DSO interface – impact on network planning**  
F Pilo, *University of Cagliari, Italy*, G Mauri, *RSE, Italy*, B Bak-Jensen, *University of Aalborg, Denmark*, E Kämpf, *Fraunhofer Institut, Germany*, J Taylor, *EPRI, United States*, F Silvestro *University of Genova, Italy*
- 0986 Strategic interconnected network transitioning**  
M Bebbington, A Elena de Leonardo, *SP Energy Networks, United Kingdom*, R Bryans, *TNEI Services Ltd, United Kingdom*
- 1006 Cost-benefit analysis for using the li-ion batteries in low-voltage network for decreasing outage time experienced by customers**  
O Vilppo, J Markkula, P Järventausta, *Tampere University of Technology, Finland*, S Repo, T Hakala, *Elenia Oy, Finland*
- 1236 Fractal grid - towards the future smart grid**  
N Retiere, Y Sidqu, *Uni. Grenoble Alpes, France*, G Muratore, G Kariniotakis, A Michiorri, R Girard, *MINES Paris Tech, France*, P Frankhauser, A Poirson, *Université de Franche-Comté, France*, J-G Caputo *INSA de Rouen, France*

*Sub-block 3 – DC distribution systems*

- 0542 Construction of actual LVDC distribution line**  
Y Cho, H J Kim, J Kim, J Cho, J Kim, *KEPCO Research Institute, South Korea*
- 0732 Demonstration of LVDC distribution system in island**  
H J Kim, Y Cho, J Kim, J Cho, J Y kim, *KEPCO Research Institute, South Korea*

**Block 3: Distribution planning**

*Sub-block 1 – Advanced planning*

- 0383 Local forecasting could identify future LV bottlenecks**  
M Klerx, S Cobben, *TU Eindhoven, Netherlands*, A Jongepier, *Enduris BV, Netherlands*
- 0677 Case Study of the distribution system planning for a multi-divided and multi-connected system.**  
M Miyata, S Koizumi, M Watanabe, *TEPCO Power Grid, Japan*, M Kuroiwa, *Tokyo Electric Power Company Holdings, Japan*
- 0708 Impact of meshed grid topologies on distribution grid planning and operation**  
D Wolter, M Zdrallek, M Stötzel, *University of Wuppertal, Germany*, C Schacherer, I Mladenovic, *Siemens AG, Germany*, M Biller, *FAU University Erlangen, Germany*
- 0857 Methodology to support the CapEx allocation in a global scenario with multiple companies, ENEL case study**  
G Palumbo, G Licasale, *Enel SPA, Italy*, A Rojas Orbes, *Enel-Codensa, Columbia*

*Sub-block 2 – Planning of active networks and smart grids*

- 0048 Comparison between static and dynamic curtailment of RES in probabilistic high voltage distribution grid planning**  
P Wiest, K Rudion, S Eberlein, *University of Stuttgart, Germany*, A Probst, *Netze BW GmbH, Germany*
- 0771 Active distribution network planning based on a hybrid genetic algorithm-nonlinear programming method**  
N Koutsoukis, P Georgilakis, N Hatzargyriou, *NTUA, Greece*
- 0855 Effects of network reinforcement options on energy losses**  
S Blake, I Sarantakos, P Taylor, *Newcastle University, United Kingdom*

- 0991 Distribution grid planning considering smart grid technologies**  
B Nasiri, C Wagner, U Häger, C Rehtanz, *TU Dortmund University, Germany*
- 1118 Analysing the effect of increasing renewable capacities in Great Britain on the regional allocation and Wholesale Prices**  
S Lupo, A E Kiprakis, *University of Edinburgh, United Kingdom*, M Ruppert, V Slednev, *Karlsruhe Institute of Technology, Germany*
- 1357 Demonstration of an actively managed planning approach for connection of renewable generation**  
S Conner, G Harrison, *University of Edinburgh, United Kingdom*

*Sub-block 3 – Optimal placement of power and control discrete components*

- 0154 Optimal recloser deployment to leverage self-healing: a techno-economic robustness assessment**  
E Rodrigues, I Miranda, N Silva, *Efacec, Portugal*, H Leite, *University of Porto, Portugal*

*Sub-block 4 – EV accommodation planning*

- 0551 Optimal planning of EV charging network based on fuzzy multi-objective optimisation**  
K Qian, *State Grid Corporation of China, China*, J Gu, X Zhang, H Zhou, *Nantong University, China*, C Zhou, *Glasgow Caledonian University, United Kingdom*, Y Yuan, *Hohai University, China*

#### **Block 4: Methods and tools**

*Sub-block 1 – Load/generation modelling & forecasting*

- 0370 Identification of electrical energy consumption patterns**  
V Pereira, P Mousinho, L Jorge, *EDP Distribuição, Portugal*
- 0600 Application and evaluation of a probabilistic forecasting model for expected local PV penetration levels**  
R Bernards, *TU Eindhoven, Netherlands*, R Verweij, E J Coster, *Stedin BV, Netherlands*, J Morren, H Slootweg, *Enexis BV, Netherlands/ TU Eindhoven, Netherlands*
- 0842 Improved small area forecasting for electrical spatial load forecast analysis**  
J McCann, A Chabrol, S Quinn, *ESB International, Ireland*
- 1020 The improved model for the spatial load forecasting of the Slovenian distribution network**  
M Grabner, Z Bregar, Š Ivanjko, L Valenčič, *Milan Vidmar Electric Power Research Institute, Slovenia*
- 1071 ANDES: Grid capacity planning using a bottom-up, profile-based load forecasting approach**  
P van de Sande, M Danes, T Dekker, *Alliander N.V, Netherlands*

*Sub-block 2 – Network modelling and representations*

- 0222 Elektro Gorenjska CIM project**  
B Rozic, D Mlakar, M Gruden, *GDB doo, Slovenia*, N Petrovic, *Elektro Gorenjska, Slovenia*
- 0314 A model to simulate medium voltage active networks with an aggregated view of the low voltage ends**  
A Pagnetti, G Malarange, *EDF R&D, France*, F Pilo, S Ruggeri, *University of Cagliari, Italy*
- 0315 Effects of asymmetrically connected PV and battery systems on the node voltages and PEN-Conductor currents in low voltage grids**  
M Wagler, R Witzmann, *Technical University of Munich, Germany*

*Sub-block 3 : Load flow & short circuit calculations*

- 0367 The impacts of a reduction in 11kV voltage settings in South Wales**  
G Shaddick, A Green, *University of Bath, United Kingdom*, M Watson, *Western Power Distribution, United Kingdom*
- 0381 Utilizing residential flexibility in the planning of LV-networks**  
J Reinders, R Bernards, *TU Eindhoven, Netherlands*, D Geldtmeijer, J Morren, H Slootweg, *Enexis BV, Netherlands/TU Eindhoven, Netherlands*
- 0806 Combination of linear power flow tools for voltages and power estimation on mv networks**  
J Buire, X Guillaud, F Colas, *L2EP, France*, J-Y Dieulot, *CRISTAL, France*, L De Alvaro, *Enedis, France*

*Sub-block 4 – Energy losses*

- 0785 Identifying energy efficiency improvements and savings potential in Croatian energy networks**  
T Baricevic, M Skok, *EIHP, Croatia*, S Zutobradic, L Wagemann, *HERA, Croatia*
- 0963 Losses**  
M Bebbington, W Mantle, *SP Energy Networks, United Kingdom*, R Bryans, *TNEI Services Ltd, United Kingdom*
- 0988 Containment of power losses in LV networks with high penetration of distributed generation**  
G Celli, N Natale, F Pilo, G Pisano, *University of Cagliari, Italy*, F Bignucolo, M Coppo, A Savio, R Turri, *University of Padova, Italy*, A Cerretti *e-distribuzione SpA, Italy*

- 1007**    **Optimal network reconfiguration in distribution system for loss reduction and voltage profile improvement using hybrid algorithm of PSO and ACO**  
M A Heidari, *SHEDC, Iran*
- 1260**    **Innovative Approaches to Identification and Reduction of Distribution Network Losses**  
J Acosta, C Higgins, *TNEI, United Kingdom*, M Hughes, *Element Energy, United Kingdom*, T Manolopoulos, *SSEN, United Kingdom*
- 1286**    **Radial distribution network reconfiguration (DNR) for power losses reduction using a modified particle swarm optimization (MPSO)**  
I Atteya, H Ashour, *Arab Academy for Sciences and Technology, Egypt*, N Fahmi, D Strickland, *Aston University, United Kingdom*