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## SC A1 ROTATING ELECTRICAL MACHINES

### PS1: Generation Mix of the Future

- A1-101 Hybridizing Gas Turbine with Battery Energy Storage: Performance and Economics**  
N.W. MILLER - *US*, V. KAUSHIK - *US*, J. HEINZMANN - *US*, J. FRASIER - *US*
- A1-102 Investigations on ROCOF withstand capability on large synchronous generators**  
K. CHAN - *CH*, J. OESTERHELD - *CH*, S. TEMTEM - *CH*, J. HALDEMANN - *CH*
- A1-103 Development, Test and Validation of new Generator Product Line for current and future operational regimes**  
J.-H. BRAAM - *DE*
- A1-104 Impact of grid code evolution on the design of the generators for nuclear plants (Half speed, power above 800 MVA)**  
B. WAHDAME - *FR*
- A1-105 Contribution of Kyogoku Power Station, an adjustable speed pumped storage, in actual grid operation**  
T. ISHIZUKI - *JP*, R. HASAGAWA - *JP*, Y. SHIOZAKI - *JP*, K. IWABUCHI - *JP*
- A1-106 Calculation of Rotor Eddy Current Losses in High-Speed PM Synchronous Generators using Transfer Matrices**  
J.R. ANGLADA - *GB*, S.M. SHARKH - *GB*, M.A. YURATICH - *GB*

## SC A1 ROTATING ELECTRICAL MACHINES

### PS2: Asset Management of Electrical Machines

- A1-201 Variability of PD readings and failure location in high voltage bars**  
T. HILDINGER - *BR*
- A1-202 A Study of the Propagation Behaviour of Partial Discharge Pulses in the High-Voltage Winding of Hydro Generators**  
F. OETTL - *AT*, C. ENGELEN - *AT*, E. BINDER - *AT*, T. KESSLER - *AT*
- A1-203 Partial Discharge Activity in Isolated Phase Bus (IPB) – Case Studies from UK Power Stations**  
A. SINGH - *GB*, M. HUGHES-NARBOROUGH - *GB*
- A1-204 Analysis of Insulation Diagnosis for Generator-Motor Stator Winding and Core in Pumped Storage Power Plants**  
S. H. LEE - *KR*, T. S. KONG - *KR*, H. D. KIM - *KR*, D. M. KIM - *KR*
- A1-205 Novel fiber optics technology monitors in-slot vibration and hot spots in an air cooled gas generator**  
P. KUNG - *CA*
- A1-206 CANCELLED - Ability of Sweep Frequency Response Analysis (SFRA) to detect broken bars in squirrel cages of induction machines**
- A1-207 Importance of operating parameters when assessing the condition of machines on-line**  
J. LETAL - *CA*
- A1-208 Torsional Oscillations Mitigation for Interconnected Power System via Novel Fuzzy Control Based Braking Resistor Model**  
M. FAYEZ AHMED - *EG*, M.A. EBRAHIM - *EG*, M.A. EL-HADIDY - *EG*, W.M. MANSOUR - *EG*
- A1-209 Using an air gap monitoring system during initial commissioning stages of a hydro generator**  
A. TÉTREULT - *CA*

- A1-210 Application of Differential Magnetic Field Measurement (DMFM method) in winding fault detection of AC rotating machines as part of expert monitoring systems**  
A. ELEZ - *HR*
- A1-211 Generators as Synchronous Condensers to meet Dynamic System Requirement by Renewable Mix. – Indian Scenario**  
D.K. CHATURVEDI - *IN*, A.K. GUPTA - *IN*

### SC A1 ROTATING ELECTRICAL MACHINES

#### PS3: Developments of Rotating Electrical Machines and Operational Experience

- A1-301 A Study of the failure and repair rate indicators of the Itaipu generator units**  
R. SILVA - *BR*
- A1-302 Forensic Analysis of Gas Turbine-generator Shaft Failures due to Possible Subsynchronous Resonance**  
J.D. GALVEZ - *US*, M.D. URBINA - *US*, D.J. MADER - *US*, J.B. WISNIEWSKI - *US*
- A1-303 Analyses of possible refurbishment of generators in HPP Perucica**  
R. BATAKOVIC - *ME*, B. ĐORDAN - *ME*
- A1-304 Operation experience of asynchronized turbo-generators in the Moscow power system**  
P. SOKUR - *RU*
- A1-305 Analysis on the effect of screen ventilation width on end flux distribution and eddy current losses of Turbo-generator**  
L. WANG - *CN*
- A1-306 Influence of total flow rate on complex fluid flow and temperature rise in the rotor region of large Hydrogenerators**  
J. HAN - *CN*
- A1-307 Loss Reduction by large-Scale Electromagnetic Analysis for Turbine Generators**  
H KOMETANI - *JP*
- A1-308 Reactive power capability of large hydro generators and the European Grid Code requirements with respect to voltage stability**  
L. ROUCO - *ES*, F. PERÁN - *ES*
- A1-309 Development of Large Indirectly Hydrogen-cooled Turbine Generator and Associated Technologies**  
S MURAMATSU - *JP*
- A1-310 Analysis of Winding Temperature Characteristic by Dual-frequency Method and Real-load Test for Induction Motors**  
B.H. KANG - *KR*, S.J. LEE - *KR*, S. D. HONG - *KR*

### SC A2 POWER TRANSFORMERS AND REACTORS

#### PS1: Thermal Characteristics of Power Transformers

- A2-101 Development of a dynamic thermal hydraulic network model for core-type power transformers windings**  
H. M. CAMPELO - *PT*, C. COTAS - *PT*, N. D. GONÇALVES - *PT*, R. J. SANTOS - *PT*, M. M. DIAS - *PT*, J. C. LOPES - *PT*, M. A. QUINTELA - *PT*
- A2-102 Experimental validation of a thermal hydraulic management platform for core-type power transformers**  
H. M. CAMPELO - *PT*, M. A. QUINTELA - *PT*, A. C. BARRADAS - *PT*, S. COUTO - *PT*, E. COSTA - *PT*
- A2-103 Improved THNM models for power transformers using new correlations set up with CFD simulations.**  
W. VAN DER VEKEN - *BE*
- A2-104 The role of direct hot-spot temperature measurements and dynamic thermal models in the determination of power transformers dynamic thermal rating**  
TIM GRADNIK - *SI*, A. POLAJNER - *SI*
- A2-105 Selecting the right level of complexity for thermal modelling of transformer windings**  
T LANERYD - *SE*

- A2-106 Uneven liquid flow distribution in radial ducts in transformer winding cooling systems shown by CFD and experimental measurements**  
P. JARMAN - *GB*, X. ZHANG - *GB*, M. DAGHRAH - *GB*, Q. LIU - *GB*, Z.D. WANG - *GB*, P. DYER - *GB*, A. GYORE - *GB*, P. SMITH - *GB*, P. MAVROMMATIS - *GB*, M. NEGRO - *CH*, D. WALKER - *GB*
- A2-107 Determination of local losses and temperatures in power transformer tank**  
R. SITAR - *HR*
- A2-108 Determination of the temperature rise of the magnetic core of power transformer by 3D finite element method modelling**  
D. BORTOLOTTI - *FR*
- A2-109 Comparison between different methods to measure winding hot-spots**  
M. MARTÍNEZ - *ES*, C. VILA - *ES*, M. CUESTO - *ES*, M. VAQUERO - *ES*, J.E. GRIJUELA - *ES*
- A2-110 Experience with transformer loading tests and direct temperature measurements in laboratory and in service**  
C. RAJOTTE - *CA*
- A2-111 Measurement of thermal behavior of an ester-filled power transformer at ultra-low temperatures**  
F. BACHINGER - *AT*, P. HAMBERGER - *AT*
- A2-112 Practical aspects of determining the hotspot temperature in large power transformers**  
C.J.G. SPOORENBERG - *NL*
- A2-113 Study on Winding Temperature Rise Using Full-Scale Large Power Transformer Model**  
S YAMADA - *JP*
- A2-114 Design of Insulated Cables to Reduce Gassing Issues in Power Transformers**  
D. VIR - *US*, T.M. GOLNER - *US*
- A2-115 Experiences with high-temperature insulation systems & overload requirements**  
C. PERRIER - *FR*
- A2-116 Cold start-up and loading of oil immersed power transformers at extreme ambient temperatures**  
Z. RADAKOVIC - *RS*, U. RADOMAN - *RS*, G. KLASNIC - *RS*, R. MATIC - *RS*
- A2-117 Thermal comparison between mineral oil, natural and synthetic esters at largest single-phase 420 kV green transformer**  
M. CUESTO - *ES*, C. GONZÁLEZ-GARCÍA - *ES*, M. VAQUERO - *ES*, D. VUKOVIC - *DE*

## SC A2 POWER TRANSFORMERS AND REACTORS

### PS2: Advances in Diagnostics and Modelling

- A2-201 Development of Power Transformer Defect Location Detection Technology using UHF Partial Discharge Monitoring System**  
B. W MIN - *KR*, J. B. LEE - *KR*, C. H CHO - *KR*, J. S. PARK - *KR*
- A2-202 Experimental Investigation on Ungrounded Conductive Objects Effects Approximate to Power Transformer during IVPD Test**  
A.A. ABBASI - *IR*, F. GHELICHI - *IR*, A. TOFIGHI - *IR*, S. EMRANI SARAVI - *IR*, K. GHARANI KHAJEH - *IR*
- A2-203 Experimental evaluation of the status of 400 kV shunt reactor bushings in the Swedish national grid**  
L JONSSON - *SE*
- A2-204 First results from the field testing of advanced acoustic monitoring of variable shunt reactors and on-load tap-changers**  
K. VIERECK - *DE*, A. SAVELIEV - *DE*, U. SUNDERMANN - *DE*, M. SPÄTH - *DE*
- A2-205 Localization of PD Sources in Transformers by Analysis of Signals in Time- and Frequency Domain**  
J. FUHR - *CH*, T. ASCHWANDEN - *CH*
- A2-206 Machine Learning Tools in Support of Transformer Diagnostics**  
L. CHEIM - *US*
- A2-207 Method of Investigations and Predictions for transformers faults**  
M. AL-NSOUR - *JO*

- A2-208 A novel approach for bushing fault diagnosis: Power Grid India experience**  
SUMIT S HARICHANDANRAY - *IN*
- A2-209 Application of natural frequencies deviations patterns and high-frequency white-box transformer models for FRA interpretation**  
V. LARIN - *RU*
- A2-210 French utility investigations for simulating HF transients in power transformers**  
P. POUJADE - *FR*
- A2-211 Interpretation of the LF resonance in Frequency Response Analysis of transformer windings**  
J. SUBOCZ - *PL*, M. SZROT - *PL*, J. PAWLUCHA - *PL*
- A2-212 modelling of winding frequency Response of a Large Power Transformer, based on design data, and comparison to Measured Results**  
M. LOUWERSE - *NL*
- A2-213 Modelling of transformers and reactors for electromagnetic transient studies**  
B. GUSTAVSEN - *NO*, A. PORTILLO - *UY*, H.K. HØIDALEN - *NO*
- A2-214 A New Approach for High Frequency Modelling of Disc Windings**  
S. TENBOHLEN - *DE*, M. TAHIR - *DE*, E. RAHIMPOUR - *DE*, B. POULIN - *CA*, S. MIYAZAKI - *JP*
- A2-215 Transformer Internal Resonant Over-voltages, Switching Surges and Special Tests**  
J.A. LAPWORTH - *GB*, P.N. JARMAN - *GB*, Z.D. WANG - *GB*, S. DRAGOSTINOV - *BG*
- A2-216 CANCELLED - Transient modelling of Shunt Reactors for System Studies and Impact on Insulation Design**

## SC A2 POWER TRANSFORMERS AND REACTORS

### PS3: Site Commissioning Tests

- A2-301 Benefits of high voltage testing at site for power transformers**  
E. TENYENHUIS - *CA*
- A2-302 The Emerging Role of FRA as a Required Commissioning Test**  
J. TUSEK - *AU*
- A2-303 Particularities of the additional site commissioning tests applied to power transformers and shunt reactors for correct decision regarding their technical condition - a Romanian Experience**  
C. MOLDOVEANU - *RO*
- A2-304 Recommendation of site commissioning tests for rapid recovery transformers with an installation time less than 30 hours**  
S. RIEGLER - *AT*, E. SCHWEIGER - *DE*, C. Ettl - *AT*, M. STOESSL - *AT*, S. BOSE - *US*
- A2-305 The Study for Environmental Effect of Sound Measurement of Power Transformer**  
K. H. LEE - *KR*, C. J. PARK - *KR*, C. H YANG - *KR*
- A2-306 A study on key technology and demonstration application of UHV AC site assembled transformers**  
X. WANG - *CN*

## SC A3 TRANSMISSION & DISTRIBUTION EQUIPMENT

### PS1: Requirements for AC and DC Transmission & Distribution Equipment

- A3-101 Application of metal oxide surge arresters in parallel with circuit breaker's chambers as a possible solution to reduce TRV**  
J. AMON - *BR*
- A3-102 High-voltage Circuit-Breaker Test Statistics 2011-2016 and test Analysis Tools**  
R. SMEETS - *NL*

- A3-103 Optimizing the energizing scheme of unearthed shunt capacitor banks**  
R. DOCHE - *CA*
- A3-104 Control Methods for Fault Current Limiting Using Hybrid HVDC Breakers**  
D JOVCIC - *GB*, A JAMSHIDI FAR - *GB*, A . HASSANPOOR - *CN*
- A3-105 Development of 500kV modular cascaded hybrid HVDC breaker for DC grid applications**  
G. TANG - *CN*
- A3-106 Flexible measures to depress switching over-voltage in UHVAC transmission system and latest research results**  
X. CHEN - *CN*
- A3-107 Enhancement of 765kV System Stability: Optimization of Neutral Grounding Reactor Parameters.**  
UMESH SEN - *IN*
- A3-108 Technical design requirements and test experiences on Composite Hollow Core Insulators regarding pollution performance under AC and DC stress**  
E. MOAL - *DE*, V. BERGMANN - *DE*, C. PONS - *FR*, A. SOERGEL - *DE*, W. MANZKE - *DE*
- A3-109 Development of requirements for testing and verification of RTV-coated substation support insulators for AC application**  
A DERNFALK - *SE*
- A3-110 Simulation and Measurement of Pressure Rise in GIS 145 kV due to Internal Arcing**  
D. GORENC - *HR*
- A3-111 Development of a protection strategy for future DC networks based on lowspeed DC circuit breakers**  
A BERTINATO - *FR*
- A3-112 Survey on Requirements for Induced Current Switching by Earthing Switches**  
S TSUKAO - *JP*
- A3-113 Development and Research of Switching Capability of Gas-insulated Disconnecting Switch of Switchgear**  
A. ROTBLUT - *RU*
- A3-114 Experience of application generator circuit breakers in TPP Kakanj**  
A. LUJNOVIC - *BA*
- A3-115 Full Power Short-circuit Tests of HVDC Circuit Breakers using AC Generators Operated at Reduced Power Frequency**  
S. TOKOYODA - *JP*, R.P.P. SMEETS - *NL*, R. NIJMAN - *NL*, N.A. BELDA - *NL*, K. TAHATA - *JP*, F. PAGE - *GB*, H. ITO - *JP*, C. SPALLAROSSA - *GB*, C.A. PLET - *NL*

### SC A3 TRANSMISSION & DISTRIBUTION EQUIPMENT

#### PS2: Lifetime Management of Transmission & Distribution Equipment

- A3-201 Digital Disconnecter: return on experience on digital substation**  
E. STELLA - *IT*, J.L. RAYON - *FR*, G: HENRY - *FR*
- A3-202 The Egyptian experience in solving transient problems associated with the switching operations of 220kV capacitor banks**  
M. BASYOUNI - *EG*
- A3-203 Experience on use of Controlled Switching Devices with Circuit Breakers in Indian Power System- A Case Study**  
JIVESH KHANNA - *IN*, R.K TYAGI - *IN*
- A3-204 Safety in the operation of oil-paper instrument transformers**  
J.M. NOGUEIRAS - *ES*
- A3-205 Disconnectors reliability on the French grid and means to reduce the consequences of their failures on the electrical system**  
G. HENRY - *FR*
- A3-206 Application and Reliability of Metal Oxide Surge Arresters in Japan**  
H KAJINO - *JP*

**A3-207 Online monitoring of Capacitive Voltage Transformers using energy meters**

T LINDQUIST - *SE*

**SC A3 TRANSMISSION & DISTRIBUTION EQUIPMENT**

**PS3: Novel Developments of Transmission & Distribution Equipment**

**A3-301 Performance Evaluation of CO<sub>2</sub>/Fluoronitrile Mixture at High Short Circuit Current Level in GIS and Dead-Tank High-Voltage Circuit Breakers**

V. HERMOSILLO - *US*, C. GREGOIRE - *FR*, D. VANCELL - *FR*, J. OZIL - *FR*, Y. KEIFFEL - *FR*, E. PIERRES - *FR*

**A3-302 Vacuum Generator Circuit Breaker as a Reliable SF<sub>6</sub> Alternative with Reduced Life Cycle Costs for Power Plants up to 400 MW**

P. LEUFKENS - *US*, R. NAYER - *US*, K.R. VENNA - *DE*

**A3-303 Evolution of functional requirements for MV switchgear**

A. JANSSEN - *NL*

**A3-304 The future evolution of medium voltage circuit-breakers: new developments and possible applications**

M. RIVA - *IT*, P. BERTOLOTTO - *IT*, M. BONACONSA - *IT*, L. CHENET - *IT*, F. VIARO - *IT*

**A3-305 Physical Aspects of Arc Interruption in CO<sub>2</sub>/O<sub>2</sub>/Fluoroketones Gas Mixtures**

J.D. MANTILLA - *CH*, M. CLAESSENS - *CH*

**A3-306 Study on electrical endurance for capacitive current switching of 1100kV circuit breakers used for filter banks**

B. CUI - *CN*

**A3-307 Application of a Heptafluoroisobutyronitrile gas (C<sub>4</sub>F<sub>7</sub>N) mixed with the Background gas of CO<sub>2</sub> in GIS as SF<sub>6</sub> Alternative**

H. E. JUNG - *KR*, H. S. AHN - *KR*, J. CHOI - *KR*, Y.G. KIM - *KR*, P. HUGEUENOT - *CH*, R. LÜSCHER - *SZ*, K. BOUSOLTANE - *FR*, J. OZIL - *FR*

**A3-308 Switching of long compensated cables. Transients and switching strategies applied in 132kV AC Mallorca-Ibiza submarine link**

V.J. HERNÁNDEZ - *ES*, G. ÁLVAREZ - *ES*, A. BURGOS - *ES*, B. GARCÍA - *ES*, G. MOLINA - *ES*, D. DEL SOLO - *ES*

**A3-309 Performance evaluation of CO<sub>2</sub> and Fluoronitrile mixture in comparison with SF<sub>6</sub>**

K. BOUSOLTANE - *FR*

**A3-310 Extending metering technology limits with new approach to combined instrument transformers using IEC61850-9-2LE protocol**

M. YANIN - *RU*, T. HEID - *CH*

**A3-311 145/170 kV Vacuum Circuit Breakers and Clean-Air Instrument Transformers – Product performance and first installations in AIS substations**

J. TEICHMANN - *DE*, S. KOSSE - *DE*, M. KOLETZKO - *DE*, N. WENZEL - *DE*, S. GIERE - *DE*, D. HELBIG - *DE*, U. PRUCKER - *DE*, M. ENGEL - *DE*, C. WOLF - *DE*

**SC B1 INSULATED CABLES**

**PS1: Recent Experiences with Underground and Submarine AC and DC Cable Systems**

**B1-101 Dry-type branched joint for 72-kV extruded cable systems**

J. ROSSUM, VAN - *NL*

**B1-102 Challenges for the repair strategy of 380kV cable systems**

J. SMIT - *NL*

**B1-103 CANCELLED - 220kV underground cable Project in Melbourne - Thermo-mechanical design for transition between rigid and flexible cable Installations - a practical example**

**B1-104 Comparative Between Underground Lines Magnetic Field Shielding Techniques on the Field Reduction Factor, Line Ampacity and Implementation Costs**

R. MOREIRA - *BR*

- B1-105 Study of electromagnetic shielding of high voltage cables: a comparison between an experiment and FEM simulation**  
G. SUN - *CH*, C. D. BLASIIS - *CH*, P. CORSARO - *CH*
- B1-106 Experience of withstand voltage testing by using variable frequency tuned resonant test system for extruded power cable in site**  
A. ELFARASKOURY - *EG*
- B1-107 New High Voltage Underground Cables to Supply the Energy for the 2016 Olympic Games**  
C. PEIXOTO - *BR*
- B1-108 A new microtunneling technology for extra-high-voltage power cable installations**  
C. TAPPEL - *DE*, T. FREHN - *DE*, R. PUFFER - *DE*, M. ANDRES - *DE*, M. PETERS - *DE*, T. ENGEL - *DE*, J. BRÜGGMANN - *DE*, T. WINKEL - *DE*
- B1-109 A case study for the use of semi-conductive outer sheath layers on 400 kV cable systems installed in a tunnel application**  
T.P. DU PLESSIS - *ZA*
- B1-110 Sheath circulating currents calculation in asymmetrical installation schemes for power frequency models**  
K. ALEXANDROU - *GR*, C. TASTAVRIDIS - *GR*, G. GEORGALLIS - *GR*, G. J. ANDERS - *PL*
- B1-111 CANCELLED - Factors affecting the load current and losses in the elements of the single-core underground power cables**
- B1-112 Conversion of a portion of a 220 kV Overhead Line to Underground in Cartagena - Colombia**  
J. LOPES - *BR*
- B1-113 CANCELLED - Experience with installation of underground HVAC Cable circuits in Christchurch, New Zealand**
- B1-114 Analysis of Induced Sheath Voltages and Currents of 230 kV Oil-Filled and XLPE Underground Power Cables in The Tunnel : Case Study of Metropolitan Electricity Authority of Thailand**  
A. PHAYOMHOM - *TH*
- B1-115 Safe Work on HV Extruded insulation Cable Systems under induced Voltages**  
M. CABAU - *FR*
- B1-116 Lessons learnt during reparation of the Morocco-Spain submarine connection**  
A. DÍEZ - *ES*, A. FRANCÉS - *ES*, G. DONOSO - *ES*, E. NOGUEROLES - *ES*, E.F. SALAH - *MA*, K.M. ABDELLAH - *MA*
- B1-117 Commissioning of the Italy – Sicily 420 kV submarine link: field test results**  
F. PALONE - *IT*, V. IULIANI - *IT*, M. REBOLINI - *IT*, A. VALANT - *IT*, L. BUONO - *IT*, A. MAZZA - *IT*
- B1-118 Ampacity calculation method for deeply buried wind farm AC submarine export cables**  
D. VREE - *NL*
- B1-119 Removal of old oil filled submarine cables in the Oslo fjord 2016/2017**  
E. TOMMELSTAD - *NO*
- B1-120 Energising the Martin Linge Offshore Oil and Gas Platform**  
A. TYRBERG - *SE*, A. PERSBERG - *SE*, O. LIND - *SE*, N.G. VAN LUIJK - *NO*, L. MYJKLEBUST - *NO*, L. POPE - *NO*
- B1-121 CANCELLED - EHV/HV submarine cable systems lifetime integration**
- B1-122 Development of HVDC XLPE cable system for VSC and LCC**  
S.B LEE - *KR*, Y.H KIM - *KR*, E.H JUNG - *KR*, S.P HONG - *KR*, D.S CHO - *KR*, H.J JUNG - *KR*, J.H NAM - *KR*, S.H SON - *KR*, I.H LEE - *KR*, J.Y KOO - *KR*, D.W KIM - *KR*
- B1-123 Evaluation of 320 kV extruded DC cable system for temporary overvoltages by testing with very long impulse waveform**  
T. KARMOKAR - *SE*
- B1-124 Italy-France HVDC interconnection named “Piedmont-Savoy”: an example of synergy between electric energy transmission and highway infrastructures**  
R. DE ZAN - *IT*, R. BENATO - *IT*, S. DAMBONE SESSA - *IT*, M. PAZIENZA - *IT*, M. REBOLINI - *IT*

- B1-125 The Johan Sverdrup project, Power from shore**  
K. JOHANNESSON - *SE*
- B1-126 Distributed Temperature Sensing on the NorNed HVDC Cable System**  
Ø. GARVIK - *NO*
- B1-127 Development and qualification of the extruded cable system for Xiamen ± 320 kV VSC-HVDC Project**  
X. GU - *CN*

#### SC B1 INSULATED CABLES

##### PS2: Best Use of Existing Underground and Submarine AC and DC Cable Systems

- B1-201 A development of on-line system for detecting partial discharge of underground extra high voltage XLPE cable**  
J. H. LEE - *KR*, D. J. WOO - *KR*, D. H. KIM - *KR*, Y.J MYONG - *KR*, Y. S. SONG - *KR*
- B1-202 Investigation on the Incipient Self-clearing Faults in Distribution Cables by Power Quality Monitoring System and Online PD Detection**  
C. HONGYAN - *SG*
- B1-203 Belgian experience with the design and installation of online monitoring techniques on a 380 kV A.C. cable system**  
P. LEEMANS - *BE*
- B1-204 Fire performance upgrade of installed HV insulated cables through special on-site taping**  
X. BALZA - *ES*, D. CALVERAS - *ES*, N. GENERÓ - *ES*, S. PARÉS - *ES*, G. DENCHE - *ES*, G. DONOSO - *ES*, I. ENRIQUEZ - *ES*
- B1-205 Initiatives in prevention measures against SCOF cable faults and fires**  
K. IWASAKI - *JP*
- B1-206 Thermo-Electrical Equivalent of Submarine Export Cable System in Wind Farms – Model Development and Validation**  
T. SARTO - *DK*
- B1-207 New Approach to Third Party Damage Probability Assessment for Submarine Cables**  
CHR. FREITAG - *DE*, A. FOSTER - *GB*, L. MACNAY - *GB*
- B1-208 Feasibility evaluation of existing AC cable joints under DC operating conditions**  
A. LEWARKAR - *NL*

#### SC B1 INSULATED CABLES

##### PS3: AC and DC Underground and Submarine Cable Systems in the Network of the Future

- B1-301 On the possibility of using HTSC cable lines in creation of long-distance interconnections**  
V.E. SYTNIKOV - *RU*, ?V. RYABIN - *RU*, S. YAMGUCHI S. YAMAGUCHI - *JP*, Y. IVANOV - *RU*
- B1-302 22.9 kV Polypropylene Insulated Power Cable with Soft Polypropylene**  
S.M. CHANG - *KR*, B.C. MUN - *KR*, S.H. LEE - *KR*, J.H KIM - *KR*
- B1-303 World First Commercial Project for Superconducting Cable System in Korea**  
D. C. KOO - *KR*, Y. J. WON - *KR*, J. G. JEON - *KR*, N. Y. PAIK - *KR*, K. T. KIM - *KR*, C. H. RYU - *KR*, J. B. NA - *KR*
- B1-304 Design and tests of the first commercialized 500 kV XLPE insulated submarine power cable**  
L. SUN - *CN*
- B1-305 Innovative Fault Location and Repair of Submarine Power Cables on the Seabed**  
P. O'ROURKE - *IE*
- B1-306 Armour Loss in Three Core Submarine Cables – Measurements of Cable Impedance and Armour Wire Permeability**  
R. STØLAN - *NO*
- B1-307 Current and future applications of HPTE insulated cables Systems**  
A. BAREGGI - *IT*, P. BOFFI - *IT*, S. CHINOSI - *IT*, S. FRANCHI BONONI - *IT*, L. GUIZZO - *IT*, G. LAVECCHIA - *IT*, M. MARZINOTTO - *IT*, G. MAZZANTI - *IT*, G. POZZATI - *IT*



- B1-308 Prequalification Test of Extruded HVDC 525-kV-Underground Cables**  
ST. POEHLER - *DE*, J. BRUEGGMANN - *DE*, D. THIELE - *DE*, F. MARTIN - *DE*, C. KUHN - *DE*, T. SCHRANK - *DE*,  
J. CHRISTIAN - *DE*, M. SCHULTHEISS - *DE*
- B1-309 Fully qualified 640 kV underground extruded DC cable system**  
M. JEROENSE - *SE*
- B1-310 Electromagnetic Interference in Parallel HVDC Cable Circuits**  
R. STØLAND - *NO*

## SC B2 OVERHEAD LINES

### PS1: Overhead Lines and Information Technology

- B2-101 Optical system for broadband data transmission concomitant to monitoring the physical integrity of conductors in overhead transmission lines**  
J. ROSOLEM - *BR*
- B2-102 Reliability Based Transmission Capacity Forecasting**  
J. MCCALL - *US*, R. BLISS - *US*, D. NADEAU - *CA*
- B2-103 Frequency of weak winds on a long transmission line fjord crossing**  
H. AGUSTSSON - *NO*
- B2-104 Potential analyses for dynamic rating optimization on basis of four years of operational experience in Austria**  
K. REICH - *AT*, G. MIKA - *AT*, R. PUFFER - *DE*
- B2-105 Quantifying the risk in dynamic thermal line rating**  
L. DAWSON - *CA*
- B2-106 Dimensioning of Electrical Clearance of OHL Using Correlation between Weather Condition and Lightning Strike Probability**  
B. RUSEK - *DE*, S. STEEVENS - *DE*, K. KLEINEKORTE - *DE*, M. HANNIG - *DE*, C. BALZER - *DE*, V. HINRICHSEN - *DE*, C. NEUMANN - *DE*
- B2-107 Innovative techniques for the predictive maintenance of overhead power lines. Practical application in the improvement of efficiency in felling and pruning in Northern Spain**  
D. CUASANTE - *ES*, A. GONZALEZ - *ES*, R. GARAÑEDA - *ES*, G. SOTO - *ES*, A. CRESPO - *ES*, A. SOLA - *ES*
- B2-108 CANCELLED - Dynamic line rating using an approach for weather condition predictors**

## SC B2 OVERHEAD LINES

### PS2: Experiences Leading to Improvements of OHL

- B2-201 Test Results to Confirm Minimum Vegetation Clearance Distance (MVCD) Standards**  
A. PHILLIPS - *US*, C.S. ENGELBRECHT - *NL*
- B2-202 CANCELLED - Damping the Longest Transmission Span in the World**
- B2-203 Modelling and verification of flowing air discharge in transmission lines wind environment**  
G. WU - *CN*
- B2-204 Comparative Study of the Long-term Reliability of HTLS Conductor Systems**  
W. KIEWITT - *DE*, M. WUNKTE - *DE*, R. BARDL - *DE*, C. KÜHNEL - *DE*, D. LOUDON - *NO*, D. STENGEL - *DE*
- B2-205 CANCELLED - Shortcomings and proposed improvements to the current practice used by Eskom Transmission to determine asset health index of overhead transmission lines**
- B2-206 The improvement of the performance of the overhead lines with the use of new technologies – The Chilean experience**  
S. ORTEGA - *CL*

- B2-207 Global approach for mechanical reinforcement of OHL**  
T. RAULT - *FR*
- B2-208 Recent Disaster Experiences and Countermeasure Technologies for Overhead Transmission Lines in Japan**  
M. MORI - *JP*
- B2-209 Overheating of Grounding Wire Clamps of Transmission Lines - Diagnostics, EMTP Investigation and Solution Suggestion**  
L. MUSIL - *CZ*
- B2-210 Optimum maintenance frequency determination of transmission towers degraded by salt pollution on the Peruvian coastline**
- B2-211 Protection of metal towers of overhead lines from corrosion: non-destructive diagnostic methods and recommendations for additional security**  
E. LYPUNOV - *RU*
- B2-212 Estimation of Tensile Force in Conductor by Vibration and Strain Measurement in Pillar's Legs of Transmission Line**  
K. BAKIC - *SI*, N. GUBELJAK - *SI*, J. PREDAN - *SI*, F. JAKL - *SI*, R. MARUSA - *SI*, E. VEG - *RS*, V. LOVRENCIC - *SI*
- B2-213 Conception of very high towers for crossing the river Scheldt**  
J. MAESSCHALCK - *BE*

### SC B2 OVERHEAD LINES

#### PS3: JOIN PS with C3 Technical and Environmental Aspects of OHL

- B2-301 Copel's experience on upgrading a 69 kV Compact Overhead Urban Transmission Line into 138 kV (Supercompact urban transmission line)**  
M. SOUZA - *BR*
- B2-302 HVDC & hybrid HVAC/HVDC overhead line conversion: An acceptance case study**  
S. HEDTKE - *CH*, M. PFEIFFER - *CH*, C. M. FRANCK - *CH*, CLAU DERMONT - *CH*, I. STADELMANN - *CH*, J. JULLIER - *CH*
- B2-303 Development of an innovative measurement system for audible noise monitoring of OHL**  
K. REICH - *AT*, U. SCHICHLER - *AT*, B. FISCHER - *AT*, T. HEINE - *AT*, W. TROPFAUER - *AT*, M. LEONHARDSBERGER - *AT*, O. OBERZAUCHER - *AT*
- B2-304 Innovative towers to facilitate public acceptance**  
J.F. GOFFINET - *BE*
- B2-305 380kV double circuit compact "Vitruvio" towers equipped with antitorsional insulating crossarms**  
P. BERARDI - *IT*, L. ALARIO - *IT*, M. GAMBASSI - *IT*, S. MEMEO - *IT*, A. PICCININ - *IT*, M. REBOLINI - *IT*, O. COLOMBO - *IT*, G. VERRILLO - *IT*
- B2-306 Passive loops: effects on distance protections and lightning performances of EHV overhead lines**  
F. PALONE - *IT*, M. FORTELEONI - *IT*, G. GEMELLI - *IT*, S. GENTILINI - *IT*, L. BUONO - *IT*, M. REBOLINI - *IT*
- B2-307 Over Head Transmission Lines and High Voltage Substations Electromagnetic Field Analysis and Design Considerations for Minimizing External Impacts**  
A. KLADAS - *GR*, A. DIAMANTIS - *GR*, T. DAMATOPOULOU - *GR*, C. DIKAIKOS - *GR*, G. PAPAIOANNOU - *GR*
- B2-308 The composite pylon**  
M.H. MIKKELSEN - *DK*
- B2-309 Study on the spectrum characteristics, identification and control methods of corona noise generated by UHVDC transmission lines**  
Y. LIU - *CN*
- B2-310 Full Scale Test for ±500kV HVDC Double Bi-Pole with Return Conductor Overhead Transmission Line**  
K.Y. SHIN - *KR*, G.M. KWON - *KR*, J.H. LEE - *KR*, W.J. CHOI - *KR*, C.K. PARK - *KR*, J.M. WOO - *KR*, M.N. JU - *KR*
- B2-311 Advanced conductor displacement modelling under wind conditions to improve right-of-way management**  
P. RODRÍGUEZ - *ES*, A. USEROS - *ES*, L.F. ALVARADO - *ES*, X.H. ZANG - *CA*, D. MALIK - *CA*, G. MCCLURE - *CA*
- B2-312 Design of lattice towers and metallic grid foundations with undercut for helicopter works to reduce environmental impact**  
V. ROULET - *FR*

## SC B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS

### PS1: Advances in Substation Technology and Design

- B3-101 Integrated Compact Substation – SECI: A Strategic Pattern for Expansion of the Electrical Distribution System in Brazil**  
P. COSTA - *BR*
- B3-102 Comparison of Medium Voltage Substation Bus Configurations**  
V. WESTFALLEN - *US*, L. GARCIA-GARCIA - *US*, P. TYSCHENKO - *US*
- B3-103 Levels of functionality for power distribution systems employing intelligent merging unit (IMU) and low-power instrument transformer (LPIT) technologies**  
B. SOUSA - *FI*
- B3-104 Station insulation performance under heavy icing conditions**  
G. TESTIN - *IT*, P. CARDANO - *IT*, M. NOSILATI - *IT*, E. STELLA - *IT*, V. GIRLANDO - *IT*, M. SARAVOLAC - *IT*, A. PIGINI - *IT*, A. DARIANI - *CA*, S. YUAN - *CA*
- B3-105 Partial Discharge Measurement by TEV and Ultrasonic Methods and their Limitations for Medium Voltage (MV) Switchgears - Experience of KAHRAMAA**  
C. BHATNAGAR - *QA*
- B3-106 Easier Short-Circuit and Switching Conditions in Bus-Node Substations**  
G. KOEPPL - *CH*, T. ASCHWANDEN - *CH*
- B3-107 Application of a fluoronitrile gas in a 123 kV GIS pilot substation**  
C. LINDNER - *CH*, D. GAUTSCHI - *CH*
- B3-108 Improved grid resilience and optimized power availability by use of fast deployable transformer and substation concepts**  
R. SZEWCZYK - *PL*, R. MAREK - *US*, J.-C. DUART - *SZ*
- B3-109 The development of a 400kV mobile substation bay for flexible transmission services**  
M. OSBORNE - *GB*, M. WALDRON - *GB*, P. JARMAN - *GB*, R. ZHANG - *GB*, D. GARDNER - *GB*
- B3-110 Determination of the main parameters of UHV AC GIL**  
G. SUN - *CN*
- B3-111 Study on application of SF6/N2 mixture insulated GIB**  
L. GAO - *CN*
- B3-112 Development of an exclusive substation of renewable Energy – Hub Substation**  
Y. YOO - *KR*, S. SONG - *KR*, G. JANG - *KR*, S. JUNG - *KR*
- B3-113 Novel distribution substation design for congested smart metro cities**  
PANKAJ SINGHAL - *IN*
- B3-114 Upgrading of EHV sub-stations for Additional Bays and Power Handling**  
RAJIL SRIVASTAVA - *IN*
- B3-115 On-site experiences of 72.5 kV Clean-air GIS for Wind-turbine On- and Offshore application**  
M. KUSCHEL - *DE*, C. BRADLER - *DE*, C. BÜTÜNER - *DE*, L. HANSEN - *DK*, A.-S. BONDE MORTENSEN - *DK*, J. GAARD - *DK*
- B3-116 The Digital Substation – Capitalize on Digitalization with Focus on this Central Element in Transmission Grids**  
E. RAUBER - *DE*, U. WEIGT - *DE*
- B3-117 New smart approach for a UI-measuring system integrated in a GIS cast resin partition (NCIT) – Design, Manufacturing, Qualification and Operational Experience**  
W. OLSZEWSKI - *DE*, F.W. GATZEN - *DE*, M. KUSCHEL - *DE*, J. TIUSANEN - *FI*, T. NAUKKARINEN - *FI*, T. VIINIKAINEN - *FI*, P. HÖYTIÄ - *FI*
- B3-118 Voltage uprating of existing Eskom high voltage substations when transient voltage stress and available withstand strength are coordinated**  
P. SCHUTTE - *ZA*
- B3-119 Prefabricated substations as a leverage for increased availability and agile expansion of high voltage grids**  
F. MAUBAN - *FR*

**B3-120 CANCELLED - TenneT's giant leap to be able to replace 140 substations within next 10 year, while in service and coming from different lay-outs**

## SC B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS

### PS2: Evolution in Substation Management

**B3-201 Developing and Using Justifiable Asset Health Indices for Tactical and Strategic Risk Management**

T. MCGRAIL - *US*, S. RHOADS - *US*, J. WHITE - *US*

**B3-202 CANCELLED - New approach for aged SF6 insulated equipment with humidity problems, reducing costs and down-time**

**B3-203 Wireless sensor units for acoustic monitoring of switching devices**

T. LAITINEN - *FI*

**B3-204 Operations and Maintenance of Offshore Transmission Assets**

C. JONES - *GB*, P. ROLLINGS - *GB*, M. LEE - *GB*, R. KASKANA - *GB*

**B3-205 Modelling Substation Control and Protection Assets Condition for Optimal Reinvestment Decision Based on Risk, Cost and Performance**

T. VU - *AU*

**B3-206 Effective Substation Earthing System Assessment – The Quest for Clean Measurements**

D. WOODHOUSE - *AU*

**B3-207 Study on the effective inspection & replacement strategy for 145KV GIS**

T.H. KIM - *KR*, J.J. KIM - *KR*, H.A. JANG - *KR*, W.Y. YUN - *KR*

**B3-208 Application of an Asset Health Management System for High-Voltage Substations**

J.R. JUNG - *KR*, H.D. SEO - *KR*, S.J. KIM - *KR*, H.S. KIM - *KR*, J.O. JOO - *KR*, S.S. RYOO - *KR*

**B3-209 Program Development for Condition evaluation, importance and risk assessment of power transformer in MEA electrical system**

S. BUAKAEW - *TH*

**B3-210 Streamlining the Decision-making Process on Tubular Rigid Busbar Selection During the Planning / Designing Stage by Utilizing 3D Substation BIM Design Software**

A. FOSKULO - *HR*

**B3-211 Smart grid substation equipment maintenance management functionality based on control centre SCADA data**

I. IVANKOVIC - *HR*, D. PEHARDA - *HR*, D. NOVOSEL - *US*, K. ZUBRINIC-KOSTOVIC - *HR*, A. KEKELJ - *HR*

**B3-212 New technologies for reducing energy consumption of 500-750 kV substation auxiliary systems**

T. RYABIN - *RU*

**B3-213 Asset Management evolution in Transelec. An approach to evolve from traditional time-based to a condition-based/predictive maintenance strategy**

S. ORTEGA - *CL*

**B3-214 Improvement in Substation Design and Construction by Application of 3D Model**

S. ICHIHARA - *JP*

**B3-215 Recent Challenges of Condition Evaluation for Substation Equipment in Japan**

M. UEDA - *JP*

**B3-216 Perspective given by 3D printing and virtual reality technologies**

F. BIQUEZ - *FR*, C. DESCOTTES - *FR*, B. ROUSSIN - *FR*, O. COUDERC - *FR*, V. GIRLANDO - *IT*

**B3-217 Return on experience on asset management implementation in High voltage switchgears**

J.L. RAYON - *FR*

- B3-218 Predictive maintenance strategy to ensure high availability and controllability of substation management platform**  
D. LAI - *TW*
- B3-219 Organization of service in the power industry (example of Federal Grid Company of Unified Energy System)**  
A. EPIFANOV - *RU*
- B3-220 CANCELLED - Practical Experiences with UHF- Partial Discharge - Monitoring Techniques applied on Gas-insulated Switchgear**

### SC B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS

#### PS3: Health, Safety, Environmental and Quality Assurance Considerations in Substations

- B3-301 Structural Integrity Assessment and Design of Switchgear Enclosures Considering Internal Arcing Conditions**  
S. W. PARK - *KR*, J. D. KIM - *KR*, H. T. LEE - *KR*
- B3-302 Environmental Awareness for High-Voltage Substation Eco-Design**  
C. WALLNER - *DE*, B. STRASSBURGER - *DE*, F. PARTHEY - *DE*, T. HAMMER - *DE*, K. KUNDE - *DE*, A. RENTSCHLER - *DE*, J. HOLZAPFEL - *AT*
- B3-303 Solution on Substation Design Considering Reduction of Environmental Impact, Fire Prevention and Safety**  
K. AOKI - *JP*
- B3-304 Ground system diagnostic in the ITAIPU Binacional's Margen Derecha Substation**  
R. CHAPARRO - *PY*
- B3-305 Problems of Information Security in Energy Object Control Systems**  
A. DENISSENKO - *UA*, Y. BONDARENKO - *UA*

### SC B4 DC SYSTEMS AND POWER ELECTRONICS

#### PS1: HVDC Systems and their Applications

- B4-101 An 800 kV HVDC bipole to reinforce a regional interconnection and integrate a large amount of variable renewable generation**  
D. CARVALHO - *BR*
- B4-102 HVDC Ground Electrodes and Tectonic Setting**  
P. FREIRE - *BR*
- B4-103 Linking DC Macrogrids to Underlying AC Systems**  
D.A. WOODFORD - *US*, L.O. BARTHOLD - *US*
- B4-104 Parallel operation of multivendor VSC-HVDC schemes feeding a large islanded offshore Oil and Gas grid**  
K. SHARIFABADI - *NO*
- B4-105 Assessment of Nordic HVDC operation and maintenance practices on reliability and availability of HVDC systems**  
T. RAUHALA - *FI*
- B4-106 Power Semiconductors for Energy Transmission**  
K. KOREMAN - *NL*
- B4-107 Innovative mitigation measures for electrostatic charge build-up on surfaces of dry-type air-core reactors for HVDC application**  
H. REISINGER - *AT*, P. GRIEBLER - *AT*, S. LANG - *DE*
- B4-108 Support of VSC-HVDC to the restoration of weakly connected systems: the Sardinia case**  
D. CIRIO - *IT*, E. CIAPESSONI - *IT*, A. PITTO - *IT*, G. GIANNUZZI - *IT*, M. MARZINOTTO - *IT*, R. ZAOTTINI - *IT*, G. GARZI - *IT*, T. MURAO - *JP*
- B4-109 Hybrid multi-terminal HVDC - LCC with VSC converter taps: A Manitoba case study**  
D. JACOBSON - *CA*

- B4-110 Application of converter transformer controlled switching in Nelson River Bipole III HVDC system**  
P. WANG - *CA*
- B4-111 Design considerations for parallel HVDC links feeding offshore platforms**  
V. PATHIRANA - *CA*
- B4-112 Single arm MMC VSC converter: a novel design for high voltage-low power terminals (taps)**  
M. MOHADDES - *CA*
- B4-113 Lessons Learnt from the BEST PATHS Project for the Integration of Offshore Wind Power Plants using Multi-Terminal HVDC Grids**  
C. UGALDE-LOO - *GB*, S. WANG - *GB*, D. ADEUYI - *GB*, N. JENKINS - *GB*, J. LIANG - *GB*, S. D'ARCO - *NO*, G. BERGNA - *NO*, M. PARKER - *GB*, S. FINNEY - *GB*, S. CEBALLOS - *ES*, M. SANTOS - *ES*, I. VIDAURRAZAGA - *ES*, A. PITTO - *IT*, D. CIRIO - *IT*, A. GATTI - *IT*, M. RAPIZZA - *IT*, E. CIAPESSONI - *IT*, J. GLASDAM - *DK*, W.Z. EL-KHATIB - *DK*, M. BARENYS - *ES*, I. AZPIRI - *ES*, A. CASTRO - *ES*
- B4-114 Need, design and business case for building the North Sea Link**  
A. CRAIG - *GB*, R. POOLE - *GB*, P. PARADINE - *GB*, O. SAGOSEN - *NO*
- B4-115 DC Grid Control Concept for Expandable Multi-terminal HVDC Transmission Systems**  
R. IRNAWAN - *DK*
- B4-116 Challenges in bringing UHVDC from  $\pm 800$  kV to higher voltages**  
D. WU - *SE*
- B4-117 A cost effective hybrid HVDC transmission system with high performance in DC line fault handling**  
M. ANDERSSON - *SE*
- B4-118 Next generation of Line and Cable fault Locator for HVDC transmissions**  
H. BJÖRKLUND - *SE*
- B4-119 Lifecycle Service for HVDC Systems**  
U. ELGQVIST - *SE*
- B4-120 Research and development of Ultra-High-Voltage VSC for the multi-terminal hybrid  $\pm 800$  kV HVDC project in China Southern Power Grid**  
H. RAO - *CN*
- B4-121 Characteristics of system and parameter design of key equipment for Zhangbei DC grid**  
G. TANG - *CN*
- B4-122 Design, erection and operational aspects of India's first indoor DC yard at Agra converter station**  
NISHANT SINGH - *IN*
- B4-123 Commissioning experience and challenges of World's first  $\pm 800$  kV HVDC Link with Dedicated Metallic Return (DMR)**  
V.P. SRIVASTAVA - *IN*
- B4-124 Transformer-less VSC-HVDC Transmission**  
GAURAV KUMAR KASAL - *IN*
- B4-125 Studies for Upcoming  $\pm 320$  kV, 2000 MW Pugalur – Trichur VSC HVDC link with  $\pm 800$  kV, 6000 MW Raigarh – Pugalur LCC HVDC link - Indian Approach**  
M. VARDIKAR - *IN*
- B4-126 Introduction of a new level of HVDC to UHVAC linked systems with respect to main component transformer technology and design**  
R. WIMMER - *DE*, R. FRITSCHKE - *DE*, T. HAMMER - *DE*, W. KUTZLEB - *DE*, K. LOPPACH - *DE*, L. ZHEONG - *CN*, Z. JIN - *CN*
- B4-127 A Novel DC Fault Blocking Concept for Full Bridge Based MMC Systems with Uninterrupted Reactive Power Supply to the AC Grid**  
P. RUFFING - *DE*, C. BRANTL - *DE*, M. STUMPE - *DE*, A. SCHNETTLER - *DE*
- B4-128 CANCELLED - Impact of the dc-network configuration and the converters types on the stability of a multi-terminal HVDC system**

- B4-129** **Kriegers Flak Combined Grid Solution – Combination of Interconnector and Wind Power Collector using a Back-to-Back and a Master Controller**  
A.- K MARTEN - *DE*, T. B. SORENSEN - *DK*
- B4-130** **Advances in DC neutral breaker performances for bipolar HVDC schemes**  
M. BACKMAN - *SE*
- B4-131** **Design Aspects of MTDC Grids with Integration of Renewable Energy Sources**  
G. BOPPARAJU - *SE*
- B4-132** **The Construction of the New Hokkaido-Honshu HVDC Link Project**  
S. SATO - *JP*
- B4-133** **The construction of the Hida-Shinano HVDC link**  
M. TAKECHI - *JP*
- B4-134** **Assessment of interoperability in multi-vendor VSC-HVDC systems: interim results of the BEST PATHS DEMO #2**  
O. DESPOUYS - *FR*
- B4-135** **Virtual capacitor for DC grid stability enhancement**  
K. SHINODA - *FR*
- B4-136** **Operating experience and ways to improve reliability of Vyborg back-to-back HVDC link (in connection with the 35th anniversary of the commissioning of the first converter unit)**  
O. SUSLOVA - *RU*
- B4-137** **A Survey of the Reliability of HVDC Systems throughout the World during 2015 – 2016**  
M.G. BENNETT - *CA*, N.S. DHALIWAL ON BEHALF OF STUDY COMMITTEE B4 - *CA*

#### SC B4 DC SYSTEMS AND POWER ELECTRONICS

##### PS2: MVDC / LVDC and Power Electronics for Distribution Systems

- B4-201** **Design of the first public distribution DC grid in The Netherlands**  
W. JAGER, *DE - NL*, P.J. BOS - *NL*, I. MELNIK - *NL*, T. BRAND - *NL*
- B4-202** **Developments in the Angle-DC project; conversion of a medium voltage AC cable and overhead line circuit to DC**  
J. YU - *GB*, A.T. MOON - *GB*, K. SMITH - *GB*, N.M. MACLEOD - *GB*
- B4-203** **Performance Evaluation of Different Modulation Strategies Applied to Modular Cascaded Multilevel Inverter based Shunt Hybrid Active Power Filter**  
T. DEMIRDELEN - *TR*, M. TUMAY - *TR*, R.I. KAYAALP - *TR*

#### SC B4 DC SYSTEMS AND POWER ELECTRONICS

##### PS3: FACTS

- B4-301** **Refurbishment Strategies for Conventional SVC Stations Utilizing Modern Control Cooling and Thyristor Valves and Selective Main Circuit Replacements**  
M.A. REYNOLDS - *US*, B.C. FURUMASU - *US*, A. LAUGHLIN - *US*, R. THORTON - *US*, R. BROBERG - *SE*, A. SAMADI - *SE*
- B4-302** **Upgrading of three SVCs in Norway. What is the best action to take for aging SVCs?**  
E.N. ABILDGAARD - *NO*
- B4-303** **CANCELLED - Hybrid STATCOM with 3-winding transformer - a novel concept for transient control and harmonic impedance optimization**
- B4-304** **CANCELLED - The World's Largest SVCs Deliver Voltage Stability and Load Balancing for the Saudi Power Grid at High Speed Railway Feeder Stations**

- B4-305 Power Semiconductor Technology Advancements for Enabling Next Generation Grid Systems**  
M. RAHIMO - *CH*, J. VOBECKY - *CH*, F. DUGAL - *CH*, A. KOPTA - *CH*, T. WIKSTRÖM - *CH*, A. HÄMMERLI - *CH*
- B4-306 Essex STATCOM upgrade - Engineering, testing and commissioning**  
J. BURROUGHS - *CA*
- B4-307 Development and Design of  $\pm 100$ Mvar MMC STATCOM at NP Kunta substation in India**  
J.S. PARK - *KR*, J.S. KIM - *KR*, D.G LEE - *KR*, J.Y. CHOI - *KR*, H.J. YANG - *KR*, W.P. SONG - *KR*
- B4-308 Operation experience of back-to-back HVDC station based on voltage source converters for interconnection of non-synchronous power systems with significant voltage distortion**  
A. DROZDOV - *RU*

## SC B5 PROTECTION AND AUTOMATION

### PS1: Protection under System Emergency Conditions

- B5-101 Power Swing Blocking and Tripping - Brazilian Study Case**  
R. FERNANDES - *BR*
- B5-102 IEC 61850 R-GOOSE Applications to Load-Shedding Under System Emergency Conditions**  
A.P. APOSTOLOV - *US*
- B5-103 Developing a Unified Protection System: Philosophy, Short Circuit Software, and Wide Area Protection Coordination Study**  
S. ALAEDDINI - *US*, D. NOVOSEL - *US*, M. AL-TUKHAIFI - *SA*, S. BAMASAK - *SA*, M.T. AL-SABA - *SA*, H.S. BIN MASHINI - *SA*, D.G. HART - *US*, A. GOPALAKRISHNAN - *US*, M. MALKI - *US*, I. ANAND - *US*, J. VELEZ - *US*, P. MCGUIRE - *US*, D.B. COLEMAN - *US*, S. AQUILES-PEREZ - *US*, Z. SCHREINER - *DE*
- B5-104 Case Study In Jordan For Operation Of Frequency Relays In Load Shedding Schemes And Comparison Between The Frequency Rate Of Change Settings And The Threshold Settings**  
M. DAOUD - *JO*
- B5-105 New Single-Ended Earthfault Distance Estimation for the 110-kV- and 20-kV-Compensated Network**  
G. DRUML - *AT*, G. ACHLEITNER - *AT*, W. LEITNER - *AT*, L. FICKERT - *AT*
- B5-106 Investigation of novel directional protection techniques based on current only**  
A. MAGDY - *EG*
- B5-107 Investigation of Measurement Errors Effect on Fault Location Reliability for Parallel Distribution Feeders**  
E. ISMAIL - *EG*
- B5-108 Power Oscillations and Generator Protection Issues**  
F. BALASIU - *RO*
- B5-109 Innovative network response-based special protection scheme for imminent loss of synchronism detection with surge arrester protection and energy monitoring functions**  
M. PERRON - *CA*
- B5-110 30 Years on: A look at Dinorwig Pole Slip Protection**  
C. KEMP - *GB*, J. PECHEY - *GB*, U. HUANG - *GB*
- B5-111 A study on under-frequency load shedding scheme considering the coordination with system splitting and over-frequency generator tripping**  
X. XU - *CN*
- B5-112 Development of a New Under Frequency Load Shedding Scheme for Jeju Island Power System**  
S. KANG - *KR*, S. AHN - *KR*, S. BYUN - *KR*, Y. LYU - *KR*
- B5-113 System Separation Scheme for Southern Regional Grid in India**  
T. MUTHUKUMAR - *IN*
- B5-114 Indian Operational Experience Of Under Excitation Limiters In Coordination With Under Excitation Protection**  
B. VENKATESWARA RAO - *IN*
- B5-115 CANCELLED - Implementation and Operational Experience of a Special Protection Scheme on SCADA/EMS with Controller Box based on FPGA**



- B5-116 The application of let-through energy protection to the main and back-up protection elements on high voltage overhead feeders**  
M. SLABBERT - *ZA*
- B5-117 Transmission network angle stability protection based on synchrophasor data in control centre**  
I. IVANKOVIC - *HR*, V. TERZIJA - *GB*, S. SKOK - *HR*
- B5-118 A Tool for Simulation, Analysis and Design of Underfrequency Load-Shedding (UFLS) Schemes of Isolated Power Systems**  
L. SIGRIST - *ES*, I. EGIDO - *ES*, L. ROUCO - *ES*, A. RODRÍGUEZ - *ES*, C. CASTRO - *ES*, J. RUPÉREZ - *ES*, S. MARÍN - *ES*
- B5-119 Application experience of emergency automatics in UPS of Russian Federation**  
A. ZHUKOV - *RU*
- B5-120 EDP Distribuição Experience in Islanded Energy Storage System Operation**  
A. NEVES - *PT*, B. ALMEIDA - *PT*, M. LOURO - *PT*, J. M. TERRAS - *PT*, J. FERREIRA PINTO - *PT*, J. M. DAMASIO - *PT*, J. SANTANA - *PT*, S. PINTO - *PT*
- B5-121 Application of Stabilization System for Electric Power Network Emergency**  
M. YAMAZAKI - *JP*
- B5-122 Upgrade's impact on Protection & Automation schemes under Emergency conditions : Case study of Gibraltar Electric Authority's power distribution system**  
B. ANDRE - *FR*, T. FA - *GI*, Y-E. BOUFFARD-VERCELLI - *FR*
- B5-123 Detection principles of oscillation of power system electrical mode parameters and their application for power systems control tasks**  
A. ZHUKOV - *RU*
- B5-124 Efficient procurement of extended reserves (AUFLS) with high penetration of distributed generation: Changes for AUFLS scheme in New Zealand**  
N. NAIR - *NZ*

## SC B5 PROTECTION AND AUTOMATION

### PS2: User Experience and Current Practice with IEC61850 Process Bus

- B5-201 Implementation of Digital Substation Automation Systems in Brazil - Challenges and Findings**  
M. PAULINO - *BR*
- B5-202 Functional Testing of Digital Substations Based on IEC 61850 Process Bus**  
A. APOSTOLOV - *US*
- B5-203 Experience with process bus in Statnett R&D project Digital substation**  
R.S.J. LØKEN - *NO*
- B5-204 Digitalization in Power Distribution Systems: the Kalasatama Smart Grid Project**  
M. LOUKKALAHTI - *FI*
- B5-205 Numerical Relay Testing and Validation in Relay Life Cycle**  
S. PATKI - *IN*
- B5-206 Design of multi-vendor bay solutions and their interoperability performance assessments in a fully digital substation**  
H. LI - *GB*, L. CHEN - *GB*, T. CHARTON - *GB*, R. ZHANG - *GB*, B. PENG - *GB*, P. NEWMAN - *GB*, D. GEACH - *GB*, C. POPESCU-CIRSTUCESCU - *GB*, C. DORMER - *GB*
- B5-207 FITNESS Multi-Vendor Interoperability in Digital Substations**  
P. NEWMAN - *GB*, C. POPESCU - *GB*, P. MOHAPATRA - *GB*, H. QIN - *GB*, P. BALASUBRAMANI - *GB*, C. PATTERSON - *GB*, M. WEHINGER - *GB*, A. ABDULLA - *GB*
- B5-208 Laboratorial assessment and scalability analysis of protection and automation functions supported by a smart substation process bus network**  
B. SOARES - *PT*, A. SANTOS - *PT*, R. CARTAXO - *PT*, W. YANG - *PT*
- B5-209 Practice on reliability and efficiency improvement of process level engineering and operation**  
S. HU - *CN*

- B5-210 Development of Sampled Values Generation Device for Testing Process Bus-Based Busbar Protection IEDs**  
S. Y. MOON - *KR*, K. H. NHO - *KR*
- B5-211 Operational Experience of IEC 61850 Process Bus Systems Deployed in POWERGRID, India**  
B. N. DE BHOWMICK - *IN*
- B5-212 Under-frequency Load Shedding Scheme in Thailand**  
K. NARONG - *TH*
- B5-213 Design, Concept, Commissioning, Maintenance, Cyber Security of a IEC61850 Process Bus Brown Field Application**  
S. FLEMMING - *DE*, H. ENGLERT - *DE*, C. BISALE - *DE*, C. RUFF - *CA*, A. RUDD - *CA*
- B5-214 Process bus interoperability under IEC 61869-9 + differential protection (87L) scheme with one conventional end**  
P. ALBI - *ES*, J.C. SÁNCHEZ - *ES*, C. RODRÍGUEZ - *ES*, A. FERNÁNDEZ - *ES*, D. RAMOS - *ES*, A. CABALLERO - *ES*, J. ROMÁN - *ES*, J. CÁRDENAS - *ES*, A. SÁNCHEZ - *ES*, J.M. PARRA - *ES*, R. VÉLEZ - *ES*
- B5-215 Experience Feedback of Testing and Commissioning of a fully Digital IEC 61850 based PACS**  
V. LEITLOFF - *FR*
- B5-216 Experience of implementation, testing and operation of electronic instrument transformers, merging unit devices, power-system protection and automation devices realizing IEC 61850 process bus for the generator-transformer unit of Nizhegorodskaya HPP**  
D. ZHUKOV - *RU*
- B5-217 IEC 61850 Standard-Based Integrated Tests and Certification of Secondary Switching Equipment on the Digital Substation Testing Field of R&DC FGC UES JSC**  
V. ALEKSEYEV - *RU*

## SC C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS

### PS1: Expanding Role of Social Factors and Transparency in Transmission Investment Decision Approaches

- C1-101 Multiple criteria data envelopment analysis for ranking of investments in transmission systems**  
H. REIS - *BR*
- C1-102 Project portfolio management for a transmission investment portfolio**  
G WESTERBERG - *NO*
- C1-103 Assessing the impact of transmission investments on the Italian Ancillary Services Market using MODIS simulator**  
M. STABILE - *IT*, B. COVA - *IT*, S. OSTI - *IT*, A. VENTURINI - *IT*, E.M. CARLINI - *IT*, P. CAPURSO - *IT*, C. GADALETA - *IT*
- C1-104 Trends in Transmission Planning Uncertainty and the Impacts and Value of Leveraging Flexible Investment Strategies and Technologies**  
M. LONGORIA - *US*, T. BLOCH-RUBIN - *US*, J. ERWIN - *US*, E. FAN - *US*, A. MARTIN - *US*, T. NUDELL - *US*
- C1-105 Flow Based Transmission Capacity Calculations for Investment Analyses - a Novel Approach for Network Development**  
S. GRAAFF, DE - *NL*
- C1-106 A bottom-up approach for the development of Qatar long term load forecast**  
A.A. AL-MAHMOUD - *QA*
- C1-107 Optimisation of the Burkina Faso electricity mix at the 2030 horizon**  
P. HENNEAUX - *BE*
- C1-108 The Mediterranean Master Plan**  
C. SABELLI - *IT*, A. FERRANTE - *IT*, E. BUE' - *FR*, M. PAUN - *IT*
- C1-109 Planning process of Polish transmission grid under non-deterministic conditions**  
W. LUBICKI - *PL*, M. PRZYGRODZKI - *PL*
- C1-110 Managing Future Uncertainties in the Ireland Power System through the Implementation of Scenario Planning**  
N. CUNNIFFE - *IE*
- C1-111 Transpower's Transmission Asset Investment Approach and Methodology for Waikato and Upper North Island**  
S. TING - *AU*

**C1-112 Paradigm Shift in Transmission Planning and Regulatory Changes approved in Chile in 2016**  
I. SAAVEDRA - *CL*

**C1-113 Stakeholder participation in the development of the electricity grid: the INSPIRE-Grid project**  
S. MARAN - *IT*, J. HILDEBRAND - *DE*, L. SPÄTH - *CH*, A. LUE' - *IT*, A. CEGLARZ - *DE*

#### **SC C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS**

##### **PS2: Impact of Changing External Factors on Asset Management**

**C1-201 On Developing Automated Tools for Reliability Planning**  
T. NUDELL - *US*, J. YU - *US*, E. FAN - *US*, A. MARTIN - *US*

**C1-202 Managing Uncertainty in the Power Flow Studies of South Australian Transmission Network**  
M. CRNKOVIC - *AU*

**C1-203 Strategic Planning of the Egyptian Transmission System under a strong Increase of the Installed Generation Capacity**  
K. ABD-EL-KAREEM - *EG*

**C1-204 Using modular power flow control elements to improve transfer capability, reduce constraints on renewable generation, and alleviate congestion**  
B. PARKER - *AU*

**C1-205 Valuation approaches to risk in asset management in Australia**  
G. ANCELL - *AU*

**C1-206 Experiences and procedures in dealing with typhoon situation to coal-fired power plant**  
U. JITTAMAI - *TH*

**C1-207 Efficient Facility Renovation Using Asset Information**  
M. TANIGUCHI - *JP*

**C1-208 Optimization of maintenance and renewal strategies for towers in France**  
P. STEVENIN - *FR*

#### **SC C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS**

##### **PS3: Coordinated Planning between Grid Operators across all Voltage Levels**

**C1-301 Managing risk: recommendations for new methods in system development planning**  
K. BELL - *GB*, J. SPROOTEN - *BE*, A. VERGNOL - *BE*, W. BUKHSH - *GB*

**C1-302 Converting Regional EHV AC Transmission to HVDC**  
B. MEHRABAN - *US*, R. ADAPA - *US*, F. GOMEZ - *CA*, D. WOODFORD - *CA*, C. LOCKWOOD - *US*, N. KOEHLER - *US*

**C1-303 Improving the Electric Interconnection between the Grids of Mexico and United States by using HVDC Systems**  
R. CASTELLANOS - *MX*, M. RAMIREZ - *MX*, O. MICHELOUD - *MX*

**C1-304 Planning a meshed HVDC offshore grid in the North Seas**  
P. HENNEAUX - *BE*

**C1-305 Research on African transcontinental power grid interconnection planning for large-scale clean energy integration and transmission**  
Z. LIU - *CN*

**C1-306 Integration of Large Scale Renewable through Co-ordinate System Planning in India**  
SUBIR SEN - *IN*

**C1-307 Connecting South Asia with HVDC**  
J. WASBORG - *SE*

**C1-308 Application of PTDF methodology to exchange capacity calculation and contingency analysis**  
R. LÓPEZ - *ES*, M. ESCRIBANO - *ES*, F. GUY - *FR*, P. LABRA - *ES*

- C1-309 Impact of Adriatic submarine HVDC cables to South East European Electricity Market Perspectives**  
G. MAJSTROVIC - HR
- C1-310 Enhanced Transmission Expansion Planning Strategy with Penetration of Renewable Energy Resources for Egyptian Grids**  
R. A. EL-SEHIEMY - EG, F. M. BENDARY - EG, H. M. MAHMOUD - EG, A. ATEF - EG
- C1-311 Transitional Refinements in Point of Connection Transmission Pricing Implementation Pan India**  
G. CHAKRABORTY - IN
- C1-312 TCSC Application to Increase Transmission Capacity and Ensure SSR Mitigation in Korea Power Grid**  
J. CHOI - KR, B. MOON - KR, H. KIM - KR, E. KWAK - KR, C. LEE - KR
- C1-313 Dealing with conflicts between DSO and TSOs in procuring ancillary services**  
G. MCFADZEAN - GB, S. HAY - GB, C. HIGGINS - GB
- C1-314 Coordinated Planning of ENWL Distribution Network and NG Transmission Network in Cumbria area for the Moorside Project**  
X. ZHANG - GB, A. OLIVER - GB, C. BURLOIU - GB, I. POVEY - GB
- C1-315 Coordinated TSO and DSO network development plan on the islands of Cres and Lošinj**  
V. KOMEN - HR
- C1-316 International Experiences on Subtransmission Network Planning and Delivery: A proposal for Chile**  
R. MELLADO - CL
- C1-317 Optimal Asset Planning based on Actual Demand Trend**  
H. YAMAMOTO - JP

## SC C2 POWER SYSTEM OPERATION AND CONTROL

### PS1: Ensuring Operating Reliability

- C2-101 Future of EMS for short-term system studies and real time operation : Anticipating the safety of the power grid**  
N. OMONT - FR
- C2-102 Soria-Chira Pump Storage Power Plant: A new tool for the System Operator to achieve large Renewable Energy Sources integration in the isolated electric system of Gran Canaria**  
P. SANTOS - ES, A. ÁLVAREZ - ES, C. LONGÁS - ES, V.J. HERNÁNDEZ - ES, A. ZAPICO - ES
- C2-103 Control Center Tools for Power System Restoration with High Shares of Volatile Generation**  
W. H. WELLSSOW - DE, M. OSTERMANN - DE, P. HINKEL - DE, D. RAOOFSHEIBANI - DE, J. VANZETTA - DE, C. SCHNEIDERS - DE, A. DICK - DE, F. REYER - DE
- C2-104 Brazilian Interconnected Power System – Criteria and Actions to Improve the Restoration Process**  
A. GUARINI - BR
- C2-105 Field test results of an Italian 380 kV top-down Restoration strategy from neighboring power systems supplying very long restoration path**  
R. ZAOTTINI - IT, F. BASSI - IT, T. BAFFA SCIROCCO - IT, G. BRUNO - IT, L. CACIOLLI - IT, M. DI SALVATORE - IT, G. GIANNUZZI - IT, C. PISANI - IT, G. PASINI - IT, S. FEDELI - IT
- C2-106 Role of regional Security Coordinators in a changing world**  
D. KLAAR - NL
- C2-107 The Role of Fast Frequency Response in Low Inertia Power Systems**  
D. STENCLIK - US, M. RICHWINE - US, N. MILLER - US, L. HONG - US
- C2-108 Dynamic Response Analysis of Frequency Control Function in GCCIA HVDC Converter**  
H. ALZHRANI - SA
- C2-109 Assessment of technologies to limit the rate of change of grid frequency on an island system with low inertia**  
B. O'CONNELL - IE
- C2-110 Estimate Instantaneous Reserves Requirements in the Eskom Control Area**  
N. GUMEDE - ZA

- C2-111 Thermal Energy Storage Contribution to the Flexibility and Economic Operation of an Island Power System**  
P. ROMANOS - *GR*, G. TAKIS - *GR*, E. VOUMVOULAKIS - *GR*, G. TSOURAKIS - *GR*, N. HATZIARGYRIOU - *GR*
- C2-112 Demonstration projects for providing ancillary services using different three types of large-scale battery systems**  
K. SHINYA - *JP*
- C2-113 RES participation in ancillary services in Spain**  
M. SÁNCHEZ - *ES*, A. GIL - *ES*, G. GARCÍA - *ES*, M. DE LA TORRE - *ES*, J. BOLA - *ES*
- C2-114 Active and Reactive Power Provision across the TSO – DSO Boundary**  
M. POWER - *IE*, E. LANNOYE - *IE*, S. POWER - *IE*
- C2-115 Demonstration of new solutions for provision of ancillary services: Frequency and voltage control**  
R. PESTANA - *PT*, J. ESTEVES - *PT*, D. JIANG - *PT*, N. PINHO DA SILVA - *PT*
- C2-116 Transmission and Distribution System Voltage Control Impact due Large-Scale Solar Photovoltaic Generation**  
H. VALGAS - *BR*
- C2-117 Voltage collapse assessment of the Lufubu – Kasama 330kV planned overhead line and power transfer capacity on the Zambia – Tanzania cross-border corridor**  
S. GALANTINO - *IT*, I. COLUCCI - *IT*, A.S. NYIRENDA - *ZM*
- C2-118 New generator voltage control at Hydro-Québec to increase transmission robustness**  
J. PRÉVOST - *CA*
- C2-119 The impact of the uncoordinated local control of decentralized generation on the reactive power margin**  
C. SCHIRMER - *AT*, A. ILO - *AT*
- C2-120 CANCELLED - Harvesting Reactive Power from Distributed Generation to Support Transmission Network**
- C2-121 Automating the Dispatch of Reactive Power in Australia**  
S. BOROCZKY - *AU*
- C2-122 Exploiting the capabilities of reactive power generation and absorption of Wind generators for better power system operation – Indian approach**  
N.S. RAO - *IN*
- C2-123 Icelandic Operational Experience of Synchrophasor-based Fast Frequency Response and Islanding Defence**  
D. WILSON - *IS*
- C2-124 Introducing PMU-based Applications in the Control Room Setting**  
D. KARLSEN - *NO*
- C2-125 WAMs Analytics For Large Indian Grid**  
VINEETA AGARWAL - *IN*
- C2-126 Future approach to mitigate Inter-Area Oscillations in GCC Combined System**  
N. AL-SHAHRANI - *SA*
- C2-127 Implementation of a wide area monitoring system in “Sistema Argentino de Interconexion”**  
J. CHINCUINI - *AR*
- C2-128 Study on the oscillation issues and damping method of weak grid integration of large-scale wind power**  
Y. CHI - *CN*
- C2-129 CANCELLED - Identification and prevention of rotor-angle stability limitations of power transfer corridors**
- C2-130 Power System Operational Planning using ESS to ensure Transient Stability in the eastern area of Korea**  
T.O. KIM - *KR*, B.S. MOON - *KR*, H.G. KIM - *KR*, J.A. KIM - *KR*, G.H. KIM - *KR*, Y.G. HA - *KR*, H.C. SONG - *KR*, H.P. BANG - *KR*
- C2-131 Stability and interaction analysis in islanded power systems including VSC-HVDC and LCC-HVDC power converters**  
C. COLLADOS-RODRÍGUEZ - *ES*, M. CHEAH-MAÑÉ - *ES*, E. PRIETO-ARAUJO - *ES*, R. FERRER-SAN-JOSÉ - *ES*, E. SÁNCHEZ-SÁNCHEZ - *ES*, O. GOMIS-BELLMUNT - *ES*, S. SANZ - *ES*, C. LONGÁS - *ES*, A. CORDÓN - *ES*, L. CORONADO - *ES*

- C2-132 Vulnerability analysis of HVDC contingencies in the Nordic power system**  
I.B. SPERSTAD - *NO*
- C2-133 Efficient Day Ahead Calculation of the Operating Reliability in Isolated Power Systems with Interconnection Links**  
E. THALASSINAKIS - *GR*, K. SIDERAKIS - *GR*, E. DIALYNAS - *GR*
- C2-134 Coordinated control with improved observability for network congestion management in medium-voltage distribution grid**  
N. KARTHIKEYAN - *DK*
- C2-135 Use of Power Flow Controllers to Enhance Transmission Network Utilisation on the Irish Transmission Network**  
A. SOROUDI - *IE*

## SC C2 POWER SYSTEM OPERATION AND CONTROL

### PS2: BIG DATA and their Use for System Operations

- C2-201 Flexible balancing power services within four control zones, using e-trading platform – Future Flow project**  
D. ILISIU - *RO*
- C2-202 Providing ancillary services from distribution grids under the usage of distributed renewable generation: Results from a field test**  
S. WENDE-VON BERG - *DE*, B. REQUARDT - *DE*, J. DOBSCHINSKI - *DE*, M. BRAUN - *DE*, J. BUHR - *DE*, H. HÄNCHEN - *DE*, J. SCHWEDLER - *DE*, A. K. MARTEN - *DE*, T. WAGNER - *DE*, U. SCHMIDT - *DE*, N. BORNHORST - *DE*, M. KREUTZIGER - *DE*, J. GÖTZ - *DE*
- C2-203 New primary reserve requirements in the Nordic synchronous area – Designing the disturbance reserve**  
M. KUIVANIEMI - *FI*
- C2-204 A Dynamic Multi-Variate Approach to the Management of Power System Inertia**  
B. SIBEKO - *ZA*
- C2-205 A Data-driven Tool for Primary Frequency Regulation Evaluation**
- C2-206 Cloud-based Data Exchange Infrastructure for Wide Area Monitoring of Bulk Electric Power Grids**  
A. BOSE - *US*, D. ANDERSON - *US*, S. SAHASRABUDDHE - *US*, C. HAUSER - *US*, E. LITVINOV - *US*, X. LUO - *US*, F. ZHANG - *US*, T. GKOUNTOUVAS - *US*, W. SONG - *US*, Y. LIAO - *US*, K. BIRMAN - *US*, A. DARVISHI - *US*, G. STEFOPOULOS - *US*, A. ETTLINGER - *US*
- C2-207 Application of Advances in Wide Area Monitoring to Address the Challenges from an Evolving Power System**  
S. CLARK - *GB*, D.H. WILSON - *GB*, O. BAGLEYBTER - *GB*, K. HAY - *GB*, P. MOHAPATRA - *GB*, F. MACLEOD - *GB*, C. HALLIDAY - *GB*, M. OSBORNE - *GB*, P. ASHTON - *GB*, P. WALL - *GB*, V. TERZIJA - *GB*
- C2-208 Monitoring and decision support systems as the means for improving the efficiency of managing the electrical power regime of power systems**  
V. DIYACHKOV - *RU*
- C2-209 TSO-DSO data exchange : the ongoing French project between RTE and Enedis**  
O. ARNAUD - *FR*
- C2-210 Improvement in Estimation Accuracy for Current and Short-Term Future Photovoltaic Generation Output through Big Data Analysis Using Smart Meters**  
T. KAWAKAMI - *JP*
- C2-211 Regulating the Information of New Generation Power Dispatch System in Taiwan**  
J.D. LEE - *TW*, C.H. LIU - *TW*
- C2-212 Smarter asset management with big data**  
M. ISTAD - *NO*

## SC C3 POWER SYSTEM ENVIRONMENTAL PERFORMANCE

### PS1: Effectiveness on Environmental Prevention, Mitigation and Compensation Measures

- C3-101 Measuring Effectiveness of Environmental Measures**  
R. FURTADO - *BR*

- C3-102 Risk Assessment and Mitigation of Fish Death at Brazilian Hydropower Plants**  
R. LOURES - *BR*
- C3-103 Use of avian radar as a method to study the effect of bird flight diverters**  
F.B. JOHANSEN - *NO*
- C3-104 Assessing the effectiveness of wire marking to reduce bird collisions: A critical evaluation of current practices and priorities for scientific research**  
P. FERNANDES - *PT*, F. MOREIRA - *PT*, C. SAINT-SIMON - *PT*, F. PARADA - *PT*, M. HALL - *PT*, R. MARTINS - *PT*, J. BERNARDINO - *PT*
- C3-105 Application Study of High Permeability Metal Magnetic Material For the Magnetic Field Shielding Underground Cable**  
I. H. CHO - *KR*, H. S. AN - *KR*, Y. S. LIM - *KR*, B. W. LEE - *KR*
- C3-106 Research on electric heating system plan in northern region in winter based on emission reduction and existing heating costs**  
F. LIN - *CN*
- C3-107 Effectiveness of markers for bird protection (bird flight diverter fittings) on an overhead powerline in the national park “Lower Oder Valley” – Minimisation of the risk of collision by markers for bird protection**  
K. HORENK - *DE*, E. BRENNENSTUHL - *DE*, B. KALZ - *DE*, R. KNERR - *DE*
- C3-108 Technological Solutions & Compensation Measures for Right of Way Constraints in Construction of Large Network of Overhead Transmission Lines – Indian Experience**  
ANISH ANAND - *IN*
- C3-109 Magnetic Field Meter Lending Service and Influence on Risk Perception of EMF**  
Y. YAMATO - *JP*
- C3-110 Ecological and occupational electromagnetic safety of power grid facilities improvement**  
N. RUBTSOVA - *RU*
- C3-111 Solving the Environmental Electromagnetic Safety Issues in 110–500 kV AC Cable Power Lines**  
A. ABDURAKHMANOV - *RU*

#### SC C3 POWER SYSTEM ENVIRONMENTAL PERFORMANCE

##### PS2: Mitigation of the Visual Impacts of Electrical Assets to Increase Public Acceptance

- C3-201 Reducing visual impact of power lines in Norway - 20 years of experience**  
L.V. HAMMER - *NO*
- C3-202 How does visual impact influence the public acceptance of overhead lines and other national infrastructures**  
S. BERG, VAN DEN - *NL*
- C3-203 Virtual Reality models as a tool to present visual impacts of transmission lines**  
E.T. HOIFF - *NO*
- C3-204 Methodology for Landscape Analysis in Environmental Impact Studies**  
R. SAN MILLÁN - *ES*, L. MORO - *ES*, R. ARRANZ - *ES*, J. REQUEJO - *ES*
- C3-205 CANCELLED - Optimisation of OHL with respect to Costs and Public Acceptance**
- C3-206 New innovative tower types for urban areas. Technical challenges and public acceptance**  
R. JONSSON - *NO*
- C3-207 Development of Eco-friendly Electric Transmission Tower in Korea**  
W. K. LEE - *KR*, C. H. YUN - *KR*, S.B. SHIN - *KR*, D. Y. CHUNG - *KR*, G. H. SHIN - *KR*

#### SC C3 POWER SYSTEM ENVIRONMENTAL PERFORMANCE

##### PS3: JOIN PS with B2 Technical and Environmental Aspects of OHL

- C3-301 Environmental visual harmony measures of transmission installation and effects on social acceptance**  
Y. SUGIMOTO Y. SUGIMOTO - *JP*

- C3-302 Comparative life cycle assessment of an environmentally friendly 145 kV gas insulated substation**  
D. GAUTSCHI - *CH*, R. LÜSCHER - *CH*, Y. KIEFFEL - *CH*, I. HUET - *CH*, E. LARUELLE - *CH*
- C3-303 Geomagnetically Induced Currents Modelling and Monitoring Transformer Neutral Currents in Austria**  
T. HALBEDL - *AT*, H. RENNER - *AT*, G. ACHLEITNER - *AT*
- C3-304 CANCELLED - The use of LIDAR technology for vegetation management**
- C3-305 The citizens and local authorities views on actions taken to enhance public acceptance of a 380kV grid extension project**  
J. MENTENS - *BE*
- C3-306 Ciclo VEGETA. Optimum management of vegetation treatment cycles at REE**  
J.M. ÁVILA - *ES*, L.F. ALVARADO - *ES*, E. NOGUEROLES - *ES*

#### SC C4 POWER SYSTEM TECHNICAL PERFORMANCE

##### PS1: System Technical Performance Issues Focusing on the Effects of High Level Integration of Power Electronics Based Technologies

- C4-101 The Difficulties Faced in the Filters Design versus the Low Harmonic Voltages Generated by Wind Farms**  
M. CARLI - *BR*
- C4-102 On Steady-State Voltage Standards with High-Penetration of Distributed Energy Resources**  
J. PEPPANEN - *US*, J.A. TAYLOR - *US*
- C4-103 Zero-sequence currents in the high voltage grid in the Netherlands**  
S. NAUTA - *NL*
- C4-104 Measurement and analysis of harmonic data to assess the impact of installations connected to high voltage systems**  
F. ERP, VAN - *NL*
- C4-105 Investigation of processes during single-phase auto reclosing on transmission lines with controlled shunt reactors**  
G. AMICO - *AR*
- C4-106 Updating reactive power compensation calculation required at Bader converter station in view of generation capabilities expected to be in service**  
G. ABD EL-RAHEEM - *EG*
- C4-107 Improvement of Power System Harmonics Level Generated from the Electric Arc Furnaces EAF to the Acceptable Level by Using Shunt Passive Filters**  
E. F. SHAROUDA - *EG*, H.M. MAHMOUD - *EG*
- C4-108 Harmonic Responsibilities Determination at the Point of Common Coupling**  
O. F. FADL - *EG*, A. A. EISA - *EG*, A. S. ADAIL - *EG*, E. A. OSMAN - *EG*
- C4-109 Power Quality Monitoring as a Valuable Tool for Assessing System Technical Performance**  
C. STANESCU - *RO*
- C4-110 Technical challenges associated with the integration of long HVAC cables and inverter based renewable generation in weak transmission networks: the Irish experience**  
M. VAL ESCUDERO - *IE*
- C4-111 International Comparison of Harmonic Assessment Approaches and Implications**  
Z. EMIN - *GB*, D.O. BRASIL - *BR*, C. BUCHHAGEN - *DE*, C.F. JENSEN - *DK*, L. SOTO CANO - *ES*, M. VAL ESCUDERO - *IE*
- C4-112 Inverter Dominated UK Grid**  
S. KARAMITSOS - *GB*, A. CANELHAS - *GB*, M. BAZARGAN - *GB*, R. IERNA - *GB*, B. MARSHALL - *GB*, S. KELLY - *GB*
- C4-113 Investigation into the transmission system modelling for the effective assessment of voltage unbalance due to AC railway operation. Evaluation using on-site Measurement data**  
A. TAMATOPOULOS - *DK*



- C4-114 Power quality analysis and IEC standard evaluation using measurements and simulations in a STATCOM application**  
J. HASLER - *SE*
- C4-115 Application of Fast Frequency Response (FFR) to improve Primary Frequency Control (PFC) in Tasmania**  
M. PIEKUTOWSKI - *AU*
- C4-116 Cost effective EMC/EMI management for transmission and distribution substation control buildings**  
A. MAHARAJ - *AU*
- C4-117 Minimum system strength for secure operation of large-scale power systems with high penetration of non-synchronous generation**  
B. BADRZADEH - *AU*
- C4-118 Battery Storage for Enhancing the Performance of Transmission Grids**  
N. PAHALAWATHTHA - *AU*
- C4-119 Risk Assessment and Reserve Requirements for Power Systems with High Wind Power Penetration**  
M. NEGNEVITSKY - *AU*
- C4-120 Novel mechanism explanation and mitigation study of SSR in DFIG based on separate stator and rotor torque analysis**  
X. DONG - *CN*
- C4-121 Determination of Wind Farm Performance**  
G. BUMROONGGIT - *TH*
- C4-122 Power Quality Monitoring in Power Grids focusing on Accuracy of High Frequency Harmonics**  
S. TENBOHLEN - *DE*, C. KATTMANN - *DE*, T. BRÜGGER - *CH*, M. SIEGEL - *DE*, M. KONERMANN - *DE*, E. JUNGE - *DE*, J. CHRISTIAN - *DE*
- C4-123 CANCELLED - Technical performance investigation of Thai power system**
- C4-124 Utilizing Advanced Resiliency Planning within the Electrical Sector**  
M. VAN HARTE - *ZA*
- C4-125 The Application of Series Compensation to the existing Scottish 400 kV Transmission System**  
R. ADOBES - *ES*, C. MCTAGGART - *GB*, D. ADAM - *GB*, C. BROZIO - *GB*, J. STOKOE - *GB*
- C4-126 Intermittent voltage unbalance and its impact on large power asynchronous motor operating modes**  
M. SILAEV - *RU*
- C4-127 Assessment of the impact of power electronic devices on harmonic levels in transmission networks**  
I. PAPIĆ - *SI*, A. BOZICEK - *SI*, B. BLAZIĆ - *SI*

#### SC C4 POWER SYSTEM TECHNICAL PERFORMANCE

#### PS2: Developments and Advances in Modelling and Evaluation of Lightning Performance and Insulation Coordination

- C4-201 Development of outdoor insulation pollution maps for IEC Power Grid**  
E. VOLPOV - *IL*
- C4-202 Optimal Placement of Line Surge Arresters Based on Predictive Risk Framework Using Spatiotemporally Correlated Big Data**  
M. KEZUNOVIC - *US*, T. DOKIĆ - *US*, R. SAID - *US*
- C4-203 Merits and Challenges of a Differentiating-Integrating Measurement Methodology with Air Capacitors for High-Frequency Transients**  
F. BARAKOU - *NL*
- C4-204 Application of C-type Harmonic Filters as Remedial Measure Against Temporary Overvoltages in Transmission Systems due to Harmonic Resonances**  
K. VELITSIKAKIS - *NL*
- C4-205 Voltage transient measurements using electric field sensors and ATP modelling of A 500 kV GIS station**  
R. BIANCHI - *AR*

- C4-206 A simplified approach for use of a lightning attachment model to assess exposure of EHV and UHV lines to direct strikes**  
F. RIZK - *CA*
- C4-207 Shield wire or not – experiences from the Swedish 130 kV grid**  
P. NORBERG - *SE*, T. INGMARSON - *SE*, J. STELIN - *SE*
- C4-208 Field measurement of lightning transient voltage in substations using optical electric field sensors**  
S. XIE - *CN*
- C4-209 Analysis of Lightning Performance for 154/345 kV Transmission Lines with Externally Gapped Line Arrester(EGLA) in South Korea**  
J.W. WOO - *KR*, J.S. KWAK - *KR*, T.G. KIM - *KR*, J. KOO - *KR*
- C4-210 A novel approach to statistical analysis of slow front overvoltages in HVDC converter stations**  
A. BILOCK - *SE*
- C4-211 Ferroresonance in Inductive Voltage Transformers or Power Voltage Transformers: analysis, laboratory tests and solutions**  
A. BURGOS - *ES*, F. OCHOA - *ES*, A. ARDITO - *IT*, A. BERTANI - *IT*, B. CERESOLI - *IT*, G. PANNUNZIO - *IT*, E. REGIL - *ES*, U. ZATICA - *ES*, I. HUERTA - *ES*
- C4-212 Evaluation of insulation coordination of substations by advanced approaches**  
S. OKABE - *JP*
- C4-213 Evolution of lightning protection of nuclear power plants: An overview of EDF's experience**  
P. DUQUERROY - *FR*

#### SC C4 POWER SYSTEM TECHNICAL PERFORMANCE

##### PS3: Computational Advances in Tools, Models, Methodology and Analysis of Power System Technical Performance related Issues

- C4-301 Comparison between measured and simulated VFTO in 525 kV GIS**  
P. MIGUEL - *BR*
- C4-302 Full-Frequency Dependent Models for Variable Time-Step Simulations**  
F. CAMARA - *BR*
- C4-303 Hardware in the loop platform for testing the wind turbine type 4 ability of improving frequency stability of power systems**  
J. RUEDA TORRES - *NL*
- C4-304 Impact of uncertainties in OHL and UGC modelling on transmission system harmonic behaviour**  
F. BARAKOU - *NL*
- C4-305 requirements for models to study and prevent system separation and collapse**  
A. JANSSEN - *NL*
- C4-306 Computation of power losses in HV submarine three-core armoured cables: a 3D multiconductor cell analysis along with subdivision technique**  
R. BENATO - *IT*, S. DAMBONE SESSA - *IT*
- C4-307 A Review of Dynamic Model Equivalents in Emerging Electrical Grids**  
S. ALERYANI - *CA*
- C4-308 Utilizing EMT for Benchmarking and Assessing Short Circuit Calculation Methods**  
H. CATANASE - *IE*
- C4-309 Impact of Cable Impedance Modelling Assumptions on Harmonic Losses in Offshore Wind Power Plants**  
L. KOCEWIAK - *DK*
- C4-310 Development of improved aggregated load models for power system network planning in the Nordic power system Part 2: Method verification**  
E. HILLBERG - *SE*

- C4-311 A High Frequency Power Transformers Model for Network Studies and TDSF Monitoring**  
X.M. LOPEZ-FERNANDEZ - *ES*, L. ROUCO - *ES*, C. ALVAREZ-MARIÑO - *ES*, H. GAGO - *ES*, C. VILA - *ES*
- C4-312 PMU placement in a 110-330 kV AC network for identification of the mathematical model of the Kaliningrad Region power system mode**  
J. SHAROV - *RU*
- C4-313 Benchmarking standard power test systems for real-time simulation studies**  
S. ARUNPRASANTH - *CA*
- C4-314 System Dynamic Studies of Power Electronics Devices with Real-Time Simulation - A TSO operational experience**  
H. SAAD - *FR*

#### SC C5 ELECTRICITY MARKETS AND REGULATION

##### PS1: The Need to Change Business and Regulatory Models Driven by Increase in Distributed Resources, Storage and Demand Response

- C5-101 Regulatory model to accommodate distributed and renewable resources in a challenging economic situation: Brazilian experience**  
S. CUPERTINO - *BR*
- C5-102 CANCELLED - Evolution of Regulatory and Business Models Given Reduction in Revenue, Decreasing Load Growth and Penetration of Renewable Energy, Energy Efficiency and Demand Side Management**
- C5-103 The estimation of the Value of Lost Load**  
D. PUGLIESE - *IT*, S. LIBRATTI - *IT*, M. MAURO - *IT*
- C5-104 Imbalance Pricing in the context of the third and fourth energy packages – The new balancing market arrangements in Ireland and Northern Ireland**  
A. DOWNEY - *IE*
- C5-105 Electricity Tariff Structure Review in Iran(Identifying and analyzing the most influenced factors)**  
M. MOHAMMADI - *IR*
- C5-106 The impact of shorter intraday market gate closure on regulation reserves**  
N. PINHO DA SILVA - *PT*, R. PASTOR - *PT*, J. ESTEVES - *PT*, R. PESTANA - *PT*
- C5-107 Indian Electricity Market –Data Analysis of a Decade of Experience**  
S.C. SAXENA - *IN*
- C5-108 Towards a Common Target Regulatory Framework. Harmonising Technical Rules for the Mediterranean Power Systems from a TSO perspective**  
J.F. ALONSO - *ES*, S. BEL HAJ AMOR - *TN*, S. EFSTATHIOU - *GR*, Z. NADIR - *MA*, B. NUNES - *PT*, A. SAINZ - *ES*
- C5-109 Exploring multi-services business cases for a storage unit in various grid schemes**  
A. ATAYI - *FR*
- C5-110 Network tariff design in evolving electricity markets**  
L. MARTIN - *FR*

#### SC C5 ELECTRICITY MARKETS AND REGULATION

##### PS2: Impact of Climate Policy on Electricity Markets

- C5-201 Electricity Network Codes: A success story?**  
M. SUPPONEN - *FI*
- C5-202 Implications of the integration of renewable energies into the electricity market of Greece**  
U. BACHHIESL - *AT*, P. KAKAVAS - *GR*, G. FEICHTINGER - *AT*, R. GAUGL - *AT*
- C5-203 Revenue Stacking for Battery Storage Projects from a Technical and Risk Perspective in the UK**  
M. SCOTT - *GB*, G. WATSON - *GB*, L. BLOOR - *GB*

- C5-204 Analysis of the current Carbon Tax implementation in the Chilean Electric Market and future regulatory developments to allow effective CO2 reduction**  
F. LEIVA - *CL*
- C5-205 Revision of the French capacity market**  
E. MERCKEL - *FR*
- C5-206 Challenges and Measures to Integrate Renewable Energy Sources and Storage Means in the Brazilian Power System and Electricity Market**  
S. CISNEIROS - *BR*
- C5-207 Mexican Energy Reforms: Mexico's Path to a Clean Economy**  
M.A. AVILA ROSALES - *MX*
- C5-208 The design and modelling of China's electricity market mechanism of renewable energy**  
L. MA - *CN*
- C5-209 Solar Parks to Ramp up Solar Projects in India: The recent Downward trends in Tariff**  
RADHEY SHYAM MEENA - *IN*
- C5-210 Evolutions of Japanese markets to realize stable and low cost power supply satisfying environmental targets**  
H. ASANO - *JP*

### SC C5 ELECTRICITY MARKETS AND REGULATION

#### PS3: Localized Markets or Microgrids Interacting with Wholesale Markets

- C5-301 The New Market Paradigm of the Brazilian Power System considering Thermal Base Generation for Supporting the Renewable Source Expansion**  
J. MELLO - *BR*
- C5-302 The evolution of embedded networks and localised markets in Australia**  
A. CRUICKSHANK - *AU*
- C5-303 Exploring the Market Value of Smart Grids and Interactions with Wholesale (TSO) and Distribution (DSO) markets**  
E. LAROSE ON BEHALF OF CIGRE WG C5.24 - *US*
- C5-304 Economic assessment of smart grid flexibilities**  
A. BATTEGAY - *FR*
- C5-305 Efficient Participation by Customers in an Electricity Market Using a Receding-Horizon Optimization**  
A.J. LAMADRID - *US*, T. MOUNT - *US*, W. JEON - *KR*, H. LU - *AU*
- C5-306 TSO-DSO coordination and market architectures for an integrated ancillary services acquisition: the view of the SmartNet project**  
G. MIGLIAVACCA - *IT*, M. ROSSI - *IT*, H. GERARD - *BE*, M. DŽAMARIJA - *DK*, S. HORSMANHEIMO - *FI*, C. MADINA - *ES*, I. KOCKAR - *GB*, G. LECLERQ - *BE*, M. MARROQUIN - *ES*, H. SVENDSEN - *NO*
- C5-307 Smart TSO-DSO interaction schemes and ICT solutions for the integration of ancillary services from distributed generation**  
L. ORTOLANO - *IT*, G. GUIDA - *IT*, G. BRUNO - *IT*, L. ORTOLANO - *IT*, M. POLI - *IT*, G. MIGLIAVACCA - *IT*, D. MONETA - *IT*, C. ARRIGONI - *IT*, F. ZANELLINI - *IT*, G. DELLA CROCE - *IT*, A. BRIDI - *IT*, M. BALDINI - *IT*, M. PALLESCHI - *IT*
- C5-308 A comparative analysis of existing and prospective market organisations at the retail level: role modelling and regulatory choices**  
A. BIALECKI - *GB*, A. DALLAGI - *GB*, R. BELHOMME - *FR*, C. DEFEUILLEY - *FR*, J. EBERBACH - *DE*
- C5-309 Exploiting flexibility of radio base stations in local DSO markets for congestion management with shared balancing responsibility between TSO and DSO**  
C. MADINA - *ES*, J. JIMENO - *ES*, J. MERINO - *ES*, M. PARDO - *ES*, M. MARROQUIN - *ES*, E. ESTRADE - *LU*
- C5-310 Key Guidelines to New Market Design to Ancillary Services in Latin American's Power Systems with High Levels of Wind and Solar Energy: Practical Experiences from North America ISOs and European TSOs**  
J. AVALOS - *CL*

## SC C6 ACTIVE DISTRIBUTION SYSTEMS AND DISTRIBUTED ENERGY RESOURCES

### PS1: Achieve Flexibility through Strategic Distribution Planning

- C6-101 Risk-based Planning of Radial Distribution Networks with Distributed Generation and Demand Response in the Presence of Uncertainty**  
Ž. POPOVIC - *RS*
- C6-102 Long-term forecasting model for energy and power flow estimation at Primary substation level**  
S. GRILLO - *IT*, A. MAZZOLA - *IT*, F. CAZZATO - *IT*, M. DI CLERICO - *IT*, G. CANEPONI - *IT*, S. FERRERO - *IT*
- C6-103 Modelling of Active Distribution Network for Distributed Generation Planning**  
A. A. RADWAN - *EG*
- C6-104 Active distribution system operation and optimal development of the whole power system**  
K. BELL - *GB*, S. GILL - *GB*
- C6-105 Germany's lighthouse projects addressing cellular grids, industrial DSM and sector coupling**  
V. BUEHNER - *DE*, B. MEYER - *DE*, P. NOGLIK - *DE*, R. SIMON - *DE*, M. KUESTER - *DE*
- C6-106 Residential Smart Thermostats for Potential Energy Savings and Case Studies on Smart Thermostat Field Tests**  
O. AYAN - *TR*
- C6-107 Potential of and limitations to distributed management of LV and MV feeder voltage profiles with high penetration of embedded generation and storage**  
A. MORTON - *AU*
- C6-108 MV grid curtailment reduction with gird flexible operations and limited control of the dispersed generation**  
A. KAKOL - *PL*, M. CZERWONKA - *PL*, M. WILK - *PL*, J. SMOTER - *PL*
- C6-109 Effectiveness of different flexibility options and innovative network technologies for the use in the BDEW traffic light concept, on the basis of a German distribution grid**  
T. ACKERMANN - *DE*
- C6-110 A comprehensive evaluation platform for health index of power distribution network**  
Z. MA - *CN*
- C6-111 Study on load management method in low voltage power distribution systems using smart meter**  
H. ITO - *JP*

## SC C6 ACTIVE DISTRIBUTION SYSTEMS AND DISTRIBUTED ENERGY RESOURCES

### PS2: Energy Storage in Distribution Systems

- C6-201 Benefit Cost Analysis of Battery Energy Storage Systems to Defer Distribution Capacity Upgrades on Utility Distribution Systems**  
E. PAASO - *US*, L. GARCIA-GARCIA - *US*, P. TYSCHENKO - *US*, S. BAHRAMIRAD - *US*
- C6-202 Impact of prosumer ESS on active distribution network planning**  
M. DI CLERICO - *IT*, M. MANGANELLI - *IT*, M.C. FALVO - *IT*, F. CAZZATO - *IT*, G. CANEPONI - *IT*, S. FERRERO - *IT*
- C6-203 Implementation of Energy Storage in MV distribution networks – A Cost/Benefit Analysis in the Italian regulatory framework**  
G. CELLI - *IT*, F. PILO - *IT*, G. PISANO - *IT*, G. G. SOMA - *IT*
- C6-204 The European Research Project “TILOS”**  
K. KAOUSIAS - *GR*, T. XYGKIS - *GR*, G. PAPOUTSIIS - *GR*, E. STAVROPOULOU - *GR*, T. PATSAKA - *GR*, C. KOURELIS - *GR*, Z. MANTAS - *GR*, J. KALDELIS - *GR*, C. PRONIOS - *DE*, T. DELAPLANGE - *FR*, G. NOTTON - *FR*, M. TODESCHINI - *IT*, D.H. ALAMO - *ES*
- C6-205 CANCELLED - Determining applicability of sodium nickel and lithium ion batteries to electric utility applications**
- C6-206 Unleashing Flexibility from Electric Boilers and Heat Pumps in Danish Residential Distribution Network**  
R. SINHA - *DK*

- C6-207 Opportunities for interoperability between different energy networks for remote or island networks**  
C. HIGGINS - *GB*, G. MCFADZEAN - *GB*, X. ZHANG - *GB*, R. HODGES - *GB*, J. VAHEESHAN - *GB*
- C6-208 Research on coordinating planning between electric distribution network and regional electric thermal storage boilers based on peak load shifting of heat and electricity consumption**  
D. JIA - *CN*
- C6-209 Application of ESS for Wind Power Connection to Youngheung Wind Farm**  
J.H. LEE - *KR*, B.G. JIN - *KR*, D.H. CHOI - *KR*, J.I. LEE - *KR*
- C6-210 Remote PV Control and Combination with Load Control : System Construction and Demonstration**  
H. ISHII - *JP*
- C6-211 Experimental studies of energy storage system for multi-level integration of generating stations and consumers**  
K. DENSHIKOV - *RU*

## SC C6 ACTIVE DISTRIBUTION SYSTEMS AND DISTRIBUTED ENERGY RESOURCES

### PS3: Intelligent Electrification for All

- C6-301 Design and Implementation of a Grid-connected Microgrid in Medium Voltage Brazilian Distribution Network – Architecture, Control and Regulatory Challenges**  
L. LEITE - *BR*
- C6-302 CANCELLED - Experiences in Microgrids and Islanded Networks with High Degrees of Renewable Penetration in the Scottish Highlands and Islands**
- C6-303 CANCELLED - In-house Development of Micro Energy Management System for Grid-Connected Microgrids**
- C6-304 Full-scope simulation of grid-connected microgrids**  
A. DR KOVACS - *HU*
- C6-305 Medium Voltage connected  $\mu$ grid in dispersed rural areas: mGridStorage project**  
D. BIELSA - *ES*, R. FERRET - *ES*, N. GISBERT-TREJO - *ES*, R. GONZALEZ - *ES*, H. GURENDEZ - *ES*, A. DIAZ-GALLO - *ES*, E. SANCHEZ - *ES*, I. MARINO - *ES*
- C6-306 New tool for arbitrage between network expansion and isolated mini-grids in the context of rural electrification.**  
S. LEYDER - *BE*, G. ROIG - *BE*
- C6-307 An Integrated Pan-European Research Infrastructure for Validating Smart Grid Systems**  
T.I. STRASSER - *AT*, F. PROESTL ANDRÉN - *AT*, E. WIDL - *AT*, G. LAUSS - *AT*, E.C. DE JONG - *NL*, M. CALIN - *DE*, M. SOSNINA - *DE*, A. KHAVARI - *DE*, J.E. RODRIGUEZ - *ES*, P. KOTSAMPOPOULOS - *GR*, M. BLANK - *DE*, C. STEINBRINK - *DE*, K. MÄKI - *FI*, A. KULMALA - *FI*, A. VAN DER MEER - *NL*, R. BHANDIA - *NL*, G. ARNOLD - *DE*, C. SANDRONI - *IT*, D. PALA - *IT*, D.E. MORALES BONDY - *DK*, K. HEUSSEN - *DK*, O. GEHRKE - *DK*, F. COFFELE - *GB*, Q.-T. TRAN - *FR*, E. RIKOS - *GR*, V.H. NGUYEN - *FR*, I. ORUE - *ES*, M.Z. DEGEFA - *NO*, S. MANIKAS - *GR*
- C6-308 Integrating renewable energy sources in the Tuscan Archipelago**  
F. PALONE - *IT*, L. BUONO - *IT*, P. PORTOGHESE - *IT*, M. REBOLINI - *IT*, A. NECCI - *IT*, L. APICELLA - *IT*
- C6-309 An automated grid impact study tool for integrating a high penetration of intermittent resources on diesel-based isolated systems**  
J.A. ZRUM - *CA*
- C6-310 Innovative solutions and engineering studies within the Renewable Energy Integration Development Singapore**  
R. WIBISONO - *SG*, J. WILD - *FR*, X. PENG - *SG*, A. BALLEREAU - *SG*, R. DROZDOWSKI - *SG*
- C6-311 Achieving High Renewable Energy Penetration in Off-grid Systems via Low Load Diesel Integration: A Case Study of King Island, Australia**  
M. NEGNEVITSKY - *AU*
- C6-312 Learning from a 3.275 MW Utility Scale PV Plant Project: Update and New Remarks**  
T. SAHA - *AU*
- C6-313 Development of an R&D Platform for Smart City Projects in the Indian Context**  
S. CHAKRABARTI - *IN*

**C6-314 LV Network Operation through data analytics**

L. MARRÓN - *ES*, T. ARZUAGA - *ES*, A. AMEZUA - *ES*, S. MARTÍNEZ - *ES*, A. GONZÁLEZ - *ES*, R. BACHILLER - *ES*, A. SENDÍN - *ES*

**C6-315 Study on the Feasibility of MVDC**

Z. MA ON BEHALF OF WG C6.31 - *GB*

**SC D1 MATERIALS AND EMERGING TEST TECHNIQUES**

**PS1: HVDC Insulation Systems**

**D1-101 Experiences in Dielectric Testing of Gas-insulated HVDC Systems**

U. RIECHERT - *CH*, F. BLUMENROTH - *CH*, U. STRAUMANN - *CH*, B. KAUFMANN - *CH*, M. SALZER - *CH*, P. BERGELIN - *CH*

**D1-102 Measurement of surface potential at the gas-solid interface for validating electric field simulations in gas-insulated DC systems**

M. HERING - *DE*, K. JUHRE - *DE*, S. ZHAO - *DE*, J. KINDERSBERGER - *DE*

**D1-103 Insulation Characteristics in DC-GIS: Surface charge phenomena on epoxy spacers and metallic particle motions**

T. YASUOKA - *JP*

**D1-104 Space charge measurements for HVDC GIS spacer using the Thermal Step Method**

P.S. MBOLO NOAH - *FR*

**D1-105 HFO1234zeE in medium voltage switchgear as safe alternative to SF6**

C. PREVE - *FR*

**D1-106 Experimental Investigations of Oil-Insulated Arrangements at High DC Voltage and Composite Voltage Stress considering a Charge Carrier-based Approach**

T. GABLER - *DE*, K. BACKHAUS - *DE*, J. SPECK - *DE*, S. GROSSMANN - *DE*, R. FRITSCHKE - *DE*

**D1-107 Comparative analysis of some present-day used dielectric liquids based on correlated PD phenomena and DGA investigation**

C. WOLMARANS - *SI*, I. KOBAL - *SI*, M. BABUDER - *SI*, S. VIZINTIN - *SI*

**SC D1 MATERIALS AND EMERGING TEST TECHNIQUES**

**PS2: Materials and Ageing**

**D1-201 Application of fluoronitrile/CO2/O2 mixtures in high voltage products to lower the environmental footprint**

F. MEYER - *CH*, P. HUGUENOT - *CH*, M. WALTER - *CH*, Y. KIEFFEL - *CH*, L. MAKSOUD - *CH*, I. HUET - *CH*, T. BERTELOOT - *CH*, A. SCHLERNITZAUER - *CH*, R. MAGOUS - *CH*, G. CROS - *CH*, J. G. OWENS - *CH*, J. BONK - *CH*, R. VAN SAN - *CH*

**D1-202 Environmental aspects of high voltage gas insulated switchgear that uses alternatives to SF6 and monitoring and long-term performance of a pilot installation**

P. STOLLER - *CH*, J. HENGSTLER - *CH*, C. DOIRON - *CH*, S. SCHEEL - *CH*, P. SIMKA - *CH*, P. MÜLLER - *CH*

**D1-203 CANCELLED - Development of Simulation Tool for SF6 Alternative Gas Circuit Breaker Design**

**D1-204 A comparative study of AC and DC breakdown characteristics with dielectric spectroscopy of Hexagonal Boron Nitride and Carbon Nanosphere Epoxy Nanodielectrics**

A HANK - *ZA*

**D1-205 Explanation of Breakdown Phenomena in Nanofluids depending on Nanoparticles types**

A. M. ELSAEED - *EG*

**D1-206 Adhesives for Bonding Transformerboard: Partial Discharge and Ageing Behaviour**

C. MUELLER - *AT*, Z. ZHANG - *AT*, R. SCHWARZ - *AT*, G. PUKEL - *AT*, F. WIESBROCK - *AT*, B. BAKIJA - *DE*, M. MUHR - *AT*

**D1-207 Creepage Discharge Investigations with Biodegradable Ester-based Liquids and the Implications for Transmission Transformer Design**

M. LASHBROOK - *GB*, A. GYORE - *GB*, R. MARTIN - *GB*, R. CSELKO - *HU*, B. NEMETH - *HU*

**D1-208 A Rigorous Ageing Program for Ester/Cellulose Liquid Immersed Transformer Insulation Systems**

R.P. MAREK - *US*, H.M. WILHELM - *BR*

**D1-209 25 years' experience of on-line Terna monitoring system (SMOAT) applied to HV equipment and transformers**  
F. SCATIGGIO - *IT*, F.M. PEPE - *IT*, S. SACCO - *IT*

**D1-210 Influence of the Material Composition on the Dynamic Hydrophobicity of**  
C. BAER - *CH*, FRANK SCHMUCK - *CH*, S. KORNHUBER - *DE*, R. BAERSCH - *DE*, V. BRADE - *DE*

### SC D1 MATERIALS AND EMERGING TEST TECHNIQUES

#### PS3: Testing, Monitoring and Diagnostics

**D1-301 CANCELLED - Breakdown voltage of low-GWP insulation gas in semi-inhomogeneous fields**

**D1-302 Impulse test and partial discharge detection for GIS equipment in field**

J. LI - *CN*

**D1-303 Development of a wireless PD measurement system enabling to Contact directly with 22.9kV Live line of Gas Switchgear**

J. Y. KOO - *KR*, J. H. KIM - *KR*, K.H. SEO - *KR*, I.J. SEO - *KR*, Y. J. LEE - *KR*

**D1-304 Return of experience: The CIGRE UHF PD sensitivity verification and on-site detection of critical defects**

S. NEUHOLD - *CH*, T. BRÜGGER - *CH*, R. BRÄUNLICH - *CH*, P. MÜLLER - *CH*, M. LEHNER - *CH*, G. BEHRMANN - *CH*, H. D. SCHLEMPER - *CH*, U. RICHERT - *CH*, E. SCHNEITER - *CH*, P. SIGRIST - *CH*

**D1-305 Return on experience on the uses of GIS PD monitoring systems**

G. FAUCONNET - *FR*

**D1-306 Evaluation of three different thermally upgraded papers used in liquid-immersed transformer as reference insulation systems to determine thermal class**

H. WILHELM - *BR*

**D1-307 DGA assessment improvement by the criteria of maximum permissible gas concentrations and their rate of growth**

V. PELYSKIY - *RU*

**D1-308 Evaluation of the paper insulation condition of power transformers based on the content of methanol dissolved in transformer oil**

L. DARIAN - *RU*

**D1-309 Experience and Added Value from Capacitive Online Moisture Sensors**

I. ATANASOVA-HOEHLEIN - *DE*, M. KONCAN-GRADNIK - *SI*, T. GRADNIK - *SI*, B. CUCEK - *SI*, P. PRZYBYLEK - *PL*, K. SIODLA - *PL*, K. LILAND - *NO*, S. LEIVO - *FI*, Q. LIU - *GB*

**D1-310 Parametric Frequency Response Interpretation using Frequency Localising Basis Functions**

J. WELSH - *AU*

**D1-311 Indirectly assessing the ageing of shell-type windings using paper samples from its leads. Post-mortem analyses.**

A. PEIXOTO - *PT*, R. M. MARTINS - *PT*, S. COUTO - *PT*, P. LIMA - *PT*, H. M. CAMPELO - *PT*

**D1-312 Condition Assessment of On Load Tap Changers by Using Dynamic Resistance Measurement**

S. PROMSRITONG - *TH*

**D1-313 TERNA Transformer Fleet Knowledge Management through the use of on-line monitors**

F. SCATIGGIO - *IT*, C.A. SERAFINO - *IT*, M. TOZZI - *IE*, E. SAVORELLI - *IE*, A. SALSÌ - *IE*

**D1-314 The Asset Health Center, Implementation of Online Monitoring and the Grid of the Future**

R.P. CORNELL - *US*, P. CHUNG - *US*, J. LLAVONA - *US*, K. ZELLERS - *US*

**D1-315 A novel method to study the interface resistivity between silicone rubber housing and FRP rod of composite insulator**

X. LIANG - *CN*

**D1-316 Measurements of hydrophobicity transfer of silicone sheds in service aged non-ceramic outdoor insulators from polluted areas**

M. GIL-AGUSTÍ - *ES*, J.C. GONZALEZ - *ES*, C. HERRERO-PONCE - *ES*, L. ZUBIZARRETA - *ES*, A. SORIA - *ES*, P. LLOVERA-SEGOVIA - *ES*, V. FUSTER ROIG - *ES*, D. CERCOS - *ES*

**D1-317 Overhead line insulation state checking by on-line monitoring system**

L. PAVLOV - *SK*



- D1-318 GCCIA pollution test station Part II: Field Assessment & Test Station Results**  
A. AL-THAQAFI - SA
- D1-319 Advanced techniques in impulse testing method of electric power equipment**  
S. OKABE - JP
- D1-320 Steep-front impulse voltage tests on high-voltage equipment**  
Y. LI - AU
- D1-321 The performance of calculable impulse calibrator up to 600 V**  
A. MEREV - TR
- D1-322 Using Brillouin distributed sensing to reduce installation risk and optimize cable operation of subsea power cable**  
E. ROCHAT - CH, S. CHIN - CH, R. RAVET - CH
- D1-323 Reference PD generator for sensitivity checking of measuring instrumentation to be used for continuous on-line PD monitoring**  
F. GARNACHO - ES, F. ÁLVAREZ - ES, A. RAMÍREZ - ES, J. ORTEGO - ES, M.A. SÁNCHEZ-URÁN - ES
- D1-324 Using Optical Spectroscopy For Quality Control Of Mineral Transformer Oils**  
V. KOZLOV - RU

## SC D2 INFORMATION SYSTEMS AND TELECOMMUNICATION

### PS1: Opportunities and Challenges in ICT applied to Microgrid and DER

- D2-101 Evaluation of a LoRaWAN Network for AMR**  
N. HATZIARGYRIOU - GR, I. VLACHOS - GR, G. KIOKES - GR
- D2-102 Study on the construction of global energy research system based on economic-energy-electricity-environment integration analysis**  
W. KONG - CN
- D2-103 Analysis and visualization of residential electricity consumption based on geographic regularized matrix factorization in smart grid**  
Y. WANG - CN
- D2-104 Implementation of Interoperability Adaptor for Interface with External Systems in Campus Microgrid**  
H.Y. KANG - KR, M.H. LEE - KR, S.C. LEE - KR, Y.H. SHIN - KR, T.W. KIM - KR
- D2-105 CANCELLED - Simulation of Data Traffic and Congestion Analysis on Power Line Communication for Last Mile Network in PEA Smart Grid**
- D2-106 Assuring operational communications across the sub-transmission and MV distribution electrical power grids**  
M. MESBAH - FR

## SC D2 INFORMATION SYSTEMS AND TELECOMMUNICATION

### PS2: Potential Applications and Implementation of Network and Infrastructure Virtualization

- D2-201 Substation Virtualisation: An Architecture for Information Technology and Operational Technology Convergence for Resilience, Security and Efficiency**  
V. TAN - AU
- D2-202 Benefit and resolution of operational issues for information and communication systems using virtualization techniques in the electric power**  
H. DOI - JP

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### PS3: Maintaining Reliable and Secure Operation in an Evolving Environment

- D2-301 Building a Secure Network Policies, Architettura and Incident Response Case: Chesf**  
R. LEAL - BR

- D2-302 A Hybrid Communications Network Approach for Advanced Applications on the Modern Grid**  
J.P. KNAUSS - *US*
- D2-303 Network evolution towards packet switched technologies**  
A. VIRO - *FI*
- D2-304 IED system management solution: a universal approach for all your grid IoT integration**  
A. HAMDON - *CA*
- D2-305 Teleprotection over Multiprotocol Label Switching (MPLS): Experiences from an Australian Electric Power Utility**  
V. TAN - *AU*, J. COLE - *AU*
- D2-306 Research and application of deep security protection technology in power industrial control system**  
W. LIN - *CN*
- D2-307 Challenges in EGAT Telecommunication System Integration**  
P. CHIEWCHARAT - *TH*
- D2-308 An Indian Case Study of Hierarchically Integrated SCADA system up gradation and its impact on Connected Control centers**  
K.V.S BABA - *IN*
- D2-309 Network and Data Cybersecurity Strategy of the Electrical Power System**  
M. TALJAARD - *ZA*
- D2-310 Telecommunication solutions for IEC 61850-based substations at the Spanish TSO and its practical implementation**  
J.M. DELGADO - *ES*, S. KWIK - *ES*, J.J. ROMERA - *ES*, J.A. GARCÍA LÓPEZ - *ES*
- D2-311 MAIGE – IoT infrastructure for online asset management**  
J. GILABERT - *ES*, J.G. GERMAIN - *ES*, J.M. ROCA - *ES*, I. BENÍTEZ - *ES*, M. GARCÍA - *ES*, V. FUSTER - *ES*
- D2-312 Development of information-analytical system for automatic fault analysis and relay protection performance evaluation**  
D. ZHUKOV - *RU*
- D2-313 Approach to maintaining secure operation of various systems in Japanese electric companies**  
T. HIKINO - *JP*
- D2-314 GOOSE performance monitoring based on IEC 61850 enabled switch**  
J. CHUANG - *TW*, M. JENKNER - *DE*
- D2-315 Data Analytics Platform for Power Equipment Intelligent Lifecycle Management**  
A. KHALYSMAA - *RU*
- D2-316 Asset Management with ICT Support in Indian Power System**  
N. NARENDRA SINGH SODHA - *IN*