2018 CIGRE SESSION TECHNICAL PROGRAMME

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*

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. TÉTREAULT - *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**

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 TRANSFORMERS

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 ultralow**

F. BACHINGER - *AT*

A2-112 **Practical aspects of determining the hot-spot (factor) in large power transformers**

K. 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 **The influence of the oil viscosity on the oil and conductor temperatures in oil immersed power transformers at extreme ambient temperatures**

G. KLASNIC - *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 TRANSFORMERS

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. ABBASI - *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 noble approach for bushing fault diagnosis: POWERGRID 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 TRANSFORMERS

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*

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 HIGH VOLTAGE EQUIPMENT

PS1: Requirements for AC and DC Transmission & Distribution Equipement

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 sequence of ungrounded shunt capacitor banks based on transient electromagnetic emission analysis**

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 HIGH VOLTAGE EQUIPMENT

PS2: Lifetime Management of Transmission & Distribution Equipment

A3-201 **Digital Disconnector: 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 **On-line monitoring of for Capacitive Voltage Transformers using Energy Meters**

T LINDQUIST - *SE*

SC A3 HIGH VOLTAGE EQUIPMENT

PS3: Novel Developments of Transmission & Distribution Equipment

A3-301 **Performance Evaluation of CO2/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 SF6 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 CO2/O2/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 (C4F7N) mixed with the Background gas of CO2 in GIS as SF6 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 CO2 and Fluoronitrile mixture in comparison with SF6**

K. BOUSOLTANE - *FR*

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

M. YANIN - *RU*

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 cable: 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 Case study for the use of a semi conductive outer sheath layer on 400 kV cable systems

T. 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 Energizing the Martin Linge Offshore Oil and Gas Field

E. ERIKSSON - *SE*

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**

P. KORSUNOV - *RU*

B1-302 **22.9kV 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 - Impedance Measurements and Steel Grade Comparison**

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 **Observations and simulations of the frequency of weak winds relevant for conductor cooling on a long overhead 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*

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 **Dynamic line rating using an approach for weather condition predictors**

K. BAKIC - *SI*

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 Measurment 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 uprating 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*

B2-304 **Innovative towers to facilitate public acceptance**

J.F. GOFFINET - *BE*

B2-305 **380 kV 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. DIKAIAKOS - *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*

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 **Intelligent Merging Unit and Low-Power Instrument Transformer Technologies for Power Distribution Systems**

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 **Upgradation of EHV sub-stations (132kV, 220kV & 400kV) for additional Bays and Power Handling – Case Study**

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 U/I-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

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

D. STAIGER - *DE*

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*

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*

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 **Practical Experiences with UHF- Partial Discharge - Monitoring Techniques applied on Gas-insulated Switchgear**

M. BOLTZE - *DE*

SC B3 SUBSTATIONS

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 HVDC AND POWER ELECTRONIC SYSTEMS

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 practces 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 ±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 ±800kV HVDC project in China Southern Power Grid

H. RAO - *CN*

B4-121 Characteristics of system and parameter design o 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 +/- 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 +/- 320 kV, 2000 MW Pugalur – Trichur VSC HVDC link with +/- 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. FRITSCHE - *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 Impact of the dc-network configuration and the converters types on the stability of a multi-terminal HVDC system

G. PINARES - *SE*

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 HVDC AND POWER ELECTRONIC SYSTEMS

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*

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*

SC B4 HVDC AND POWER ELECTRONIC SYSTEMS

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 **Hybrid STATCOM with 3-winding transformer - a novel concept for transient control and harmonic impedance optimization**

A. KAHKONEN - *FI*

B4-304 **The World's Largest SVCs Deliver Voltage Stability and Load Balancing for the Saudi Power Grid at High Speed Railway Feeder Stations**

S. HUTCHINSON - *SE*

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 ±100Mvar 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. DAWOOD - *JO*

B5-105 **New Single-Ended Earthfault Distance Estimation for the 110-kV- and 20-kV-Compensated Network**

G. DRUML - *AT*

B5-106 **Investigation of novel directional protection techniques based on current only**

A. MAGDY - *EG*

B5-107 **Investigation of Measurment 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 response-based special protection scheme for imminent loss of synchronism detection and surge arrester monitoring and control**

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 **Implementation and Operational Experience of a Special Protection Scheme on SCADA/EMS with Controller Box based on FPGA**

T. SUKANCHANA - *TH*

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*

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 Distribução 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*

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 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 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 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 SYSTEM OPER ATION 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. ALZAHRANI - *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*

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 using Supply and Demand Side Resources

D. WILSON - *IS*

C2-124 Introducing PMU-based Applicatons 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 Identification and prevention of rotor-angle stability limitations of power transfer corridors

E. HILLBERG - *SE*

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 Leveraging Power Flow Control to Facilitate Outages on Existing Overhead Line Right-of-Ways

A. SOROUDI - *IE*

SC C2 SYSTEM OPER ATION 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, tuning and testing of the disturbance reserve

M. KUIVANIEMI - *FI*

C2-204 A dynamic multi-factor 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 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 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 acceptence**

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 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*

C3-304 The use of LIDAR technology for vegetation management

E. CLOET - *BE*

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 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 disturbances in distorting installations connected to high and extra high voltage power supply 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 ElectricArc Furnaces EAF to the Acceptable Level by Using Shunt Passive Filters

E. F. SHAROUDA - *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 **Technical performance investigation of Thai power system**

A. NUNTHACHAI - *TH*

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 **Assesment of the impact of power electronic devices on harmonic levels in transmission networks**

I. PAPIC - *SI*, A. BOZICEK - *SI*, B. BLAZIC - *SI*

SC C4 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. DOKIC - *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 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 precent system separation and collapse**

A. JANSSEN - *NL*

C4-306 **Computation of power losses in HV submarine three-core armooured cables: a 3D multiconductor cell analysis along with subdivision technique**

R. BENATO - *IT*, S. DAMBONE SESSA - *IT*

C4-307 **Dynamic model equivalent challenges of Alberta Interconnected Electric System**

S. ALERYANI - *CA*

C4-308 **Utilizing EMT for Benchmarking and Assessing Short Circuit Calculation Methods**

H. CATANASE - *IE*

C4-309 **Calculation of Harmonic Losses in OffshoreWind Power Plants Using Different Frequency-Dependent Impedance CableModels**

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 **Evolution of Regulatory and Business Models Given Reduction in Revenue, Decreasing Load Growth and Penetration of Renewable Energy, Energy Efficiency and Demand Side Management**

WAN SYAKIRAH WAN ABDULLAH - *MY*

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 for market and climate?**

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 of a New Market Design to Ancillary Services in Latin America's Power Systems with High Levels of Wind and Solar Energy: Practices Experiences from North America ISOs and European TSOs**

J. AVALOS - *CL*

SC C6 DISTRIBUTION SYSTEMS AND DISPERSED GENERATION

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*

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 DISTRIBUTION SYSTEMS AND DISPERSED GENERATION

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 DISTRIBUTION SYSTEMS AND DISPERSED GENERATION

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 In-house Development of Micro Energy Management System for Grid-Connected Microgrids

T. PAUKATONG - *TH*

C6-304 Full-scope simulation of grid-connected microgrids

A. DR KOVACS - *HU*

C6-305 Medium Voltage connected µgrid 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. STRASSER - *AT*

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 yhe 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. FRITSCHE - *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 FOOTPRIN

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 Development of Simulation Tool for SF6 Alternative Gas Circuit Breaker Design

H.K. KIM - *KR*, C.S . KWAK - *KR*, K.B. SEO - *KR*, S.Y. WOO - *KR*

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*

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. PELYMSKIY - *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. SAVOLDELLI - *IE*, A. SALSI - *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 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 **Simulation of Data Traffic and Congestion Analysis on Power Line Communication for Last Mile Network in PEA Smart Grid**

K. SRIVILAS - *TH*

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*

SC D2 INFORMATION SYSTEMS AND TELECOMMUNICATION

PS3: Maintaining Reliable and Secure Operation in an Evolving Environment

D2-301 **Building a Secure Network Policies, Architetura 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*