CIGRE Paris Session 2024

Provisional Technical Programme

See the list of Accepted Paper Proposals based on synopses review.

Kindly note that Full Papers are also peer-reviewed. Therefore, the list may evolve.

Final notification is due on 6th May 2024.

A1 - POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION
PS1 - ROTATING ELECTRICAL MACHINES AND THE ENERGY TRANSITION

ID: 10306
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating Electrical Machines and the Energy Transition
Keywords: Nuclear turbogenerators, Grid, PV production, Power capability, technical features

The benefits of nuclear turbogenerators for grids of the future

Herve BIELLMANN[1], Florent CHARVET[1], Jacques MARCHAND[1], Martin TOULEMONDE[1], Stephane BRAEM[2], Vincent DUBS[2], Baptiste GUIDOUX[2], Vincent FERNAGUT[2], Thierry VINAS[2]
[1]General Electric, France; [2]EDF, France

ID: 10692
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating Electrical Machines and the Energy Transition
Keywords: IEC 60034-33;

Insights to the new IEC 60034-33 – The Standard for Hydro-Generators and Motor-Generators for Pumped Storage

Thomas HILDINGER
Brazilian NC of CIGRE, Brazil; Voith Hydro

ID: 10904
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating Electrical Machines and the Energy Transition

Moneypoint Synchronous Condenser and Flywheel - A Zero Carbon Solution to Increasing Renewables and Improving Resilience on the Irish Electricity Grid

Katie WALL, Ruairí COSTELLO
Electricity Supply Board (Ireland)

ID: 11031
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating Electrical Machines and the Energy Transition

Practical Experience with the Thermal Evaluation and Classification of Type II Machine Insulation Systems according to IEC 60034-18-31

Lena M. ELSPASS[1], Stephan SCHLEGEL[1], Hans BÄRNKLAU[2]
[1]Technische Universität Dresden, Germany; [2]VEM Sachsenwerk GmbH, Germany

ID: 11065
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating Electrical Machines and the Energy Transition

Incorporating Fibre Optic Arc Flash Detection into a Conventional Generator Protection Scheme

Len GUNN, James DASH
Origin Energy, Australia

ID: 11102
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating Electrical Machines and the Energy Transition

Synchronous Condenser to Ensure Stable, Reliable And Quality Power in Renewable Energy Rich Regions – India Perspective

D.K. CHATURVEDI
NTPC

ID: 11271
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating Electrical Machines and the Energy Transition

Challenges in Core Flux test of Large Hydro Generators with natural frequency near to Power Frequency

Vipin GUPTA, A TIWARY*, Randhir KUMAR*, S. BAG
NHPC Limited, India

ID: 11394
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating Electrical Machines and the Energy Transition

Design individualization of an air-cooled synchronous condenser with directly water-cooled stator winding due to varying market requirements for grid stabilization services

Monja EVENKAMP, Hendrik STEINS, Uwe EICKELBECK, Moritz ACKERMANN
Siemens Energy Global GmbH & Co. KG, Germany

ID: 11744
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating Electrical Machines and the Energy Transition

Measurement and Practical Applications of Magnetic Flux Sensors by Radial and Tangential Axis in Synchronous Generator-Motors

Oleg AGAMALOV
Tashlyk Pump-Storage Power Plant (TPSPP)

PS2 - EVOLUTION AND DEVELOPMENT

ID: 10121
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - Evolution and Development
Keywords: wind power, permanent magnet generators, condition monitoring

Enhanced Electrical Signature Analysis (e-ESA) for Permanent Magnet Generators (PMG) Condition Monitoring for Offshore Wind

Jaime Renedo ANGLADA[1], Weizhong YAN[1], Bojun FENG[1], Manoj SHAH[2], Luc TEMPLIER[3], William BRIAND[3]
[1]GE Vernova, United States of America; [2]GE Aerospace, United States of America; [3]GE Vernova, France

ID: 10123
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - Evolution and Development
Keywords: Rotating diode rectifier, machine, diode failure, frequency, digital signal processor

Rotating diode rectifier, machine, diode failure, frequency, digital signal processor

Marc FLORES, Luc TEMPLIER, Léo PERDRIEL
EDF Hydro DTG, France

ID: 10124
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - Evolution and Development
Keywords: Turbo generator, Hydrogen-cooling, Water-cooling, Four-pole generator, Nuclear

Type test of the largest commercial 4-pole generator and exciter for an EPR power plant

Bouchra WAHDAME[1], Pascal CHAY[1], Damien DE-ROZARIO[1], Vincent FERNAGUT[2]
[1]GE Vernova, France; [2]EDF, France

ID: 10542
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - Evolution and Development

Damping local and inter-area oscillations with synchronous compensators: a fundamental study

Luis ROUCO, Jorge SUÁREZ, Fidel FERNÁNDEZ-BERNAL, Lukas SIGRIST
ETS ICAI-IIT Universidad Pontificia Comillas, Spain

ID: 10693
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - Evolution and Development
Keywords: Salient pole synchronous machine; synchronous condenser; reactive power; capability chart

On the Design of Salient Pole Synchronous Machine to Operate Strictly as Synchronous Condensers

Jorge Johnny ROCHA ECHEVERRIA, Mauro UEMORI
Brazilian NC of CIGRE, Brazil; Trassínio Consultoria Ltda.

ID: 10864
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers

Topics: A1 PS2 - Evolution and Development
Keywords: Doubly-Fed Asynchronous Machine, Load Commutated Cyclo-converter, Low Voltage Ride Through

Retrofit to 2 x 303MW Doubly-Fed Asynchronous Machine (DFAM) System at Oku-Tataragi Pumped Hydro Power Plant

Osamu NAGURA[1], Toshinari FUJII[2], Shinji ONO[2], Masayuki OKADA[1], Akira BANDO[3], Tomohiro YANO[4]
[1]HM Hydro Corp., Japan; [2]Kansai Electric Power Co., Japan; [3]Ex. HM Hydro Corp., Japan; [4]Hitachi, Ltd., Japan

ID: 11020
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - Evolution and Development

Development and design of an air-cooled 944.5 MVA hydro-generator

Thomas HILDINGER, Gunar KLAUS, Babette SCHWARZ, Georges MORONIS, Stefan ALLGEYER
Voith Hydro, Germany

ID: 11022
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - Evolution and Development

Qualification of a HV-Insulation System according IEC 60034-18-42 for a Hydro-generator Operating with Inverter Technology

Thomas HILDINGER[1], Christian STAUBACH[2]
[1]Voith Hydro, Germany; [2]Hochschule Hannover, Germany

ID: 11098
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - Evolution and Development

Site Selection Criteria For Synchronous Condensers Placement In Re Rich Network In India

Venkateswara Rao BITRA, Suneet MEHTA, Bhabani Sankar JENA
NTPC India Ltd

ID: 11171
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - Evolution and Development

Design Aspects of Synchronous Condensers

Gerfried MAIER, Serdar KADAM
Andritz Hydro

ID: 11362
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - Evolution and Development

Development of Engine Mounted Generators for Eco-Friendly Onboard Power Generation in Marine Applications

Sándor Rajmund HORVÁTH
HD Hyundai Electric Hungary Ltd.

ID: 11626
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - Evolution and Development

Design, Operation Experience, Development Trends of large Turbo Generators with Global VPI Stator Windings

Guido SCHMIDT, Friedhelm POHLMANN
Siemens Energy, Germany

ID: 11686
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - Evolution and Development

Variable Speed Pumped Storage Plants: Optimizing Benefits In Pumping, Generation And Synchronous Condenser Mode For Re Integration

Pankaj Kumar GUPTA*, Suneet MEHTA, Venkateswara Rao BITRA
NTPC Ltd, India

PS3 - KEEPING THE LIGHTS ON

ID: 10125
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Keeping the Lights on
Keywords: HV motors, detection device, fatigue breaking mechanism, coil connections

Fatigue breaking mechanism study at the coils connections of a stator winding and at the magnetic core fasteners

Aymen AMMAR[1], Thibaud FANGET[2], Romain SEIGNEURET[2]
[1]JEUMONT ELECTRIC, France; [2]EDF (DTG CNEPE), France

ID: 10350
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Keeping the Lights on

Use of Non-Destructive Tests (NDT) for synchronous condensers flywheel inspection

Gianluigi GEMELLI
TERNA, ITALY

ID: 10658
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Keeping the Lights on

Detection of Generator Earth-brush Fault Types from Shaft Voltage and Currents Measurements to monitor the performance of Earthing Brushes

Oupa MAILULA
Eskom Research, Testing & Development

ID: 10700
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Keeping the Lights on
Keywords: Deep learning; Wind turbine generators

Deep learning applied to bearing anomaly detection using advanced signal processing techniques

Marcos NISHIOKA, Yuri CROTTI, Tiago MATSUO, Emerson LIMA DO NASCIMENTO
Brazilian NC of CIGRE, Brazil; AQTECH

ID: 10701
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Keeping the Lights on
Keywords: Corona Effect; Corona Discharges; Corona glove; Partial Discharges; Relief Interface

Reconfiguration of the Corona Prevention System and Application to a Practical Case

Paulo VILHENA[1], Renan DUARTE[1], Fernando BRASIL[1], Jorge Johnny ROCHA ECHEVERRIA[2], Mauro UEMORI[2]
[1]Brazilian NC of CIGRE, Brazil; Eletrobras Eletronorte; [2]Brazilian NC of CIGRE, Brazil; Trassínio Consultoria

ID: 10702
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Keeping the Lights on
Keywords: Stator failure

The painful (and expensive) experience of having to remedy an avoidable stator failure

Rafael FERREIRA, André GARGHETTI
Brazilian NC of CIGRE, Brazil; CGT Eletrosul

ID: 10865
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Keeping the Lights on
Keywords: Hydro generator, Non-contact sensor, Condition monitoring and diagnosis, Partial discharge

Application of Non-contact On-line Partial Discharge Monitoring System to Hydro Generator

Takashi HARAKAWA, Tomoaki TAKAHASHI, Hideyuki NAKAMURA
Toshiba Energy Systems & Solutions Corporation, Japan

ID: 11004
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Keeping the Lights on
Keywords: Early fault detection, Exponential moving average, Long-short term memory, SCADA, Wind turbine.

Early fault detection of wind turbine generator based on SCADA data analysis using LSTM Autoencoder

Hidayet YAKUPOGLU[1], Haluk GOZDE[2], M. Cengiz TAPLAMACIOGLU[3]
[1]Turkish Electrical Transmission Corporation (TEİAŞ) Türkiye; [2]Turkish Aerospace Industries Türkiye; [3]Gazi University Türkiye

ID: 11047
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Keeping the Lights on
Keywords: EL CID, high frequency, hot spots, interlaminar faults, stator core

EL CID Testing of Rotating Electrical Machines at Elevated Excitation Frequencies

Nick STRANGES[1], Mladen SASIC[1], David R BERTENSHAW[2]
[1]QUALITROL® LLC - Iris Power, Canada; [2]ENELEC LTD, United Kingdom

ID: 11661
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Keeping the Lights on
Keywords: diagnostics, hydrogenerator, stator to rotor eccentricity, vibration and air-gap measurements

Mechanical Diagnostic Campaign of a 415 MW Vertical Francis Hydro-Unit

Ozren ORESKOVIC[1], Ozren HUZNJAK[1], Damijan CERINSKI[2], Andrija KOSTELAC[3], Lucas Eduardo GUNE[4]
[1]Veski Ltd Croatia; [2]4-cube Croatia; [3]Visum Energy Croatia; [4]Hidroeléctrica de Cahora Bassa Mozambique

ID: 11712
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Keeping the Lights on

Evaluation and Assessment of Operational Data for Condition Based Service Interventions on Synchronous Machines

Sven MUSIELAK, Hendrik STEINS
Siemens Energy Global, Germany

ID: 11813
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Keeping the Lights on
Keywords: Burn-out test, Generator stator, Ground fault generator, Locate phase-to-ground fault

Locate Generator Stator Phase-to-ground Fault Point by Burn-out Test

Aticha WONGKHAMLA, Passapong PORNPACHARAPUN, Yodsanon WITITTHUMAKUN, Apichart PALATORNPARIRUK
Electricity Generating Authority of Thailand (EGAT), Thailand

A2 - POWER TRANSFORMERS AND REACTORS

PS1 - DESIGN OF RESILIENT TRANSFORMERS

ID: 10122
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Impact of Front of Wave Impulse Testing on Dielectric Design of Transformer

Dharam VIR, Pradeep RAMASWAMY, Tim ROCQUE, Ajith VARGHESE
Prolec-GE Waukesha, United States of America

ID: 10148
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Comparison of Structural Strength of UHV AC Transformers with Different Outgoing Modes under Arc Fault in Oil

Yikun ZHAO[1], Ke WANG[1], Jinzhong LI[2], Shuqi ZHANG[1], Jiaxi LI[1]
[1]China Electric Power Research Institute,China; [2]State Grid Corporation of China,China

ID: 10149
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Research on the Static Stress Distribution of Winding Transposition Structure under External Short-circuit Fault

Yi ZHAO[1], Tao WEN[1], Weijiang CHEN[2], Guangjin ZHANG[3], Ke WANG[4], Jinzhong LI[2]
[1]Hefei university of technology,China; [2]the State Grid Corporation of China,China; [3]Xi'an Jiaotong University,China; [4]China Electrical Power Research Institute,China

ID: 10150
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Transformer Winding Deformation Monitoring Technology Based on Distributed Fiber Optic

Peng LI, Zhengyu XU, Zuoxian WANG, Shuqi ZHANG, Huanchao CHENG
CEPRI,China

ID: 10157
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Research on Analysis for Fire and Explosion Prevention Capability of Large Transformers and its Improvement Measures

Jun DENG, Zhicheng XIE, Zhicheng PAN, Haibin ZHOU
China Southern Power Grid, Co., Ltd. , China

ID: 10256
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers
Keywords: Insulating liquid, requirements, dielectric properties, ageing stability, LCA

Insulating liquid requirements for power transformers

Christophe PERRIER, Marielle MARUGAN, Sébastien LOUISE, Juliette SULPICE
GE Grid Solutions, France

ID: 10259
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers
Keywords: Powers transformers, floating offshore, applications, technology, potential failure

Stresses on Power Transformers in Floating Offshore Applications

Triomphant NGNEGUEU[1], Max GILLET[1], Vivekkumar CHAUBEY[2], Rupesh DARIPA[2], Oguzkan SENTURK[3], Tobias STIRL[4], Jian ZHANG[5], Hongbiao SONG[6]
[1]Grid Solutions , GE Vernova, France; [2]Grid Solutions , GE Vernova, India; [3]Grid Solutions , GE Vernova, Turkey; [4]Grid Solutions , GE Vernova, Germany; [5]Grid Solutions , GE Vernova, China; [6]Grid Solutions , GE Vernova, USA

ID: 10351
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Natural Ester in Arc-Furnace Transformers for Steel Production

Fabio SCATIGGIO
A&A Fratelli Parodi, IT

ID: 10402
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Thermal and Electrical Designs of Transformers by Considering Different Insulating Liquids

Qiang LIU[1], Sicheng ZHAO[1], Haichuan YU[1], Zhongdong WANG[1], Mark WILKINSON[2], Massimo NEGRO[3], Christoph KRAUSE[3], Andree HILKER[4], Ed Van SCHAIK[5], Muhammad DAGHRAH[6], Attila GYORE[6]
[1]The University of Manchester UK; [2]SGB-SMIT Group Netherlands; [3]Weidmann Electrical Technology AG Switzerland; [4]Shell Global Solutions Germany; [5]Shell Downstream Services International BV Metherland; [6]M&I Material Ltd UK

ID: 10489
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Challenges regarding Factory acceptance Test of large offshore Shunt Reactors

Daniel WIKBERG
Hitachi Energy Sweden AB, Sweden

ID: 10517
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers
Keywords: GIC, GMD, harmonics, reactive power, temperature, sound, transformer

GIC Field Test on 500 kV Single-Phase Transformers

Bart SIMONS[1], Luc DORPMANNS[1], Roland BRANDIS[2], Adedasola A. ADEMOLA[2], Andy SCHUETZINGER[2], Robert ORNDORFF[2], Marlu DEVERICK[2], Francisco VELEZ-CEDENO[2], Katelynn VANCE[2], Micah J. TILL[2], Mike LAMB[2], Matthew GARDNER[2], Emanuel BERNABEU[3]
[1]Royal SMIT Transformers B.V.; [2]Dominion Energy; [3]PJM

ID: 10543
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Dynamic model analysis of shell power transformers under short circuit vibration and the influence in the tank design

Miguel AGUIRRE[1], Daniel GARCÍA-VALLEJO[2], Jesús VÁZQUEZ[2], Carlos NAVARRO[2]
[1]Hitachi Energy, Spain; [2]Universidad de Sevilla, Spain

ID: 10545
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Design of transformers suitable for different insulating liquids

Andres AGUADO, Izaskun ARICETA, Diego LUMBRERAS, Miguel MARTINEZ
i-DE Redes Eléctricas Inteligentes, Spain

ID: 10546
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers
Keywords: Life Extension, Sustainability, Transformer

Transformer Sustainable Refurbishment for Ultra Long-Life

Ed TENYENHUIS[1], Lars Andreas ERIKSSON[2], Goizeder PAJARO[3]
[1]Hitachi Energy, Canada; [2]Hitachi Energy, Norway; [3]Hitachi Energy, Spain

ID: 10611
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Resilient Transformers – Holistic Approach Considering Aspects in Operation, Maintenance and Design

Radoslaw SZEWCZYK[1], Jean-Claude DUART[2], Anastasia O'MALLEY[3], Robert MAYER[4], Ewald SCHWEIGER[5]
[1]DuPont, Poland; [2]DuPont, Switzerland; [3]Consolidated Edison Co. of NY, USA; [4]Siemens Energy, Austria; [5]Siemens Energy, Germany

ID: 10659
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Optimized design methodology of a resilient power transformer

Mphumuzi KHOZA
ACTOM HIGH VOLTAGE EQUIPMENT

ID: 10660
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Multidisciplinary approach to achieving resilient transformers – an end user perspective

Sidwell MTETWA
Eskom Holdings SOC Limited

ID: 10712
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Swiss Experience in IEC Short Circuit Testing of Distribution Transformers

Marcel STOECKLI[1], Bruno BOSNJAK*[2], Rolf FLURI[3], Davide BOTTA[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Rauscher & Stoecklin AG, Switzerland; [3]R&S Group, Switzerland

ID: 10714
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Design evaluations with advanced insulation systems for resilient transformers

Marcel STOECKLI[1], Jean-Claude DUART*[2], Peter HATOS[3], Marco MILONE[3], Frank KUEBLER[4]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]DuPont, Switzerland; [3]SGB-SMIT Group GmbH, Germany; [4]Krempel, Germany

ID: 10733
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

GIC Test with Mock-up Transformer for Verification of Temperature Rise Calculation

Heesung YOON, Cheul Hyeok CHANG, Woo Heng HEO
Hyosung Heavy Industries, Korea, Republic of (South Korea)

ID: 10784
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Power Transformer Protection against Geomagnetic Induced Currents: Thyristor Neutral Earthing

Aleksandr KHRENNIKOV[1], Alexey KUVSHINOV[2], Vera VAKHNINA[2]
[1]S&T Centre of Rosseti FGC UES, Russian Federation; [2]Togliatti State University, Russian Federation

ID: 10785
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Identification of Switching Operations Leading to Harmful Fast Transient Overvoltages in Power Transformers Windings

Vasily LARIN[1], Anton ZHUYKOV[2], Daniil MATVEEV[3], Mikhail FROLOV[3], Andrey SELIKHANOVICH[4], Alexander SMIRNOV[5]
[1]VEI – branch of RFNC-VNIITF, Russian Federation; [2]FACTS Plus, LLC, Russian Federation; [3]National Research University «MPEI», Russian Federation; [4]BO-Energo, LLC, Russian Federation; [5]SMTT High-Voltage Solutions, LLC, Russian Federation

ID: 10840
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers
Keywords: Arc resistant design, finite-element method, power transformers, specifications

Specifications for a Calculation Procedure to Achieve an Adequate Arc-resistant Design for Power Transformers and Reactors

Jean-Bernard DASTOUS
Hydro-Québec, Canada

ID: 10886
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

On-site GIC withstand experiment on a 1000 MVA 3-limb autotransformer and a 300 MVA 5-limb transformer Part 1: Design, Modelling, Instrumentation, DAQ and Testing

Roald KLEIVI[1], Dietrich BONMANN[2], Claes CARRANDER[3]
[1]Statnett; [2]Hitachi Energy Germany; [3]Hitachi Energy Sweeden

ID: 10936
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers
Keywords: Transformers, Resilient, Power, Systems

Flexible Transformers for Resilient and Adaptable Power Systems

Enrique BETANCOURT-RAMIREZ[1], Juan Gonzalo CASTELLANOS-GONZALEZ[1], Omar MENDEZ-ZAMORA[1], Ibrahima NDIAYE[2]
[1]Prolec-GE International, Mexico; [2]GE Research, USA

ID: 11026
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

On Energizing Power Transformer in Offshore Cold Climate Applications: Challenges using Natural Ester Liquids

Ahmed GAMIL
Hitachi Energy Germany AG, Germany

ID: 11033
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

On-site GIC withstand experiment on a 1000 MVA autotransformer and a 300 MVA 5-limb transformer Part 2: Measurements and Evaluation

Dietrich BONMANN[1], Roald KLEIVI[2], Claes CARRANDER[3]
[1]Hitachi Energy Germany AG, Germany; [2]Statnett Norway; [3]Hitachi Energy Germany AG, SVEDEN

ID: 11136
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Summary of In-Service Assessment of Synthetic Ester Filled Transformers

Muhammad DAGHRAH[1], Rafat AL JARRAH[2], Ayham BAKHEER[3]
[1]M&I Materials Ltd UK; [2]Princess Sumaya University for Technology Jordan; [3]Jordan Electric Power Company Ltd Jordan

ID: 11156
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers

Design of rupture-proof transformers equipped with on-load tap-changer in the event of internal arc failures

Moritz BENGLER[1], Michael STEMPLINGER[1], Marc FOATA[1], Sebastian REHKOPF[1], Ewald TASCHLER[2], Martin STOESSL[2], Monther SARI[2]
[1]Maschinenfabrik Reinhausen GmbH; [2]Siemens Energy Austria GmbH

ID: 11237
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Design of Resilient Transformers
Keywords: Earthquake, Seismic design, Transformer, Diagnosis, Coil slide

Seismic strengthening of large-capacity transformers and methods of diagnosis in the event of a huge earthquake

Atsushi ETO, Keisuke YOKOHATA, Yuki ISHIKAWA
TEPCO Power Grid, Inc., Japan

ID: 11282
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Short Circuit Tested Power Transformer FAT Healthiness check

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NTPC, India

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Indian Experience of Reactive Power Compensation at 220kV Grid using Variable Shunt Reactor (VSR) for Voltage Stability

Ayyaj MANER*, Manali SARVANKAR*, Raiju HASSAN, Vini VAZHAPPULLY, Sonu KAREKAR, Mahesh AMBARDEKAR
Adani Electricity, India

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Topics: A2 PS1 - Design of Resilient Transformers
Keywords: Extreme weather, Hydro power, Optical fibre, Specification, Transformer

EDF specifications for hydro power transformers

Olivier VACHERON[1], Mohamed RYADI[2], Dominique SOURIE[1], Jean SANCHEZ[3]
[1]EDF CIH, France; [2]EDF LAB, France; [3]EDF DTG, France

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Topics: A2 PS1 - Design of Resilient Transformers
Keywords: High-frequency model, Non-standard impulse waveforms, Power transformer, Overvoltages, White-box model

Calculation of Internal Transformer Overvoltages for Non-Standard Impulse Waveforms

Zvonimir JURKOVIC[1], Bruno JURISIC[1], Mladen MARKOVIC[2], Tomislav ZUPAN[1]
[1]Končar – Electrical Engineering Institute Ltd, Zagreb, Croatia; [2]Končar – Distribution and Special Transformers Inc. Zagreb, Croatia

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Keywords: Dynamic effect, Internal arcing, Short-circuit, Tank expansion, Transformer

A Qualitative Analysis on the Consequences of Neglecting Dynamic

Ashwin PADMANABAN, Philippe MAGNIER, Didier HAMOIR
SERGI Transformer Protector, France

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Calculation and visualization of forces on leads during short circuit of a large offshore power transformer with axially split dual MV windings

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Končar Power Transformers Ltd. – A Joint Venture of Siemens Energy and Končar Croatia

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DC Injection Testing on In-Service Power Transformers for Replicating GIC

Soren SUBRITZKY[1], Andrew LAPTHORN[1], Stewart HARDIE[1], Michael DALZELL[2]
[1]University of Canterbury, New Zealand; [2]Transpower New Zealand

PS2 - ADVANCES IN TRANSFORMER ANALYTICS

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Topics: A2 PS2 - Advances in Transformer Analytics
Keywords: Powers transformers, maintenance, critical outage, technical policies, strategy

RTE's Large Power Transformers: new fleet management strategy

Abasse TIMERA[1], Rudy BLANC[1], Benoît IZAC[2], Philippe CLAUDE[3]
[1]RTE France Substation Expertise Dpt., France; [2]RTE France Asset Management Dpt., France; [3]RTE France R&D Dpt., France

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Vibration Characteristics and Typical Mechanical Failure Analysis of Converter Transformer

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China Southern Power Grid, Co., Ltd. , China

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Advances in Transformer Analytics
Keywords: Artificial Intelligence, Asset Defect Detection, Maintenance, Machine Learning

Applied AI for the Maintenance Optimization of Unit Substation Transformers

Po-Chen CHEN[1], Cara GILAD[1], Ankush AGARWAL[1], Bobby BESHARATI[1], Jeff SWIATEK[2]
[1]Exelon Corporation, United States of America; [2]PECO, An Exelon Company, United States of America

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Analysis of Non-accelerated Thermal Aging of Model Windings Immersed in Mineral Oil and Natural Ester

Diego ROBALINO[1], Matias MEIRA[2], Raul ALVAREZ[3], Fabio SCATIGGIO[4]
[1]MEGGER, United States of America; [2]INTELYMEC (UNCPBA), Argentina; [3]IITREE-FI-UNLP, Argentina; [4]A&A Fratelli Parodi SpA, Italy

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Power Transformer Digital Twin: Incorporating Thermodynamic and Water Diffusion Discrete Elements Model for Enhanced Aging Calculation

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Hitachi Energy, United States of America

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Data Analytics for Transformer Dissolved Gas Analysis to Aid Asset Management

Zhongdong WANG[1], Thathsara HERATH[1], Qiang LIU[1], Gordon WILSON[2], Ruth HOOTON[2], David WALKER[3], Timothy RAYMOND[4], Luke van der ZEL[4]
[1]The University of Manchester UK; [2]National Grid Electricity Transmission UK; [3]SP Energy Network UK; [4]Electric Power Research Institute USA

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Data Mining for Targeted PCBs Management of Pole Mounted Transformers

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Analysis of Simplifications and Accuracy of a Thermal-hydraulic Model of Core-type Power Transformer Winding

João SILVA, Beatriz OLIVEIRA, Catarina SOUSA, Sandra COUTO, Ricardo CASTRO LOPES
EFACEC Energia, S.A., Portugal

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Evaluation of the Hot-Spots' Location during Dynamic Loading of a Natural Ester Cooled Power Transformer

Beatriz OLIVEIRA, Catarina CORTE-REAL, João SILVA, Sandra COUTO, Ricardo CASTRO LOPES
EFACEC Energia, S.A., Portugal

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Modelling the Thermal-Hydraulic Behaviour of Shell-Type Power Transformers: analysing the 'reality gap' by experimental validation

Sandra COUTO, Beatriz OLIVEIRA, Catarina CORTE-REAL, João SILVA, Ricardo CASTRO LOPES
EFACEC Energia, S.A., Portugal

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Artificial Intelligence in Transformer Manufacturing

Robin AXELSSON
Hitachi Energy Sweden AB, Sweden

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Advances in Transformer Analytics
Keywords: Measuring uncertainty of isolation coefficients, network unbalance, on-line bushing monitoring

Application of Online Bushing Monitoring With Low Measurement Uncertainty

Marek ANDRZEJEWSKI, Wiesław GIL, Wiktor MASŁOWSKI
MIKRONIKA, Poland

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Topics: A2 PS2 - Advances in Transformer Analytics

The evolution of power transformer appraisal methodology towards an effective and efficient risk assessment for the South African power utility

Sidwell MTETWA
Eskom Holdings SOC Limited

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Topics: A2 PS2 - Advances in Transformer Analytics

The usefulness of capacitive moisture sensors in online gas analysers

Carl WOLMARANS
GE Vernova M&D

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Topics: A2 PS2 - Advances in Transformer Analytics

Non-uniform winding Temperature Distribution in directed cooling Mode

Tor LANERYD
Hiitachi Energy Sweden AB, Sweden

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Advances in Transformer Analytics
Keywords: Transformers Ageing; Renewable Energy Generation; Novel Thermo-Chemical Evaluation

Dynamic Loading of Transformers in Renewable Energy Generation: A Comparison of Traditional Methods and a Novel Thermo-Chemical Evaluation of Transformers Ageing

Wilerson CALIL, Alan SBRAVATI, Luiz V. CHEIM
Brazilian NC of CIGRE, Brazil; HITACHI ENERGY

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Advances in Transformer Analytics

Advancements in Dynamic Thermal Modelling of Power Transformers: Integrating Detailed Thermal Hydraulic Network Models

Patrick PICHER[1], Federico TORRIANO[1], Zoran RADAKOVIC[2], Marko NOVKOVIC[2]
[1]Hydro-Québec, Canada; [2]University of Belgrade, Serbia

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Topics: A2 PS2 - Advances in Transformer Analytics

Thermal Modeling of Power Transformer and Shunt Reactor Using Physics-Informed Neural Networks

Jhelum CHAKRAVORTY[1], Michele LUVISOTTO[2], Nicolo RIPAMONTI[3], Tor LANERYD[2]
[1]Hitachi Energy Research, Canada; [2]Hitachi Energy Research, Sweden; [3]Hitachi Energy Research, Switzerland

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Topics: A2 PS2 - Advances in Transformer Analytics

Detecting degraded bushings with DFR – A case study

Lars Andreas ERIKSSON[1], Evgenii ERMAKOV[2], Lars JONSSON[2], Erik NICOLAISEN[3]
[1]Hitachi Energy Norway; [2]Hitachi Energy Sweeden; [3]Statnett

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Advances in Transformer Analytics
Keywords: Clamping pressure; condition monitoring; power transformer; short circuit performance

Monitoring Clamping Pressure in 40 MVA Power Transformer: A Study of Short and Long-Term Trends

Inge MADSHAVEN[1], Henrik ENOKSEN[1], Stefan JAUFER[2], Chritoph KRAUSE[2], Borut PRASNIKAR[3], Asgeir MJELVE[4], Alexander RITBAUER[5], Mohamed RYADI[6]
[1]SINTEF Energy Norway; [2]Weidmann Switzerland; [3]Kolektor Etra Slovenia; [4]Elvia Norway; [5]Siemens Energy Austria; [6]EDF France

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Topics: A2 PS2 - Advances in Transformer Analytics
Keywords: transformer, cooling, thermal model, benchmarking, metrics, accuracy

Improvement and Validation of IEC dynamic Transformer thermal Model

Tim GRADNIK[1], Xiang ZHANG[2], Irina LUPANDINA[3], Remi DESQUIENS[4], Alvaro PORTILLO[5], Federico PORTILLO[6], Patrick PICHER[7], Zoran RADAKOVIC[8]
[1]Elektroinstitut Milan Vidmar (EIMV)Slovenian engineering and scientific research organisation; [2]Manchester Metropolitan University; [3]Technische Universität Wien; [4]EDF France; [5]Independent researcher; [6]Independent researcher; [7]Hydro-Québec; [8]University of Belgrade, ETF

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Topics: A2 PS2 - Advances in Transformer Analytics

Practical Considerations when using Online Transformer DGA Monitors

Varun GOYAL
Hydro One, Canada

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Topics: A2 PS2 - Advances in Transformer Analytics
Keywords: Transformation, Solid-Insulation

Digital Transformation of Power-Transformer Solid-Insulation Drying Process

Gerardo TAMEZ-TORRES, Enrique BETANCOURT-RAMIREZ
Prolec-Ge International, Mexico

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Advances in Transformer Analytics
Keywords: Partial Discharge (PD), PD Source Localization, PD Signal Propagation, Power Transformer, Ultra-high frequency (UHF) sensor

Modeling and Simulation to Analyze the Propagation of the Partial Discharge UHF Signals and Localization of Their Source in the Power Transformer

Djordje DUKANAC
Joint Stock Company "Elektromreza Srbije", Belgrade, Serbia

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Steady State and Dynamic Thermal Performance of Liquid-Filled Distribution Transformers

Ali AL-ABADI
Hitachi Energy, Germany

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Topics: A2 PS2 - Advances in Transformer Analytics

Results of Long-Term Monitoring for the Proof of Stability in the Switching Process of On-Load Tap-Changers based on Vibroacoustic Measurements

Karsten VIERECK[1], Anatoli SAVELIEV[1], Julia MASSMANN[2], Johannes VEIT[2]
[1]Maschinenfabrik Reinhausen GmbH, Germany; [2]Amprion GmbH, Germany

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Topics: A2 PS2 - Advances in Transformer Analytics
Keywords: Defect Location, Partial Discharge, Transformer, Ultra-High Frequency

Study on Estimation System of Partial Discharge Position in Oil/Gas Transformer

Byoung-Woon MIN, Danbi LEE, Jeong-Bok LEE, Kwang-Don BAE
HD Hyundai Electric, Korea, Republic of (South Korea)

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Australian and New Zealand transformer reliability analytics within the context of the international failure surveys

Daniel MARTIN[1], Zeenat HANIF[2], Stefan TENBOHLEN[2]
[1]Essential Energy; [2]University of Stuttgart

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Advancing Electrical Fault Diagnosis in Power Transformers with AI

David ALVAREZ[1], Oswaldo ARENAS[1], Jhonatan ANAYA[1], Isabella ARANGO[2]
[1]ISA Intercolombia; [2]Universidad Nacional

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Voltage harmonics and dc detection on power transformers via vibration measurement analysis

Dennis ALBERT[1,2], Andre WÜRDE[3], Christoph ENGELEN[1]
[1]OMICRON electronics; [2]TU Graz; [3]RWTH Aachen

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Topics: A2 PS2 - Advances in Transformer Analytics

Transformer Electromagnetic Modelling based on DC Hysteresis Measurements

Alexander FRÖHLICH[1], Dennis ALBERT[1,2], Martin A. STOESSL[3], Peter HAMBERGER[3], Gerald LEBER[3], Herwig RENNER[1]
[1]Graz University of Technology; [2]OMICRON electronics; [3]Siemens Energy

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Topics: A2 PS2 - Advances in Transformer Analytics

A Reliable Future in Power Transformers and Reactors Through Proactive Bushing Management

Elkin CANTOR
ISA Intercolombia

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Topics: A2 PS2 - Advances in Transformer Analytics
Keywords: Shunt reactor, Deterioration, Aging, Criteria of Replacement

Detailed study of aging shunt reactors to determine suitable maintenance and replacement strategies

Shunsuke TAMURA, Ryo SAEKI, Atsushi ETO, Takashi YAMAMOTO, Harukazu AKIYAMA, Yasuhiko HANAMAKI
TEPCO Power Grid, Inc., Japan

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Power Transformer Diagnostics using Magnetic and Acceleration Sensors

Kohei YAMAGUCHI, Akira AMAGISHI, Mizuki OGI, Satoshi ICHIMURA, Yusuke TAKENAKA, Kota DOI
Hitachi Ltd., Japan

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Topics: A2 PS2 - Advances in Transformer Analytics
Keywords: Dissolved gas analysis, Fault detection, Machine learning, Oil-immersed transformer

Incipient fault detection method for oil-immersed transformer using time series .data of dissolved gas analysis

Shunichi HATTORI, Kosuke MIKUNI, Hiroshi MURATA, Taisei HOMMA, Satoru MIYAZAKI, Yoshinobu MIZUTANI
Central Research Institute of Electric Power Industry, Japan

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Advances in Transformer Analytics
Keywords: Aging diagnosis, Degree of polymerization, Power transformer, Thermal deterioration characteristics, Thermally upgraded paper

Diagnostic method for thermal deterioration of insulation paper used in power transformers based on winding temperature calculation - Extension to thermally upgraded paper -

Satoru MIYAZAKI, Yoshinobu MIZUTANI
Central Research Institute of Electric Power Industry, Japan

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Determination of Short-Circuit Reactance of Transformers from Sweep Frequency Response Analysis Measurements

Sreeram V*, Rajkumar M, Rajaramamohanarao CHENNU, T GURUDEV, S Sudhakara REDDY
Central Power Research Institute, India

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Development of AI-ML based Reliability Centred Maintenance Framework for Power Transformers and Reactors in Powergrid

Deo Nath JHA*, Amandeep SINGH, Devaprasad PAUL, Joseph George JOSE, P R S YADAV, Kuleshwar SAHU, Pradeep KUMAR
Powergrid, India

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A novel approach in Development of Furan and Methanol-Based Accelerated Ageing Model for Power Transformers and Shunt Reactors

Deo Nath JHA*, Rohit Kumar JAIN, P R S YADAV, Pradeep KUMAR
POWERGRID, India

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AI-Driven Intelligent Objective Analysis of SFRA Signatures for EHV Transformers and Reactors

Deo Nath JHA*, Maganti SIDDHARDHA, Akash TRIVEDI, Aakash KHANDELWAL, Keshav GUPTA
POWER GRID, India

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Topics: A2 PS2 - Advances in Transformer Analytics

Practical Implementation of Two-Dimensional Transformer Fleet Management Approach based on an example of a German Utility.

Alexei BABIZKI[1], Philipp BIRGMEIER[1], Martin GUTH[1], Rolf FUNK[2], Martin KNAPP[2]
[1]Maschinenfabrik Reinhausen GmbH, Germany; [2]Rheinische NETZGesellschaft mbH, Germany

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Shared digital twins as approach for the data-sovereign collaboration between TSO and 3rd Party in the condition assessment of a transformer fleet

Bastian FISCHER[1], Christian HOFMEISTER[1], Jochen JUNG[2], Michael GRATZA[2]
[1]Maschinenfabrik Reinhausen GmbH, Germany; [2]TenneT TSO GmbH, Germany

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Advancing Transformer Condition Assessment through Fuzzy Logic

Abdulla ALABBASI[1], Mohamed KHALIL[2]
[1]Bahrain Center for Strategic International and Energy Studies, Bahrain; [2]Doble Power Test,UK

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Topics: A2 PS2 - Advances in Transformer Analytics
Keywords: Cast resin transformer, FEM analysis, Load loss, Winding temperature rise

Characteristic Evaluation and Performance Analysis for Cast Resin Transformer of Large Capacity

Hongwoo JIN, Youngbae CHOI, Byungjun HWANG, Woonghee LEE, Jonggun LEE
HD Hyundai electric, Korea, Republic of (South Korea)

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Advances in Transformer Data Management and Analytics in Malaysian Grid Utility (TNB)'s Perspective

Gobi Kannan SUPRAMANIAM, So'adiah NANYAN, Roslina YASSIN
Tenaga Nasional Berhad, Malaysia

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Requirements for reliable Transformer Diagnostics

Evgenii ERMAKOV
Hitachi Energy Sweden AB, Sweden

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Predicting oil quality to support asset management decisions using Markov chains

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University of Wuppertal, Germany

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Topics: A2 PS2 - Advances in Transformer Analytics
Keywords: EMTP simulations, field measurements, high frequency model, lightning location system, overvoltages, power transformer

Simulations and Measurements of Lightning Overvoltages Transferred Through Power Transformers

Bruno JURISIC[1], Bozidar FILIPOVIC-GRCIC[2], Tihomir JAKOVIC[1], Tomislav ZUPAN[1]
[1]Končar – Electrical Engineering Institute Ltd. Zagreb Croatia; [2]University of Zagreb Faculty of Electrical Engineering and Computing,Zagreb Croatia

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Topics: A2 PS2 - Advances in Transformer Analytics

A new method for health index calculation using power transformers as an example

Mahmoud MOH'D, Henning SCHNITTKER, Peter WERLE
University of Hannover, Germany

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Dielectric Condition Assessment Index of Power Transformer a Case Study at UIT-JBM Population

Fermi TRAFIANTO, Indra KURNIAWAN, Didik Fauzi DAKHLAN, Ika SUDARMAJA
PT. PLN (PERSERO), Indonesia

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Enhancing Power Transformer Transmission Reliability Evaluating and Strategizing Online Monitoring Implementation for Power Transformer in PLN

Harry GUMILANG, Rahmat BETA, Andhy Dharma SETYAWAN, Tejo WIHARDIYONO
PT.PLN (Persero), Indonesia

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Topics: A2 PS2 - Advances in Transformer Analytics

Analysis of AC Transformer Reliability

Stefan TENBOHLEN[2], Dan MARTIN[1], Zeenat HANIF[2]
[1]Essential Energy; [2]University of Stuttgart

PS3 - RELIABILITY OF TRANSFORMERS FOR RENEWABLE ENERGY

ID: 10117
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Reliability of Transformers for Renewable Energy
Keywords: Electric vehicles (EVs), peak load shaving, voltage regulation, type of insulation system

1 How Charging Electric Vehicles Affects the Lifespan of Power Transformers : A Study from Aswan City

Mohamed ORABI[1], Al-Attar ALI[1], Omar ABDEL RAHIM[2], Mostafa ALI ELDAWY[3]
[1]Faculty of Engineering, Aswan University; [2]Egypt-Japan University of Science and Technology; [3]Upper Egypt Electricity Distribution Company

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Topics: A2 PS3 - Reliability of Transformers for Renewable Energy

Transforming the Future: The Innovative Design of Distribution Transformers

Andrea SOTO, Fernando XAVIER, Luís Almeno FERNANDES, Pedro Miguel SILVA, Luís Filipe AZEVEDO, Ricardo RIBEIRO, Ricardo CASTRO LOPES, Simão ALMEIDA, Valter PIMENTA
EFACEC Energia, S.A., Portugal

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Topics: A2 PS3 - Reliability of Transformers for Renewable Energy

Comparative analysis of Life Cycle Assessment methodology for a power transformer manufacturer's transition to Circular Economy

Ricardo RIBEIRO[1], Luís Almeno FERNANDES[1], Viviana PINTO[2], Filipa FARIA[2]
[1]EFACEC Energia, S.A., Portugal; [2]INEGI, Portugal

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Topics: A2 PS3 - Reliability of Transformers for Renewable Energy

Experimental analysis of transient overvoltage protections in distribution transformers

Víctor Manuel GARCÍA-CHOCANO, Antonio NOGUÉS
Hitachi Energy, Spain

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Reliability of Transformers for Renewable Energy
Keywords: Power transformers, Sustainability, Recommended practice, Carbon footprint

Standard Approach Towards Power Transformers' Sustainability through a Joint Industrial Project

Mohammad Reza SHAH[1], Christina LOSIFIDOU[2]
[1]DNV; [2]Siemens Energy

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Topics: A2 PS3 - Reliability of Transformers for Renewable Energy

Wind Farm Transformers. Relevance of FAT Tests for Safe and Reliable Operation

Raúl ALVAREZ[1], Leonardo CATALANO[1], Hernán MAYORA[2], Pablo MORCELLE[1], Tomas SCHMIDT[1]
[1]IITREE-FI-UNLP; [2]FI-UNLP

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Reliability of Transformers for Renewable Energy
Keywords: Dry-type transformer, Low carbon, Renewables, Sustainability

The sustainability benefits of liquid cooled dry-type transformers in renewable energy and vent-closed applications

Luiz OLIVEIRA, Müge ÖZERTEN, Ghazi KABLOUTI, Antonio NOGUÉS
Brazilian NC of CIGRE, Brazil; HITACHI

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Reliability of Transformers for Renewable Energy

Effects of Rooftop Photovoltaics on the Load Profile and Ageing of Distribution Transformers

Xin ZHONG[1], Chandima EKANAYAKE[1], Hui MA[1], Tapan SAHA[1], David FINK[2], Greg CALDWELL[2]
[1]The University of Queensland; [2]Energy Queensland Limited

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Topics: A2 PS3 - Reliability of Transformers for Renewable Energy

Development of multi-windings power transformer in frequency regulation system

Jaeyong PARK, Hyeon Gu JEONG, Seo Hyun LEE, Jae Seop RYU, Chae Yoon BAE, Jang Cheol SEO
LS ELECTRIC, Republic of Korea

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Reliability of Transformers for Renewable Energy

Investigation of the transformer winding shield design parameters on electrical performance

Serenay CURUKOVA KALE[1], Oluş SONMEZ[1], Yunus Berat DEMIROL[2], Bora ALBOYACI[3]
[1]Sönmez Transformatör Türkiye; [2]Genetek Güç&Enerji Türkiye; [3]Kocaeli University Türkiye

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[1]China Electric Power Research Institute, China; [2]Pinggao Group Co.,Ltd. , China; [3]Shandong Taikai high voltage swichgear CO., LTD. , China; [4]Dalian University of Technology, China

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[1]Exelon/ComEd, United States of America; [2]Moser-Glaser, Switzerland; [3]Pfisterer, Germany

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Takashi INAGAKI[1], Motohiro SATO[1], Frederick PAGE[1], Simon NEE[2], Tomas MODEER[2], Staffan NORRGA[2]
[1]Mitsubishi Electric Corporation, Japan; [2]Scibreak AB, Sweden

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Keywords: Circuit breaker, EMTP, ferroresonance, laboratory testing, resonance, voltage power transformer

Proposal of Testing Procedure for Resonance and Ferroresonance Inception Possibility in Instrument Transformers

Bruno JURISIC[1], Marijan PERKOVIC[1], Ivan NOVKO[1], Luka KOVACIC[2], Igor ZIGER[2], Tomislav ZUPAN[1]
[1]Končar – Electrical Engineering Institute Ltd. Zagreb, Croatia; [2]Končar – Instrument Transformers Inc. Zagreb, Croatia

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Keywords: Biodegradable Liquids, Combined Power Voltage Transformer, Rural Electrification

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Marijana NENADIC[1], Igor ZIGER[1], Ivan CRNKOVIC[1], Bruno JURISIC[2]
[1]Končar – Instrument Transformers Inc., Zagreb, Croatia; [2]Končar – Electrical Engineering Institute, Zagreb, Croatia

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Keywords: superconductivity, SFCL, HTS, relay protection

Prospects for Using Low-Resistance Superconducting Fault Current Limiter (SFCL) to Ensure the Operability of Relay Protection

Mikhail MOYZYKH, Daria KOLOMENTSEVA, Kirill BABURIN, Eldar MAGOMMEDOV
SJSC SuperOx, Russian Federation

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Keywords: Composite insulators, Substations, UHV AC/DC applications, Life-cycle costing

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Eric MOAL[1], Madhu SUDAN[2], Shuchen ZHOU[3], Sida ZHANG[3]
[1]JACKSON AND FRANK, France; [2]GE India Industrial Pvt LTD., India; [3]Jiangsu Shemar Electric CO., LTD, China

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Topics: A3 PS2 - Lowering the Carbon Footprint of T&D Equipment
Keywords: Gas Insulated switchgear, Metal enclosed, SF6-free, Circuit- breaker, GIS Bay

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GE Vernova, France

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Cathode spots behavior on gradient CuCr contact material

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Keywords: C4-PFN, Expected Lifetime, Gas Components, Aging, Thermal Cycling

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The effect of humidity on the AC breakdown behavior of SF6-replacing C4-FN/CO2 (5%/95%) with different humidities and operating pressures and the effect of humidity on its corona behavior

Ewout VAN VELDHUIZEN, André LATHOUWERS, Christian MIER, Mohamad GHAFFARIAN NIASAR
Delft Technical University

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Topics: A3 PS2 - Lowering the Carbon Footprint of T&D Equipment
Keywords: SF6 alternatives, C4-FN, Fluoronitrile, HVCB, 245kV, SLF, outdoor application, AIS, single break, EU LIFE program, Decarbonization

SF6-Free AIS high-voltage circuit-breaker capability and performances

David BERARD, Antonin BOBEAU, Joel OZIL, Blandine REVAUD
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Partial Discharge Measurement in SF6-Alternative Electrical Insulation Systems

Alistair REID[1], Rahmat ULLAH[1], Fatima ELENEZI[1], Manu HADDAD[1], Peter TADDEI[2], Mini NAMBIAR[2], Matthew BARNETT[2]
[1]Cardiff University UK; [2]SSEN Transmission UK

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How working with customers on specifications leads to reduced carbon footprint impact

Ixone URRUELA, Asier ZORROZUA, Sonia GONZALEZ, Eneko MADARIAGA
Arteche Group, Spain

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Keywords: Metal Additive Manufacturing Technology; Circuit Breaker Maintenance

Advancing Circuit Breaker Maintenance and Repair through Metal Additive Manufacturing Technology

Alexandre PINHEL[1], Rodrigo MAIA[1], Gabriel Ângelo VIEIRA[1], Anselmo THIESEN[2]
[1]Brazilian NC of CIGRE, Brazil; Eletrobras Furnas; [2]Brazilian NC of CIGRE, Brazil; SENAI-SC

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SF6-alternative 145 kV metal enclosed circuit breaker

Marcel STOECKLI[1], Patrick STOLLER*[2], Mahesh DHOTRE[2], Brooke SPREEN[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy Switzerland Ltd, Switzerland

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Keywords: High voltage circuit breakers, dielectrics, rise of dielectric withstand, controlled switching, SF6 alternatives

RDDS and RRDS characterization for 420 kV 63 kA SF6-free High Voltage Circuit Breaker

Marcel STOECKLI[1], Reto KARRER*[2], Valeria TEPPATI[2], Mahesh DHOTHRE[2], Sami KOTILAINEN[2], Peter FREI[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy, Switzerland

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Topics: A3 PS2 - Lowering the Carbon Footprint of T&D Equipment
Keywords: High voltage circuit breakers, SF6 alternatives, C4-FN mixtures, computational fluid dynamic simulations, short line faults, terminal faults

Development and type testing of a 420 kV 63 kA 50 Hz and 60 Hz SF6-free High Voltage Circuit Breaker

Marcel STOECKLI[1], Valeria TEPPATI*[2], Reto KARRER[2], Mahesh DHOTRE[2], Peter FREI[2], Patrick STOLLER[2], Markus BUJOTZEK[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy, Switzerland

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Topics: A3 PS2 - Lowering the Carbon Footprint of T&D Equipment
Keywords: SF6-free, C4-FN, GIS, CB, short-circuit, switching

72.5 kV C4-FN/O2/CO2 GIS and CB performance and comparison with its SF6-equivalent

Marcel STOECKLI[1], Maxime PERRET*[2], Robert LUESCHER[2], Clement COCCHI[2], Bernhard SPICHIGER[2], Alexis COMBAZ[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]GE Vernova, Switzerland

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Topics: A3 PS2 - Lowering the Carbon Footprint of T&D Equipment
Keywords: Decarbonisation, Environmental impact indicator, Gas insulated switchgear, High voltage circuit breaker, Life cycle assessment, fluoronitriles

Evaluation of Environmental Impact of SF6-based SP-3 and SF6-free GREENTRICtm 145 kV High Voltage Gas Insulated Switchgear through Life Cycle Assessment

Marcel STOECKLI[1], Kedar PANDYA*[2], Manuel GOTTI[2], Nicole SONG[3], Javier MANTILLA[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hyundai Electric Switzerland Ltd, Switzerland; [3]Hyundai Electric Ltd, South Korea

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Keywords: HVCB, CO2 footprint, decarbonization, C4F7N, GWP, F-gas regulations, x-ray emissions-free, CFD, MOO, terminal faults, recovery voltage, carbon-neutral

Experience in the development of a Fluoronitriles-based 145 kV / 40 kA / 50-60Hz HVCB with an extremely low CO2 footprint

Marcel STOECKLI[1], Manuel GOTTI*[2], Hyung CHOON[2], Jeong Cheol KIM[3], Sihyeong KIM[3], Xiangyang YE[2], Javier MANTILLA[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hyundai Electric Switzerland Ltd, Switzerland; [3]Hyundai Electric Ltd, South Korea

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Topics: A3 PS2 - Lowering the Carbon Footprint of T&D Equipment
Keywords: HVCB, Fluoronitriles, grading capacitors, pre-insertion resistors, ferro-resonance

Experience and considerations in the development of a non-SF6 Fluoronitriles-based 420 kV, 63 kA, 60 Hz HVCB using grading capacitors and pre-insertion resistors

Marcel STOECKLI[1], Timothy SUTHERLAND*[2], Manuel GOTTI*[2], Sylwia BRYNDA[2], Dong Hoon LEE[3], Hyunseok KI[3], Javier MANTILLA[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hyundai Electric Switzerland Ltd, Switzerland; [3]Hyundai Electric Ltd, South Korea

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High Voltage type testing of a 420 kV SF6-free High Voltage Circuit Breaker for Gas Insulated Switchgear and Dead Tank Breaker Applications

Marcel STOECKLI[1], Peter FREI*[2], Reto KARRER[2], Wilhelm THUNBERG[2], Valeria TEPPATI[2], Brian CHRISTOPHER[3], Marc CUPPETT[3], Carl R. KURINKO[3]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy, Switzerland; [3]Hitachi Energy, United States

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Future Needs and Common Approach of the Implementation of SF6 Free Equipment in the Grid of Six European TSOs

Frank RICHTER[1], Lisa SCHAEFER[1], Aurelien TAUREAU[2], Jonas BAUMANN[3], Thomas WIJNHOVEN[4], Maria Isabel MARTIN DIAZ-TOLEDO[5], Patrick SCHOERNBOECK[6], Pierre MEYER[2]
[1]50Hertz Transmission GmbH, Germany; [2]RTE, France; [3]Swissgrid AG, Switzerland; [4]Elia Transmission, Belgium; [5]REDEIA, Spain; [6]APG, Austria

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Keywords: SF6 Free, GIS, Alterntive

SF6 Free 170kV 50kA GIS verification test considering substation energization

Sooik LEE, Dongwook MOON, Kwangjoong LEE, Seungwan SON
Hyosung Heavy Industries Corporation, Republic of (South Korea)

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F-gas-free, zero-emission clean air switchgear for 420 kV

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Siemens Energy, Germany

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Keywords: Ground fault, Micro-gap, SF6 alternative gas, Temperature measurement

Hot Gas Temperature Measurement in High Voltage Circuit Breakers Using Micro-gaps in SF6-free circuit breakers

Man-Jun HA, Jung-Ho PARK, Dong-Hoon JEONG
Hyosung Corporation

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Keywords: Global warming, Life cycle assessment (LCA), SF6 gas, Switchgears

A Common LCA Format for High-Voltage Switchgears

Toshiyuki UCHII[1], Satoshi TAKAHASHI[2], Haruhiko KOYAMA[2]
[1]Toshiba Energy Systems & Solutions Corporation, Japan; [2]JEMA (The Japan Electrical Manufacturers' Association) , Japan

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Lifetime Aspects and Experiences through Commercial Operations of 72 kV SF6-free Gas-Insulated Switchgear using Natural Origin Gas

Tomoya ONISHI[1], Toru KOIKE[1], Akihisa MUKAIDA[1], Hideaki SHIRAI[1], Shigeyuki TSUKAO[2], Syuichi TAMURA[2]
[1]Toshiba Energy Systems & Solutions Corporation, Japan; [2]TEPCO Power Grid, Inc., Japan

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Keywords: Gas-insulated switchgear (GIS), Synthetic air, Vacuum circuit-breaker (VCB), Vacuum interrupter (VI)

Application of SF6 alternative switchgears in Japan - circuit-breakers and GIS using vacuum insulator in synthetic air-insulated systems

Naoya AIHARA[1], Ryosuke ITOTANI[2], Koki SADAHIRO[2], Shinichiro NAKAUCHI[1], Kenji SASAMORI[1]
[1]Mitsubishi Electric Corporation, Japan; [2]Kansai Transmission and Distribution, Inc., Japan

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Keywords: Carbon neutral, Compactness, SF6-free, Solid-insulated switchgears, Solid insulation

Long operational experiences of medium-voltage solid-insulated switchgears

Satoru MAENO[1], Yuk ISHIKAWA[2], Ryosuke ITOTANI[3], Yoshimitsu NIWA[4], Hiroyuki SHIRAI[5]
[1]Mitsubishi Electric Corporation, Japan; [2]TEPCO Power Grid, Inc., Japan; [3]Kansai Transmission and Distribution, Inc., Japan; [4]Toshiba Infrastructure Systems & Solutions Corporation, Japan; [5]Hitachi Industrial Equipment Systems Co., Ltd., Japan

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SF6 alternatives in GIS/AIS Switchgear and challenges faced in its execution and project management

Ravi Sushant CHAUDHARY*, Anshul SHARMA, R. P. S. RANA, M. THIRUMALA
POWERGRID, India

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Subject - Life cycle management and life extension of AIS/GIS Switchgear, FACTS equipment by application of RCM

Ravi CHAUDHARY*, Amit KUMAR, R. P. S. RANA, Kuleshwar SAHU, M. Thirumala REDDY
POWERGRID, India

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Experimental and Analytical Estimation of Breakdown Voltage of Fluoronitrile gas mixture for EHV Gas Insulated Switchgear

Mohana Rao M*, Uday Kumar M, Sulabh AGARWAL, Moutusi PAUL
BHEL R&D, India

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Utilization of smart measurement technologies to improve medium voltage switchgear sustainability

Roman PERNICA, Karol MAJER, Pavel VANO
ABB Czech Republic

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F-gas-free Natural Origin Gases for MV GIS, to manage a low carbon energy transition

Thomas DUERR
Siemens AG & Siemens Ag France, Germany

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Topics: A3 PS2 - Lowering the Carbon Footprint of T&D Equipment
Keywords: Biodegradable Liquids, Dielectric Performance, Instrument Transformers, Partial Discharge, Simulated Aging

Implementation of Various Biodegradable Insulation Liquids in Instrument Transformers Rated at 420 kV

Kresimir KOPRIVEC[1], Igor ZIGER[1], Darko IVANOVIC[1], Tomislav ZUPAN[2]
[1]Končar – Instrument Transformers Zagreb, Croatia; [2]Končar – Electrical Engineering Institute Zagreb, Croatia

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Keywords: Low power instrument transformers, electrical networks, TSO Experience, High voltage applications, evolutions

Status of the utilisation of Low Power Instrument Transformers in electrical networks

Laurent ROUX
RTE, France

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Research on Magnetic-controlled Vacuum Arc Technology and Circuit Breaker Development

Jianying ZHONG, Xiaoming ZHAO, Hang ZHANG, Wenkui LIU, Bingzheng GONG
Pinggao Group Co., LTD , China

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Keywords: SF6-alternatives, Health Index, Asset Performance Management, Partial Discharges, UHF measurement

Health Index computation in Switchgear Monitoring Systems: providing Asset Performance Management crucial data straight from the primary equipment

Nicolas GADACZ, Jean-Luc RAYON, Eros STELLA, Samuel FIFI, Raphaël LEBRETON
GE Vernova, France

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Topics: A3 PS3 - Maintaining and Management T&D Assets
Keywords: SF6 Alternatives, Smart Live Tank Circuit Breaker, Asset Performance Management, Monitoring, Control

Return on Experience of Smart Live Tank Circuit Breaker with SF6-Alternative

Nicolas GADACZ[1], Henrik Roland HANSEN[2]
[1]GE Vernova, France; [2]Energinet, Denmark

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Topics: A3 PS3 - Maintaining and Management T&D Assets
Keywords: fault detection and classification, power transmission systems, two-stage detection systems, and optimal and secure power transmission systems

Enhancing Fault Detection and Classification in Power Transmission Systems Using Two-stage Detection System

Hassan MAHMOUD[1], Haitham H MAHMOUD[2]
[1]Egyptian Electricity Holding Company; [2]Birmingham City University

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Topics: A3 PS3 - Maintaining and Management T&D Assets
Keywords: Condition Monitoring, Digital Twin

Condition Monitoring Analyses: from Straightforward to Surprising

Tony MCGRAIL[1], Jamie BEARDSALL[2], Carl JOHNSTONE[3], Rachael SUH[4]
[1]Doble Engineering, United States of America; [2]Drax Power, United Kingdom; [3]i4 Asset Management, United Kingdom; [4]Energy Harbor, United States of America

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Keywords: Active Condition Monitoring, Asset Performance Management, Condition Assessment, Investment Planning, Maintenance Optimization

Utilizing Asset Performance to Guide Asset Replacement and Maintenance Optimization Decisions at TVA

Jeffrey H. NELSON[1], Jay JAYARAMAN[2], Siri VARADAN[2]
[1]Tennessee Valley Authority, United States of America; [2]Hitachi Energy, United States of America

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Daniele PALLADINI
RSE, Italy

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Topics: A3 PS3 - Maintaining and Management T&D Assets
Keywords: Condition monitoring; Historical failures; Current transformers; Laboratory research

Towards online condition assessment of oil-paper insulated current transformers: experiences from laboratory experiments

Daniël WOLDENDORP, Sjoerd NAUTA, Reinder PETERSE
Alliander N.V.

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Smart Sensor with Embedded AI Model for Automatic Detection of PD Defects in Distribution Networks

Javier ORTEGO[1], Elvis JORGE[1], J. David BIELVA[2], Antonio GONZALEZ[2]
[1]Ampacimon, Spain; [2]EDP Redes Spain, Spain

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Intelligent Asset Management. First 245 kV instrument transformer in field experience

Jone JUIZ[1], Amaia RECALDE[1], Iñigo HUERTA[1], Jesús SAEZ[1], Mikel FERNANDEZ[2], Jose Antonio EGUREN[3]
[1]Arteche Group, Spain; [2]Tecnalia, Spain; [3]i-DE (Iberdrola), Spain

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[1]Circe, Spain; [2]University of Zaragoza, Spain

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Test voltage level analysis for frequency response measurements on instrument voltage transformers

Mathieu NADEAU[1], Erik SPERLING[2], Roberto SCHULZE[3]
[1]Hydro-Québec, Canada; [2]OMICRON Energy, Switzerland; [3]OMICRON Energy, Germany

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Topics: A3 PS3 - Maintaining and Management T&D Assets
Keywords: Optical Current Transformer; Measurements

Assessment of Critical Aspects Related to Optical Current Transformer Measurements

Carlos DUTRA[1], Luan TOMINAGA[1], Vitor WOYAKEWICZ[2], Tiago MATSUO[2]
[1]Brazilian NC of CIGRE, Brazil; PowerOpticks; [2]Brazilian NC of CIGRE, Brazil; AQTech

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Topics: A3 PS3 - Maintaining and Management T&D Assets
Keywords: Current Transformers; loss tangent; online monitoring; Artificial Intelligence (AI); partial discharge; high voltage measurement techniques; IoT

An Advanced Intelligent Online Monitoring System for Current Transformers Using Partial Discharges and Loss Tangent

George LIRA[1], Ana MAROTTI[2], Edson COSTA[1], Antonio LEITE NETO[1], João MELO[1], André COSTA[2], João Paulo DE SOUZA[3], Fabiana FERNANDES[2]
[1]Brazilian NC of CIGRE, Brazil; Federal University of Campina Grande; [2]Brazilian NC of CIGRE, Brazil; Eletrobras Furnas; [3]Brazilian NC of CIGRE, Brazil; Concert Technologies S.A

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Investigation of the impact of external stray fields on voltage divider accuracy for 36 kV and 123 kV system voltage levels

Marcel STOECKLI[1], Erik SPERLING*[2], Roberto SCHULZE[3], Thomas HEID[4]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]OMICRON energy, Switzerland; [3]OMICRON energy, Germany; [4]CONDIS SA, Switzerland

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Keywords: power quality monitoring, transient monitoring, CR-divider, RC-divider, low-power voltage transformer

High bandwidth low-power voltage transformers for power quality measurement and fast transient monitoring in MV and HV substations - technological overview and experience from field installations

Marcel STOECKLI[1], Thomas HEID*[2], Werner SCHOEFFER[3], Dominique ROLLE[4]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]CONDIS SA, Switzerland; [3]Artemes GmbH, Austria; [4]HEIA Fribourg University of Applied Sciences, Switzerland

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Topics: A3 PS3 - Maintaining and Management T&D Assets
Keywords: Asset Performance Management System (APMS), Condition Based Maintenance Strategy, Assets Health Indiex (AHI), Risk Indices, AHI methodology, APMS roadmap, Online Monitoring Systems, Real-time DataHub, IT solution architecture, Data management

Asset Performance Management System Design for a Modern TSO

Ales HVALA[1], Andrej F. GUBINA[2], Despoina MAKRIDOU[3], Anastasios PATSIOTIS[3]
[1]Blueprint Energy Solutions, Austria; [2]IRI UL, Slovenia; [3]TSO Greece

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[1]Powerlink QLD Australia; [2]The University of Queensland, Australia

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Risk Management Through the Implementation of Digital Twins for the Analysis of Safe Ground Clearance and Solution of Non-Compliance in High-Voltage Transmission Lines

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Dennis ALBERT[1], Nicolai SCHWARTZE[1], Lukas DOMENIG[2]
[1]OMICRON electronics; [2]Graz University of Technology

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Keywords: Aging asset, IoT, Reliability-centered maintenance

Reliability-Centered Maintenance for Optimized IoT-based Maintenance and Life Extension of Aging Substation Equipment

Toshiaki KONO, Ryoichi SHINOHARA, Hiroaki HASHIMOTO, Li LU
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Keywords: Partial Discharge

A Study on the Location Estimation of the Partial Discharge Signal using Current Transformer Sensors with Ultra-high Frequency Bandwidth in C-GIS

Sang Hyuk IM, Seung Hoon OK, Jung Soo LEE, Doo Ki LEE
HD Hyundai-Electric, Korea, Republic of (South Korea)

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Gujarat Energy Transmission Corporation Ltd, India

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Keywords: Condition monitoring, Real-time monitoring system, asset management, predictive maintenance, spring-operated mechanisms, High voltage circuit breakers, substations, reliability

Real Time Condition Monitoring Of Spring Operating Mechanism For High Voltage Circuit Breaker.

Guna Gopal A G*, Peter VON-ALLMEN, Giles FAUCONNET, Santosh Kumar A, Mahesh RAMAN, Martin WALT, Dominic MAURER, Jean-Luc RAYON, Nicolas Gadacz GADACZ, Alain Fanget FANGET
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Keywords: GIS (Gas Insulated Switchgear), Optimal Placement, PD (Partial Discharge), UHF (Ultra High Frequency) Sensor

Development of Signal Attenuation Simulator for Optimal Placement of UHF Sensor in GIS

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[1]Elimpus Ltd UK; [2]National Grid UK

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Vitsanu PHONPHAI[1], Nicolas GADACZ[2], Charcrist KUHAKARN[1], Panupan THAKONG[1]
[1]Electricity Generating Authority of Thailand (EGAT), Thailand; [2]GE VERNOVA, France

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Hamid Reza MANSOURI[1], Mohammad Majid JALALI[1], Hojjat DEZFULI[2]
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Keywords: HVDC cable, bending stiffness, FEM, testing, mechanical

Comparison of bending stiffness modelling and measurements on HVDC cables

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[1]Prysmian Group, France; [2]Prysmian Group, Italy

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SP Group Singapore

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Keywords: DALY (disability adjusted life years) method, Installation cost reduction, Proportional risk assessments, Subsea power cable installation, Unexploded Ordnance (UXO)

A proportional approach of subsea UneXploded Ordnance (UXO)

Wino SNIP[1], Ira HELSLOOT[2], Anja DREWS[1], Marijn HELSLOOT[2]
[1]TenneT; [2]Crisislab

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Keywords: cable handling, quality-control, reliability, transport and installation

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Keywords: PILC, thermo-electrical, ageing, experiments

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Keywords: dynamic cable load, cable ampacity, in situ thermal measurements, finite elements method, thermal modelling

Validation of IEC 60853 and a novel numerical thermal model for the time-dependent ampacity of MVAC and HVAC power cables by means of in-situ thermal measurements

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Development of an Electromechanical Test Technique to Grow Electrical Trees in Dynamic Power Cables

Christopher EMERSIC[1], Frances HU[1], Lujia CHEN[1], Simon ROWLAND[1], Aidan EBRAHIM[2]
[1]The University of Manchester UK; [2]ORE Catapult UK

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[1]Instituto Tecnológico de la Energía (ITE), Spain; [2]Red Eléctrica, Spain

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Environmental and Technical Lessons learnt during the cable repair of a legacy cable in a watercourse

Shamaine THULASAIE
Eskom Distribution

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Topics: B1 PS1 - Learning from Experiences
Keywords: submarine, 400kv, pq, type test, accessories

Results of PQ Test and Various Type Tests for AC 400kV Submarine Cable System

Hunjin LEE
LS Cable&System, Korea, Republic of (South Korea)

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Chulmin KIM, Jaebok LEE, Yuho RHO, Kwangsu CHOI
LS Cable & System Ltd

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Keywords: High voltage, Distribution lines, Cable insulated, Failure Statistics

Failure Statistics of High Voltage Underground Cables in Urban Areas – Experience of the Southeastern Brazilian Large City Centers

Carla DAMASCENO[1], Adilson MENEZES[2], Paulo DEUS[3], Rodrigo MOREIRA[4]
[1]Brazilian NC of CIGRE, Brazil; Consultor; [2]Light SESA; [3]Enel SP; [4]Cemig D

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Keywords: Underground transmission line;

Challenges and solutions to implement an underground transmission line in the biggest city of Brazil

Jody FUJIHARA[1], Rogerio LAVANDOSCKI[1], Gabriela RODRIGUES[1], Julio LOPES[2]
[1]Brazilian NC of CIGRE, Brazil; ISA CTEEP; [2]INOVATEC

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Keywords: underground transmission line

Learnings from a third party accident in a 220 kV underground transmission line in Colombia

Julio LOPES[1], Antonio PEDRAZA[2]
[1]Brazilian NC of CIGRE, Brazil; INOVATEC; [2]ISA

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Keywords: High voltage, Underground Lines, Cable insulated, Two Cables per Fase

The Construction of High Voltage Underground Lines Using Two Cables Per Phase in Large Cities - Their Motivations, and Installation and Maintenance Complexities

Paulo DEUS, Eduardo LEANDRO, Artur CONFORTI
Brazilian NC of CIGRE, Brazil; ENEL

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Keywords: cable line, insulation, partial discharges, insulation aging, reliability, residual life, overvoltage, insulating materials

Limitation of Switching Overvoltage as a Way to Provide the Reliability of Power Cable Lines

Ian KOROSTELEV[1], Rasim BABAEV[2], Anton KORZHOV[2], Mikhail DZIUBA[2], Valery SAFONOV[2]
[1]Energy+21 JSC / South Ural State University, Russian Federation; [2]South Ural State University, Russian Federation

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Keywords: EPDM PMJ, HVDC PMJ, PMJ

Development of EPDM Insulation Material for 500kV-class HVDC PMJ

Yeonwoo JO, Jaecheol JUNG, Dongseok HONG, Hyunjoo KIM
TAIHAN Cable&Solution, Korea, Republic of (South Korea)

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Error analysis applied to cable current rating

Frode BRYNEM, Martin HOVDE
Nexans Norway AS

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Thermal assessment of the transition joint between insulating and semiconductive inner PE sheath

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Innovative Engineering used on the Development of the Greenlink Interconnector 320kV submarine HVDC cable system

Patrick HANRAHAN[1], Paul O'ROURKE[1], Vincent FOO[2], Scott GOODING[3], Andy PAGE[4], Chris CARROLL[4]
[1]Greenlink; [2]Sumitomo Electric Industries; [3]Enshore; [4]Intertek

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Experiences with temperature monitoring on the Norwegian underground cable section of the HVDC interconnector, Skagerrak 4

Tony LUCIGNANO[1], Jerome MATALLANA[2]
[1]Statnett; [2]Statnett

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420 kV underground cable system in environment with high electrical resistivity of soil. Use of an earth continuity conductor in combination with cross bonding and consequences on insulation coordination

Jerome MATALLANA[1], Kostas VELITSIKAKIS[2], Thinus DU PLESSIS[2]
[1]Statnett, Norway; [2]TENNET The Netherlands

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Dynamic Analysis on HVDC Land Cable and prefabricated Joint under Salt-mine Blasts

Yang ZHOU
NKT AB, Sweden

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Optioneering and consenting of a 50km 400kV underground cable connection

Emanuele SALOMONE[1], Neil COWAP[2]
[1]IACOBS UK; [2]EirGrid Irelan

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Development of an extended commissioning program for temporary 220 kV cable connections

Alexander PIRKER[1], Anita MACHL[2]
[1]Verfahren Umwelt Management GmbH; [2]Austrian Power Grid AG

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The role of quality assurance in a high voltage cable market shaped by the energy transition from a grid operators' perspective

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Derivation and Application of a Sustainability Assessment System for the Installation of High and Extra-High Voltage Cables in the City of Vienna

Florian AINHIRN[1], Michael KLEIN[1], Alicia OGRYSEK[2], Lea ORTH[2]
[1]Wiener Netze; [2]Technical University Vienna

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New approaches in performing commissioning tests in HVAC on long land and inter array cable projects using Resonant Test Systems

Peter MOHAUPT[1], Marco BRAMBILLA[2], Emilio DEL RIO RUIBAL[2]
[1]Mohaupt HV; [2]Prysmian Powerlink

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B1 INSULATED CABLES - Full Papers
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Experiences and Perspectives in the Application of the BIM Methodology to the Design and Construction Phases of Underground Transmission Lines for the "El Río" 220 kV Project

Hernan RESTREPO, Antonio PEDRAZA, Luis SARMIENTO
ISA Intercolombia

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Topics: B1 PS1 - Learning from Experiences

Installing passive sensing for condition monitoring of a 400 kV cable

Steven BLAIR, Neil GORDON, Iain MCKEEMAN, Philip ORR
Synaptec UK

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Topics: B1 PS1 - Learning from Experiences

Insulated Cables Statistics 2012 to 2021

Russell WHEATLAND[1], Soren MIKKELSEN[2], Francis WAITE[3], Kim ove ASKLUND[4], Peter van der WIELEN[5], Andrew WOOLES[6]
[1]Ausnet Services, Australia; [2]Energinet, Denmark; [3]Balfour Beatty, United Kingdom; [4]Hafslund Nett, Norway; [5]DNV, Netherlands; [6]TE Connectivity, New Zealand

ID: 11275
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences
Keywords: Natural degradation, Pre-breakdown test, Water Tree, Wet Design XLPE

Assessment and asset management of aged 66 kV – 77 kV wet design XLPE cable

Shojii MASHIO[1], Takeshi KAYA[2], Kimihiro IWASAKI[3], Toshihiro TAKAHASHI[4]
[1]Sumitomo Electric Industries, Ltd., Japan; [2]Kansai Transmission and Distribution, Inc., Japan; [3]TEPCO Power Grid, Incorporated, Japan; [4]Central Research Institute of Electric Power Industry, Japan

ID: 11279
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences
Keywords: Optimization, Rationalization, Replacement, Y-branch joint

Challenges and Initiatives for replacement of aged SCFF or HPFF cables to XLPE cables

Hiroki YOKOTA[1], Masahiro NARITA[1], Kimihiro IWASAKI[2], Hidenori SATOU[2], Takeshi KAYA[3], Tatsuhiko SAKAMOTO[3]
[1]Furukawa Electric Co., Ltd., Japan; [2]TEPCO Power Grid, Incorporated, Japan; [3]Kansai Transmission and Distribution, Inc., Japan

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B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences

Cable Current rating in the presence of Harmonics

Andreas CHRYSOCHOS, Konstantina BITSI, Christos TRAIANOS, Dimitrios CHATZIPETROS, Varvara RIZOU, Vasileios KANAS
Hellenic Cables, Greece

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B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences

Evaluation of Cable Bonding Scheme under Lightning Overvoltages in HVAC Modern Siphon Systems

Christos TRAIANOS, Andreas CHRYSOCHOS, Dimitrios CHATZIPETROS, Iordanis CHALEPLIDIS
Hellenic Cables, Greece

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B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences

In depth structural analysis of submarine power cable repair/sea joints

Konstantinos LAZOS, Panagiotis DELIZISIS, Abhijit NEGINHAL, Ioannis DOLIANITIS
Hellenic Cables, Greece

ID: 11311
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences

Modeling of the Thermoelectric Performance of Offshore Power Cable Joints

Konstantina BITSI, Dimitrios CHATZIPETROS, Andreas CHRYSOCHOS, Vasileios KANAS
Hellenic Cables, Greece

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B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences

Dynamic cable rating with partial drying of the soil

Robert SPICE[1], Martin HIRD[1], Justin DIX[2]
[1]ITPEnergised UK; [2]University of Southampton UK

ID: 11354
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences
Keywords: Electric field, finite element method, heat-shrink cable terminal, structural defect

Electric field analyzes in heat-shrink cable terminals depending on the assembly and defects parameters with FEM

Yunus Berat DEMIROL[1], Elif SAKALLIOGLU[1], Bora ALBOYACI[2], Mehmet Aytaç CINAR[2]
[1]Genetek Güç&Enerji, Türkiye; [2]Kocaeli University, Türkiye

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B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences

A Machine Learning-Induced Cable Health Indexing Model for Utilities

Akshat KULKARNI*, Sanjeev KUMAR, Pratik BAJARIA, Yash KULKARNI
OrxaGrid Pvt Ltd, India

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B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences

Performance Evaluation of Thermoplastic Polyolefin (TPO) MV Cables – an alternate to MV XLPE Cables

Yogendra S. TIWARI*, C. S. MOHANTY
Universal Cables Limited, Satna (MP), India

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B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences

Improvisation in Laying & Installation of HV/EHV Power cables in extreme challenging conditions

Puneet CHAWLA, Jai KUMAR, Dileep K. SHUKLA, Vivek KAPIL, Aruna GULATI
BHEL, India

ID: 11382
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences

Investigating Overvoltage Phenomena and Partial Discharge Characteristics in Medium Voltage Underground Cables for Enhanced Reliability and Performance

Ayham BAKEER, Tarq ALNATOUR, Muawiya ABOALHUMOS
Jordan Electric Power Company

ID: 11437
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences
Keywords: Cable Diagnostics, Cable Terminations Failure, Condition Assessment, Corrosion Over Sheath, Thermal Imaging

The additional value of thermal imaging on earth system failures in high voltage cable terminations

Robin CORJANUS, Bob HOENSELAAR, Clemens MAZEE
Alliander/Qirion

ID: 11468
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences
Keywords: Single Sheath Bonding-Induced Voltage-Sheath Circulating Current-Earth Continuity Conductor-Ground potential Rise

Single Sheath Bonding Method To Eliminate Earth Continuity Cable

Mohamed KHAN
Electricite De France, UAE

ID: 11469
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences

400 KV Transmission Underground Power Cable Online Partial Discharge Monitoring System and Condition Assessment: Experiences and Outcomes

Jabir KARIMBANACKAL
KAHRAMAA, Qatar

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B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences

Challenge of TDR Fingerprint on Viking Link

Henrik Roland HANSEN[1], Manfred BAWART[2], Marco BRAMBILLA[3], Emilio DEL RIO RUIBAL[3]
[1]Energinet; [2]BAUR GmbH; [3]Prysmian Powerlink

ID: 11572
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences

Calculation of Magnetic Fields around Stranded 3 core cables

Thomas KVARTS, Anna Candela GAROLERA
Ørsted Wind Power a/s

ID: 11578
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences

Extended Numerical Model Parameter Study for Dynamic Thermal Rating Calculations Based on the Wiener Netze 400 kV Dataset

Joachim NIEMANN-LARSEN[1], Florian AINHIRN[2]
[1]Energinet; [2]Wiener Netze GmbH

ID: 11580
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences

Data-Driven Laying Condition Assessment of High Voltage Cables using Distribute Temperature Sensing - DTS

Soumya THAKUR[1], Joachim HOLBØLL[1], Joachim NIEMANN-LARSEN[2]
[1]Technical University of Denmark (DTU); [2]Energinet

ID: 11683
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences
Keywords: - Partial discharges, balanced bridge, differential setup, noise suppression

Fully Digital Differential Partial Discharge Measurement System

Vedran JERBIC, Ivan NOVKO, Dalibor FILIPOVIC-GRCIC, Tihomir JAKOVIC
Koncar Electrical Engineering Institute Zagreb, Croatia

ID: 11755
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences
Keywords: after installation test, cable breakdown, cable discharging, HVDC cable system, onsite, test system protection, wind resistance

Requirements for onsite test systems for the after-installation test of HVDC cable systems

Marcel STOECKLI[1], Michael GAMLIN*[2], Carl-Hendrik STUCKENHOLZ[2], Tobias MUELLER[2], Manuel ECKERT[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Haefely AG, Switzerland

ID: 11802
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences
Keywords: Cable monitoring, Distributed Fiber Optic Sensing, Floating offshore technologie, Operation, Maintenance

Complete power cable monitoring for floating marine energy technologies

Pierre CLEMENT[1], Gaetan CALBRIS[1], Caroline LOURIE[2], John EMEC[2]
[1]FEBUS Optics, France; [2]EMEC Ltd, UK

ID: 11827
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences

Approach, experiences and lessons learned from failures investigations on power cable systems

Peter VAN DER WIELEN[1], Anurag KUMAR[2], Jacco SMIT[2]
[1]DNV & TU Eindhoven; [2]TenneT TSO

ID: 11849
B1 INSULATED CABLES - Full Papers
Topics: B1 PS1 - Learning from Experiences
Keywords: Earth continuity conductor, gallery, HV cable, theft prevention

Theft prevention solutions against earth continuity conductor in galleries

Alicia JANDIN, Matthieu CABAU, Mathieu GROULT
RTE, France

PS2 - FUTURE FUNCTIONALITIES AND APPLICATIONS

ID: 10134
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications
Keywords: MVDC cables system, electrical field stabilization, proposition, qualification procedure, electrothermal stresses

Proposition of qualification procedure for MVDC cables

Amjad MOUHAIDALI[1], Raphaël GUFFOND[2], Ludovic BOYER[1], Lina RUIZ[2]
[1]SuperGrid Institute, France; [2]Nexans, France

ID: 10171
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

A new concept ballast design for submarine dynamic cable system

Xiejun XU, Yafeng SUN, Yujie QIAN, Haoyu SONG, Lijuan HU, Yanli XU, Qingsheng CHANG

Hengtong Optic-Electric Co., Ltd ,China

ID: 10172
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

Development and Experiment of Two-section Three-phase Coaxial 10 kV/1 kA HTS Cable with Three-phase Balance Design

Panpan CHEN, Jiahui ZHU, Qifan YANG, Hongjie ZHANG
China Electric Power Research Institute, China

ID: 10328
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications
Keywords: Routing, Superconductor, Transmission, Underground

High-Temperature Superconducting Cable Systems as a Solution to Underground Transmission Line Routing in Congested Project Areas

Collin EDWARDS, Darin LAWTON
Burns & McDonnell, United States of America

ID: 10331
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

Developing an FEM Model of a TB880 3-Core Cable Case Study

Brian RUTHERFORD, Robert HOBSON
Burns & McDonnell, United States of America

ID: 10405
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

Thermal limit of XLPE insulation: Is 90 still the magic number?

James PILGRIM[1], Thomas ANDRITSCH[2], Paul LEWIN[2], George CALLENDER[2]
[1]Ørsted Wind Power UK; [2]University of Southampton UK

ID: 10520
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

Recommendations for dielectric testing of HVDC gas insulated cable connection assemblies

C.A. PLET[1], M. KOSSE[2], S. ALAPATHI[3], N. LALLOUET[4], F. JACQUIER[5], U. RIECHERT[6], T. KARMOKAR[7], F. MICHON[8], H. HE[1], H. HE[7], C. BEVERWIJK[9], D. BOA[10], M. YAGI[11], L. HOEFER[12], J. STRIDE[3], K. ZHOU[13], Marco ALBERTINI[8]
[1]DNV; [2]Siemens Energy; [3]Vattenfal; [4]Nexans; [5]SGI; [6]Hitachi; [7]TenneT; [8]Prysmian; [9]KEMA; [10]SSEN Transmission; [11]Furukawa; [12]Pfisterer; [13]UL

ID: 10534
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications
Keywords: Installation cost reduction, Installation innovation, Obstacle clearance, Route survey, Subsea power cable installation, Unexploded Ordnance (UXO)

The development of a Route Survey Plough for subsea power cable routes with the objective to separate soil risks from installation risks

Wino SNIP, Daniel LIEFFERINK, Barend BENTVELSEN
TenneT

ID: 10577
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications
Keywords: temporary cable connections, thermo-mechanical forces, cable core movement, pre-terminated cable ends, pluggable GIS terminations

Testing experience on temporary cable connection solutions

Panos TSAKONAS[1], Corné VAN EEDEN[1], Riccardo BODEGA[1], Jacco SMIT[2], Roy ZUIJDERDUIN[2]
[1]Prysmian Group; [2]TenneT

ID: 10775
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications
Keywords: Ampacity, J-tube, screen bondings, solar radiation intensity

Analysis of Parameters Affecting Current Rating of Cables Installed in J-tube for Offshore Wind Farms

Ruhi RUHI[1], Tapabrata MUKHERJEE[1], Camilo APRAEZ[1], George J. ANDERS[2]
[1]Eaton Energy Automation Solutions, Canada; [2]Lodz University of Technology, Poland

ID: 10786
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

Feasibility Assessment of Solutions for the Introduction of High-Temperature Superconducting AC Cable Lines in Megacities

Andrey KASHCHEEV[1], Mikhail DUBININ[1], Victor SYTNIKOV[1], Elena FILIPEVA[1], Dmitriy SOROKIN[2]
[1]ROSSETI R&D Center, Russian Federation; [2]ROSSETI Moscow Region, Russian Federation

ID: 10817
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

Motion Characterization of dynamic Cables with distributed acoustic Sensing obtained from Field Measurements

Simon DE RIJCKE[1], Koenraad DE BAUW[2]
[1]MARLINKS, Belgium; [2]ENGIE Laborelec, Belgium

ID: 10915
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

Submarine Cable Connections to Hawar Island

Thomas RALPH[1], Mark MOONEY[1], Patrick O'ROURKE[2], Robert DONAGHY[2]
[1]ESB International; [2]Electricity Supply Board (Ireland)

ID: 10951
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

Evaluation of Thermal Network Modelling and Finite Element Analysis for Ampacity Rating Calculation of Wind Farm Export Cable

Camilla ESPEDAL, Henrik STRAND, Espen EBERG
SINTEF Energy Research Norway

ID: 11035
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

Electrothermal FEM simulation of special TOV test conditions of a 525 kV HVDC cable joint including nonlinear field grading material

Rashid HUSSAIN[1], Christian ANDERSSON[2]
[1]NKT Group GmbH, Germany; [2]NKT HV Cables AB, Sveden

ID: 11050
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications
Keywords: Insulated Cable Design, HVDC Cable, Meshed Grid, Meshed Network

Cable Dimensioning Based on Wind Predictions in a Meshed Network

Tom EGAN, Maryam ZADFALLAH, Henry ABRAMS
Invenergy, United States of America

ID: 11080
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

Qualification of Submarine AC Cables for 1500 m Water Depth

Lisa JOHANSSON
NKT AB, Sweden

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B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

Development and Validation of a Third-Party Intrusion Detection Software Based on DAS Measurement Data

Florian AINHIRN[1], Andreas BOLZER[1], Werner LIENHART[2], Lisa STRASSER[2]
[1]Wiener Netze; [2]Graz University of Technology

ID: 11330
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

Online Sheath Current Monitoring System - Digital Solution

Brajanath DEY*, Abhishek GARG, Amit BANSAL:
Tata Power-DDL, India

ID: 11420
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications
Keywords: Advection, Buried-cable, Groundwater, Sediments

Potential thermal impact of wind farms within dynamic seabed

Antoine MORVAN[1,2], Agnès RIVIERE[2], Antoine MAISON[1]
[1]France Energies Marines, France; [2]MINES Paris - PSL, France

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B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

Superconducting Power Cable For 500 MVA at 110 kV in Munich - First Insights in the Test Run

Robert BACH[1], Dag WILLÉN[2], Patrick MANSHEIM[1], Robert PRINZ[3], Werner PRUSSEIT[4], Alexander ALEXSEEV[5], Wescley Tiago BATISTA DE SOUSA[6]
[1]South Westphalia University of Applied Sciences, Germany; [2]NKT Cables Group, Denmark; [3]SWM Infrastruktur GmbH & Co. KG, Germany; [4]THEVA Dünnschichttechnik GmbH, Germany; [5]Linde Kryotechnik AG, Germany; [6]Karlsruher Institut für Technik, Germany

ID: 11429
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

Dynamic Transformer Rating in Worst-Case Distribution Grid Planning

Moritz FRANZ[1], Martin BRAUN[2]
[1]University of Kassel, Germany; [2]Fraunhofer Institut für Energiewirtschaft und Energiesystemtechnik IEE & Universität Kassel, Germany

ID: 11430
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

Concept and development of a digital twin of a 110-kV-cable line

Robert BACH[1], Rouven BERKEMEIER[2]
[1]South Westphalia University pf Applied Sciences Soest, Germany; [2]Fachhochschule Südwestfalen, Abt. Soest, Germany

ID: 11454
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications
Keywords: Reliability Failures Underwater Transmission

High Reliability Zero Failures in Underground and Underwater Transmission Systems

Pablo REALPOZO[1], Victor SIERRA-MADRIGAL[2], Jose Luis GARCIA-URRESTI[2]
[1]CFE, Mexico; [2]CIGRE México, Mexico

ID: 11634
B1 INSULATED CABLES - Full Papers
Topics: B1 PS2 - Future Functionalities and Applications

New HVDC Insulation System Electrical Evaluation on Small Scale Samples and Model Cables

Marc BAILLEUL[1], Ramona HUUVA[2], Johan ANDERSSON[2]
[1]BOREALIS N.V., Belgium; [2]BOREALIS AB, Sweden

PS3 - TOWARDS SUSTAINABILITY

ID: 10135
B1 INSULATED CABLES - Full Papers
Topics: B1 PS3 - Towards Sustainability
Keywords: underground cables system, potential improvements, HVDC, LCA, decarbonation

Potential improvements in loss reduction for underground cable systems

Frédéric LESUR
Nexans, France

ID: 10332
B1 INSULATED CABLES - Full Papers
Topics: B1 PS3 - Towards Sustainability
Keywords: Circular Economy, Crosslinked Cable Materials, Sustainability, Recycling

Sustainable Circular Solutions for Cables with XLPE Insulation System

Paul BRIGANDI[1], Maria MOUBARAK[2], Edit BERCZI[3], Saurav SENGUPTA[1], Alison SHAPIRO[1]
[1]Dow, United States of America; [2]Dow Deutschland, Germany; [3]Dow Europe GmbH, Switzerland

ID: 10333
B1 INSULATED CABLES - Full Papers
Topics: B1 PS3 - Towards Sustainability
Keywords: Chemistry, Cure-Scorch, Sustainability, XLPE

Positive Impact of Novel XLPE on both Performance and Sustainability

Timothy PERSON[1], Roshan AARONS[2], Edit BERCZI[3], Saurav SENGUPTA[1]
[1]Dow, United States of America; [2]Dow, Germany; [3]Dow, Switzerland

ID: 10358
B1 INSULATED CABLES - Full Papers
Topics: B1 PS3 - Towards Sustainability

Design for sustainability (D4S)

Alberto BAREGGI
PRYSMAN GROUP, Italy

ID: 10622
B1 INSULATED CABLES - Full Papers
Topics: B1 PS3 - Towards Sustainability

Development of GIS Cable Termination with improved Compactness and Compatibility towards SF6 alternative Gases

Lei CHEN
NKT AB, Sweden

ID: 10724
B1 INSULATED CABLES - Full Papers
Topics: B1 PS3 - Towards Sustainability
Keywords: gas insulated lines, pressurized air cables, GIL, GIB, high voltage, medium voltage, SF6-free, operational experience, HV testing

On-site testing and 1-year operational experience for 145 kV, 2500 A pressurized air insulated cables

Marcel STOECKLI[1], Walter HOLAUS*[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hivoduct AG, Switzerland

ID: 10952
B1 INSULATED CABLES - Full Papers
Topics: B1 PS3 - Towards Sustainability

Towards innovative solutions to connect HVDC cables with less potential environmental impact

Dustin KOTTONAU[1], Espen DOEDNES[1], Nils-Bertil FRISK[1], Abdellatif Ait AMAR[2]
[1]Nexans Norway AS Norway; [2]Nexans S.A. France

ID: 11002
B1 INSULATED CABLES - Full Papers

Topics: B1 PS3 - Towards Sustainability
Keywords: High-voltage Cable Systems, HV Intelligent Solutions, Impulse Voltages, Partial Discharge Alarming, Shield Induced Voltages, Shield Currents

Enhanced HV Cable Connection Alarm System: Introducing i-LinkBox™

Sadettin ERDENİZ, Yusuf HIZAL
EM Elektrik-EMELEC Türkiye

ID: 11285
B1 INSULATED CABLES - Full Papers
Topics: B1 PS3 - Towards Sustainability
Keywords: HPFF cable, Pipe coating, Reaction force, Reduced insulation thickness, Replacement

1 Development of replacing method from HPFF cable to XLPE cable system sustaining old steel pipe

Yusuke MURAKAMI[1], Fumihiko TAKI[1], Kimihiro IWASAKI[1], Takuto KOBAYASHI[2], Makoto SUIZU[3], Ryu MATSUO[4]
[1]TEPCO Power Grid, Incorporated, Japan; [2]TEPCO Holdings, Incorporated, Japan; [3]Sumitomo Electric Industries, Ltd., Japan; [4]STEC, Japan

B2 - OVERHEAD LINES

PS1 - CHALLENGES FROM RENEWABLES INTEGRATION AND INFLUENCES OF ENERGY TRANSITION ON OHL

ID: 10173
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Application of Phase-to-phase Spacers in Prevention and Control of Ice-Shedding on Compact Transmission Lines

Zenghao HUANG, Hao LI, Lingmeng FAN, Linjie ZHAO
China Southern Power Grid Research Institute Co., Ltd ,China

ID: 10313
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL
Keywords: HVDC, hydrophobic surfaces, polluted insulators, IEC 60815, DC insulators

HVDC overhead line insulators: basics and performance

Jean-Marie GEORGE, Damien LEPLEY
Sediver, France

ID: 10359
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Double circuits overhead lines DC + AC: focus on EMF of the pilot project 500kV DC + 132kV AC

Andrea PIGNATA
TERNA, Italy

ID: 10360
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

The new 500 kV HVDC Italian Overhead Lines

Gabriele TRESSO
TERNA, Italy

ID: 10361
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

5-phases solution and series compensation: a cost-effective strategy for OHLs power transfer capacity increase under stability margin

Michela MIGLIORI
TERNA, Italy

ID: 10522
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL
Keywords: Overhead lines, induced currents, temporary earthing, portable earthing device, arcing

Considerations for temporary earthing in compact and heavy loaded OHL

Ebbo DE MEULENMEESTER[1], Ranjan BHUYAN[2], Dhruvi SHUKLA[1], Pragati KIDAMBI[1], Chris ENGELBRECHT[3]
[1]DNV; [2]TenneT TSO; [3]DNV / Technical University of Delft

ID: 10574
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL
Keywords: Overhead lines, upgrading, HTLS conductor, tower reinforcement

Design Challenges and Recommendations in Uprating the Existing 380 kV Overhead Lines, The Netherlands

Tom BÖRGER[1], Ton VAN DER WEKKEN[2], Jeff BROWN[2], Hussain KHAN[1], Ronald LOMMERS[1]
[1]DNV; [2]TenneT TSO

ID: 10613
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL
Keywords: Latticed Tower, Corrosion, Thickness losses, Damage profiles

Substitution of Angles in Latticed Towers of Maracaibo Lake

Carlos J. GARCIA ALAMO
RRC Companies LLC

ID: 10620
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Nodes-based connection system for the cost-effective assembly of tubular lattice towers

José-Ramón LÓPEZ-BLANCO[1], Pablo RODRÍGUEZ-HERRERÍAS[2], Carlos GARCÍA-BARRIOS[2]
[1]Anisopter Insightful Research, Spain; [2]Red Eléctrica, Spain

ID: 10766
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL
Keywords: HSIL line;

500 kV Paranaíba OHL - A HSIL line with high transmission capacity: Design, construction and performance report

Luisa LEMOS NOGUEIRA MARTINS, João Batista GUIMARÃES FERREIRA DA SILVA
Brazilian NC of CIGRE, Brazil; Paranaíba

ID: 10790
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL
Keywords: remote monitoring, power transmission capacity of OHLs, wire state

Increasing Power Transmission Capacity of OHLs via Continuous Real-time Remote Monitoring of Wire State

Mikhail PANARIN, Viktor TOKAREV
ServiceEnergy Ltd, Russian Federation

ID: 10866
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL
Keywords: DLR, Dynamic Line Rating, Line Rating, Overhead Transmission, Forecast

A Study for Dynamic Line Rating of Transmission Line based on the AI and Conductor Sensor

Younghong KIM[1], Jabin KOO[1], Seungwoo LEE[1], Won CHOI[2]
[1]KEPCO, South Korea; [2]SMND, South Korea

ID: 10900
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Maximizing power transfer and RES integration using dynamic thermal rating - Irish TSO experience

Kingsuk SAHA[1], Derek CARROLL[1], Andrew MCGRATH[2], Aidan GEOGHEGAN[1], Dag DREJER[3], Vemund LOSNEDAL[3]
[1]EirGrid; [2]ESB Networks; [3]Heimdall Power

ID: 10912
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

A Data-Driven Machine Learning Framework for Day-ahead Estimation of Dynamic Line Rating in Power Systems

Rohit TRIVEDI, Chittesh CHANDRAN
EirGrid

ID: 10928
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL
Keywords: Braced line posts, Compact lines, Composite insulators, Insulated cross-arms

Evolution, State of the Art and Future Development Trends in Composite Insulated Cross-arm Technology

Usama AHMED[1], Xinlong WANG[2], Yanlin LI[2], Jie YU[2], Marcos FERNANDES[3], Eric MOAL[4], Liu CHAO[2]
[1]SHEMAR, Canada; [2]SHEMAR, China; [3]SHEMAR, Brazil; [4]SHEMAR, France

ID: 10954
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Predicting Capacity Gains from Dynamic Line Rating prior to Sensor Deployment

Tobias AASPRONG, Gunnhild SVANDAL PRESTHUS
Statnett Norway

ID: 10957
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL
Keywords: Ampacity, Conductor, High temperature low sag, Transmission

High temperature low sag conductors in high ice load regions

Vivendhra NAIDOO[1], Bjarni Helgi THORSTEINSSON[2], Kjell Åge HALSAN[2]
[1]EFLA Consulting Engineers Norway; [2]Statnett Norway

ID: 10977
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Efficacy of introducing a DLR system for the operation of an overhead line connected with high power photovoltaic facilities

Tomoki KITASHIMA[1], Severine RISO[2], Daisuke SAITO[1], Brian BERRY[2], Jonathan MCGINNIS[2], Laurent GERLACHE[2]
[1]Furukawa Electric Power Systems, Co. Ltd., Japan; [2]Ampacimon S.A., Belgium

ID: 10998
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL
Keywords: Conductor Oscillation, Finite Element Method, Jumper Conductor, Overhead Lines

Finite Element Analysis of a Jumper Conductor Set used in Power Transmission Towers under Wind Effect

Burak Talha KILIC[1], Eray BARAN[1], Mete UZAR[2], Orhan DEMİRHAN[2]
[1]Middle East Technical University Türkiye; [2]Turkish Electrical Transmission Corporation (TEİAŞ) Türkiye

ID: 11044
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL
Keywords: EHV AC, Radio, Interference

Audible Noise and Radio Interference Constraints for Hybrid Conversion of Existing EHV AC Overhead Lines: Mexican and Italian Case Studies

Francesco PALONE[1], Carlos TEJADA-MARTINEZ[2]
[1]Terna SpA, Rome. Italy; [2]Instituto Politécnico Nacional (IPN), México

ID: 11132
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Noise-reducing conductors for reconductoring projects

Jeremy UNTERFINGER, Stefan STEEVENS, Saskia MÖLLENBECK, Benjamin SCHRÖDER, Steffen RIEBLING
Amprion GmbH, Germany

ID: 11141
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Voltage Uprating of 275 kV Overhead Transmission Lines to 400 kV with Retrofit Insulated Cross-arms (RICA)

James DEAS[1], Usama AHMED[2], Xinlong WANG[2], Yanlin LI[2], Tango Teh PT[2], Bahare HASSANPOUR[3]
[1]National Grid UK; [2]SHEMAR Canada; [3]Wood Plc UK

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B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Improved Model for Overhead Line Audible Noise Prediction

Oliver PISCHLER[1], Uwe SCHICHLER[1], Isobel GREEN[2], Azeez AJIBOLA[2]
[1]TU Graz; [2]SSEN Transmission

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B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Sustainable Transmission Innovation with Poles, Cables, and Insulators -TRIPI-Study Case in Urabá, Colombia

Jhoinner OSORIO, Diego TAUTA
EPM

ID: 11199
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Optimization Algorithm for Transmission Line Routing with Multicriteria Constraints

Anderson VELANDIA[1], Cristian MENDOZA[1], Fernando DINIZ[2], Judy VALVERDE[1], Wallace HONORATO[2]
[1]Enlaza Grupo Energía Bogotá; [2]Argo

ID: 11200
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Methodology for Calculating Span-to-Span Right of Way to Reduce Environmental Impacts in Colombia

Cristian MENDOZA[1], Anderson VELANDIA VELANDIA[1], Wallace HONORATO[2], Fernando DINIZ[2]
[1]Enlaza Grupo Energía Bogotá; [2]Argo

ID: 11268
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL
Keywords: enhancing line/corridor utilization, dielectric testing, electric field modelling, bird fault mitigation.

Transmission line fault mitigation: dielectric testing of jumper covers

Nishanth PARUS
Cigre Southern Africa, South Africa

ID: 11340
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Modelling the uncertainty in weather conditions within a dynamic line rating feasibility study

Gordon MACFADZEAN, Rosemary TAWN, Gruffudd EDWARDS
TNEI UK

ID: 11422
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Wind speed measurement at the conductor for exact ampacity calculation for overhead power lines

Wolfgang FRÖB[1], Carsten BROCKMANN[2]
[1]LTB Leitungsbau GmbH, Germany; [2]Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration IZM, Germany

ID: 11472
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

First HV DC links in KSA OHL networks, conductor design, DC loss studies, manufacturing and testing

Mohamad EL CHMOURI
RIYADH CABLES GROUP, KSA

ID: 11506
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Turning Cold Deserts of India into Solar Energy Powerhouse by Developing a Transmission system Through Snow Cladded Mountains

Karanvir Singh PUNDIR, Nitesh KUMAR, Dr. Subir SEN, Rajesh GUPTA, Abhay CHOUDHARY
Power Grid Corporation of India Limited , India

ID: 11509
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Parallel Giants: The Twin Steel Monopoles in Heart of National Capital Region

Shrikant G. GAJBHE*, Nitesh Kumar SINHA, Rajesh Gupta GUPTA, Dr. Subir SEN, Abhay CHOUDHARY
POWERGRID CORPORATION OF INDIA LIMITED INDIA, India

ID: 11510
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Innovative Solution & Construction Technique For Cable Termination Arrangement for Transmission Line Towers

Rahul PURI*, Nitesh Kumar SINHA, Rajesh GUPTA, Dr. Subir SEN, Abhay CHOUDHARY
Power Grid Corporation of India Limited , India

ID: 11523
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Rock bolting raft foundation of a Long span Narrow based terminal tower for Lower Subansiri Hydropower project – POWERGRID Experience

Pradeep PALANISAMY*, Neeraj Singh GAUTAM, Nitesh Kumar SINHA, Rajesh Gupta GUPTA, Dr Subir SEN, Abhay CHOUDHARY
Power Grid Corporation of India Limited India

ID: 11527
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

DESIGN CONSIDERATIONS & ROUTE SELECTION FOR WORLD's HIGHEST ALTITUDE +/-350 kV MULTIPOLE HVDC TRANSMISSION LINE

Ashish SINGH, Nikhil JHA, Chandra KANT, Anil SHARMA, Rajesh KUMAR
POWERGRID CORPORATION OF INDIA LIMITED , India

ID: 11543
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Implementation of New Generation HTLS Conductors on Exiting Transmission Lines Contributing to Low Cost and Carbon Neutrality Solution-Power Grid Experience

Subhash C TANEJA*[1], M L SACHDEVA[2], N S SODHA[1]
[1]Ex-Power Grid Corporation of India, India; [2]Ex-Central Electricity Authority, India

ID: 11550
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

A Study on the New Adjustment Device to Adjusting a Sagging of Wires for Overhead Lines

Heejeong YU, Kyunghun LEE, Inhwa PARK, Jongchae KIM
KEPCO, Korea, Republic of (South Korea)

ID: 11551
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Uprating of the Jupiter Simmerpan lines from 275kV to 400kV

Sanjay NARAIN
Cigre Southern Africa, South Africa

ID: 11615
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Passive asset activation through a measuring system based on fiber optics in context of asset management, strategies, technologies and methods for OHL

Franziska GEBHARDT, Roman SIMKIN, Uwe ZIEBOLD
50 Hertz Transmission GmbH, Germany

ID: 11667
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Development of Design Rules for the Use of New High-Strength Steels for Lattice Towers

Jan MAESSCHALCK[1], Sofia ANTONODIMITRAKI[2], Marios-Zois BEZAS[2], Jean-François DEMONCEAU[2], Muhammad Omer ANWAAR[3]
[1]ELIA ENGINEERING, Belgium; [2]UNIVERSITY OF LIEGE, Belgium; [3]ARCELOR-MITTAL, Luxembourg

ID: 11687
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Key challenges of Design & Construction in Creek Area of 765 kV D/C Hexa Conductor Based Lakadia Vadodara Transmission Project

Chandan KALRA*, Harish KUMAR*, Prem KUMAR, Rajesh SURI
Sterlite Power Transmission Limited, India

ID: 11717
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL
Keywords: power system, overhead line, dynamic line rating, DLR, dynamic modeling

Dynamic modeling and analysis of a DLR System towards increasing overhead transmission Lines ampacity

Jemma MAKRYGIORGOU, Christos – Spyridon KARAVAS, Ioannis MORAITIS, Efthimia CHASSIOTI, Jun RONG
Department of Research Technology & Development, Independent Power Transmission Operator (IPTO) S.A., Athens, Greece

ID: 11724
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Emission-free Electric Drum Winch eST 140

Gisela GRUBER[1], Michael ERSPAMER[2]
[1]Zeck GmbH, Germany; [2]Omexom Hochspannung GmbH Zeck GmbH, Germany

ID: 11730
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL

Influencing parameters of the electrical-thermal long-term behaviour of current- carrying fittings under outdoor conditions

Christian HILDMANN, Markus Andreas GÖDICKE
TU Dresden, Germany

ID: 11759
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS1 - Challenges from Renewables Integration and Influences of Energy Transition on OHL
Keywords: bundling effect, connection to grid, corridor usage, stakeholder engagement

Optimal routing of corridors and paths of OHL for grid connectivity and substation siting with improved stakeholder engagement

Marcel STOECKLI[1], Stefano GRASSI*[2], Salvador BAYARRI[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]GILYTICS AG, Switzerland

PS2 - ASSET MANAGEMENT, STRATEGIES, TECHNOLOGIES AND METHODS FOR OHL

ID: 10136
B2 OVERHEAD LINES - Full Papers

Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Core conductors, integrity assement, obverhead composite, dielectric testing, breakdown analysis

Dielectric testing for integrity assessment of overhead composite core conductors

Léo RICHARD
Epsilon Composite Cable, France

ID: 10137
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Assets management tools, OHL, modelling, wind-induced aeolian vibrations, damages

Damage in overhead lines – A tool for lifespan prediction

Julien SAID[1], Emmanuel CIEREN[2], John REFORD[2], Maxime GUEGUIN[2], Rémi CAPILLON[2], Matthieu ANCELLIN[2]
[1]RTE, France; [2]Eurobios, France

ID: 10175
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

A Forest Fire Target Detection Method Based on YOLOV8

Yuanjun ZUO, Zhihong HUANG, Sheng WU, Jian XIAO
State Grid Hunan Electric Power Company Limtted Research Institute, China

ID: 10176
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Analysis of lightning strike distribution of typical 500 kV transmission lines based on lightning data and distributed transient traveling wave

Yingpu XIE, Shanqiang GU, Jian LI, Min WU, Mengfei LEI, Xiaoqin ZHANG
State Grid Electric Power Research Institute,China

ID: 10177
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Diagnostic analysis and suggestions for batch heating of composite insulators of 500 kV overhead lines in central China

Yijun YUAN[1], Zixin ZOU[2], Peng ZENG[3], Yafeng CHAO[1], Peng JIANG[3]
[1]State Grid Hunan Electric Power Company Limited Research Institute,China; [2]State grid Hunan Changsha power supply company,China; [3]State grid Hunan Hengyang power supply company,China

ID: 10178
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Experimental Study on the Characteristics of Grounding Devices for Towers of Overhead Transmission Line

Bo ZHANG[1], Sen WANG[2], Shanqiang GU[3], Zhizhong LI[2], Yingpu XIE[3]
[1]Tsinghua University, China; [2]Shaanxi Electric Power Research Institute, China; [3]State Grid Electric Power Research Institute, China

ID: 10179
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Lightning Risk Assessment Method for Transmission Channel Based on EGM and Numerical Solution

Shanqiang GU, Mengfei LEI, Jian LI, Min WU
Wuhan NARI Limited Company, State Grid Electric Power Research Institute, China

ID: 10182
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Study on the Fatigue Fracture Mechanism of Transmission Line under Breeze Vibration Considering the Influence of Splicing Sleeve

Jun YONG[1], Chao ZHOU[1], Hailei MENG[1], Hui LIU[1], Xiaohui LIU[2]
[1]Stage Grid Shandong Electric Power Company, China; [2]Chongqing Jiaotong University, China

ID: 10314
B2 OVERHEAD LINES - Full Papers

Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: overhead line cable, asset management, non-destructive testing, ACSR

Test bench and database for ACSR cable non-destructive testing

Pascale PRIEUR[1], Stéphane HEURTAULT[1], Louise EYMARDAUPHIN[1], Julien SAID[1], Jean-Philippe SAUT[2], Kieu-Diem HO[2]
[1]RTE, France; [2]EUROBIOS, France

ID: 10334
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Quantitative Framework for Estimating the Depth of Wind-induced Wear at Connections on Overhead Lines

Gitanjali BHATTACHARJEE, Brian MCDONALD
Exponent, Inc., United States of America

ID: 10335
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Conductor Icing Risk Assessment and Detection with Weather and Posiiton Monitoring

Kristine ENGEL[1], Shikhar PANDEY[2]
[1]LineVision Inc., United States of America; [2]Commonwealth Edison Company, United States of America

ID: 10336
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Artificial Intelligence, Asset Management, Image Recognition, Power Line Inspection

Drone and AI-enabled Transmission Line Inspections

Zefan TANG, Jing YANG, Junhui ZHAO, Elizabeth HALL, Asim FAZLAGIC
Eversource Energy, United States of America

ID: 10414
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: EMTP, Lightning strike, New Concept OHL, Temporary Protection Ground

OHL Work Safety. Use of EMTP to design the protocol for setting up Temporary Grounding Protection

Luis DIAS, Aurélie DUFAIX
RTE, France

ID: 10490
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Risk-based after-service Inspections and Testing of overhead Line Composite and Porcelain Insulators for residual Life Assessment

Igor GUTMAN
Independent Indeendent Insulation Group Sweden AB, Sweden

ID: 10500
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Wildfires, Infrastructure protection, Infrastructure monitoring, Decision support system

Decision Support Center with Muti-sensory Data for Infrastructure Protection

João GASPAR[1], Luís Mário RIBEIRO[2], José MOREIRA[1], Carlos VIEGAS[2], David ALMEIDA[2]
[1]REN, Portugal; [2]ADAI/UC, Portugal

ID: 10501
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Defect Analysis of Polymeric High Voltage Insulators: Condition Assessment and Inspection Techniques

André COELHO[1], Gonçalo PINTADO[2], Pedro NUNES[1], Rui MARTINS[1]
[1]EDP Labelec, Portugal; [2]REN, Portugal

ID: 10502
B2 OVERHEAD LINES - Full Papers

Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Electromagnetic interference, gas pipelines, transmission line

On the assessment of electromagnetic interference of overhead lines and underground cables on gas pipelines

Andreia LEIRIA, João TARQUÍNIO, António ESTEVES
EDP Labelec, Portugal

ID: 10618
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Use of insulating towers in high voltage transmission lines: effect of grounding elimination on lightning performance

Iván HIGUERO TORRES[1], Carlos GARCÍA BARRIOS[2], Alexandra BURGOS MELGUIZO[2], Paulino APARICIO CILLÁN[2], Pedro LLOVERA-SEGOVIA[1], Vicente FUSTER ROIG[1]
[1]Instituto Tecnológico de la Energía, Spain; [2]Red Eléctrica, Spain

ID: 10621
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Integrated system for work at height safety management

Pablo RODRÍGUEZ[1], Carlos RODRÍGUEZ[2], Guillermo GONZÁLEZ[3], Javier VALDÉS[4], Abel SANCHO[4], Jesús MARTÍN[5], Alejandro SICILIA[5]
[1]Red Eléctrica, Spain; [2]Elewit, Spain; [3]Redeia, Spain; [4]AOS, Spain; [5]Amplia, Spain

ID: 10705
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Experience with Satellite Imagery for Maintenance of OHL Lines

Emanuel DE BOE[1], Görg Philip MAXIMILIAN[2], William VAN DEN BROECK[1], Irid BUFI[2]
[1]ELIA, Belgium; [2]50 hertz, Germany

ID: 10735
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Composite Insulator, HTV Silicone Rubber, Hydrophobicity, Acid Attack

Influence of Acid Attack on the Hydrophobicity of HTV Silicone Rubber on Composite Insulators

Marcel STOECKLI[1], Jaka STRUMBELJ*[2], Yannick INDERBITZIN[2], Urs GASSER[2], Christine BAER[2], Jan LACHMAN[3]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Pfisterer Switzerland AG, Switzerland; [3]EGU - HV Laboratory a.s., Czech Republic

ID: 10736
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: OHL, audible noise, surface treatment, conductor diameter enlargement

Combined Effects of Audible Noise Mitigation Measures for OHLs by Surface Treatments and Enlargement of Conductor Diameter

Marcel STOECKLI[1], Hannah KIRCHNER*[2], Christian FRANCK[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]ETH Zurich, Switzerland

ID: 10768
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Nano satellites; Overhead Lines; images

Monitoring Overhead Lines through images from nano satellites

Carlos NASCIMENTO[1], Thiago MUNIZ[2], Demetrio AGUIAR[2], Valter SILVA[1], Ana GOMES[3], Everton HAFEMANN[3], Vinicius RISSOLI[3]
[1]Brazilian NC of CIGRE, Brazil; Cemig GT; [2]Cemig D; [3]SCCON

ID: 10778
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Atmospheric weathering; Atmospheric corrosion; metallic maintenance costs

Atmospheric weathering and corrosion, in a tropical country like Brazil, on metallic maintenance costs of power transmission lines

Fernando DINIZ[1], Euro PINTO DE ALMEIDA[2], Thiago Luiz FERREIRA[1], Alberto RODRIGUES DE SOUSA[1], Camila PACHER[3], Julia Stefany ALBRECHT[3], Mariana BRAGANÇA[3], Kleber PORTELLA[3], Juliano DE ANDRADE[3], Bruno KOWALCZUK[3], Mauricio MAZUR[3]
[1]Brazilian NC of CIGRE, Brazil; ARGO; [2]Consultor; [3]LACTEC

ID: 10779
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Grease degradation; Overhead line

Overhead line conductor grease degradation mechanisms and proposed condition classification system

Ricardo NEVES[1], Michael THOMAS[1], Nick XYDIS[2]
[1]Brazilian NC of CIGRE, Brazil; Metalube Group; [2]Xytecs

ID: 10792
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: insulation, investigation, natural pollution, homogenous areas pollution, flashover voltage, surface conductivity

Characteristics of Outdoor Insulation in Areas with Different Natural and Climatic Conditions, Types of Environment and Sources of Pollution

Lev VLADIMIRSKII, Olga SUSLOVA
JSC NIIPT, Russian Federation

ID: 10884
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: meteorological calculations and ice and wind load modeling, dynamic modeling of mechanical loads on OHL towers

Multiphysics OHL modeling

Aleksandar TERZIĆ, Nebojša PETROVIĆ
Elektromreža Srbije JSC, Serbia

ID: 10921
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Hyperspectral Imaging for the Corrosion Detection on Metallic Lattice Towers

Frédéric MANGIALETTO[1], Irid BUFI[2], Mohring WENCKE[2], Eveline VRANKEN[1], Michiel VLAMINCK[3], Zakaria BNOULKACEM[3], Zohreh ZAHIRI[3], Hiep LUONG[3]
[1]ELIA, Belgium; [2]50Hz, Germany; [3]Imec, Belgium

ID: 10973
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Full-scale test, Slimline tower, Tower in tower, Wind tunnel experiments

Development of a design and construction method for newly constructing a slim tower inside an existing 275 kV tower

Hayato SANO, Motoyuki YAMAZAKI, Yoshiyuki SAITO, Tomoaki OSONO, Keito MURAKAMI, Tomonori SHIRAISHI
TEPCO Power Grid,, Japan

ID: 10979
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Carbon fiber reinforced plastics, Equipment maintenance technology, Existing transmission towers remain reliable, Flat bar

Development of steel tower reinforcement method using flat bar and steel tower repair method using carbon fiber

Shunpei YAMASHITA, Keito MURAKAMI, Keigo TANAKA, Tomoaki OSONO, Motoyuki YAMAZAKI, Tomonori SHIRAISHI
TEPCO Power Grid, Inc., Japan

ID: 10980
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Anomaly detection, Automated inspection, Drones, Machine learning

Development of automated inspection technology for overhead transmission lines using drones

Fumihiko KONDO[1], Yuki MARUME[1], Takaya MASUDA[2], Masahiro OGAWA[2], Kentaro FUKAMI[2], Erika TANAKA[2]
[1]Chubu Electric Power Grid Co., Inc., Japan; [2]SENSYN ROBOTICS, Inc., Japan

ID: 10981
B2 OVERHEAD LINES - Full Papers

Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Audible noise level, Damaged RTV coating, Partial discharge, Repair criteria

Field Experience and Maintenance Assessment of RTV Coated Cap and Pin Insulators in Japan

Ryo YUZAWA[1], Asuka TOKURIKI[1], Motohiro MAEDA[2], Tomoya IIZUKA[2]
[1]Chubu Electric Power Grid Co., Inc., Japan; [2]NGK Insulators, Ltd., Japan

ID: 10986
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Spacer, Insulator, Polymer, Electrical breakdown

Mechanism Clarification of Insulating Performance Decreasing by Aging of Polymer Insulators for Overhead Transmission Lines

Teruhisa TATSUOKA[1], Hiromitsu IJICHI[1], Toshihiro TSUBOI[1], Tatsuya ISHIKAWA[2], Sakae TANIGUCHI[2], Tomonori SHIRAISHI[2]
[1]Tokyo Electric Power Company Holdings, Inc., Japan; [2]TEPCO Power Grid, Inc., Japan

ID: 11007
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: asset health index, mechanical stresses, temperature influence, tower, vibration

Asset Health Index for Towers and Conductors in the Framework of EU Project FARCROSS

Viktor LOVRENCIC[1], Nenad GUBELJAK[2], Bálint NÉMETH[3], Matej KOVAČ[4], Levente RACZ[5], Ana LOVRENCIC[6]
[1]C&G Ljubljana, Slovenia; [2]Faculty of Mechanical Engineering, Maribor, Slovenia; [3]BME Budapest, Hungary; [4]GRIDPULSE Ljubljana, Slovenia; [5]BME Budapest, Hungary; [6]C&G Ljubljana, Slovenia

ID: 11023
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Novel approach for the reliability analysis for porcelain insulators for the generation of an asset health index

Fabian LEHRETZ[1], Martin DÖRR[1], Christoph PURUCKER[2]
[1]TenneT TSO GmbH, Germany; [2]Insulation Technology Group GmbH, Germany

ID: 11082
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Case study for refurbishment of 33kV line with surge arresters on the earth wire

Anne WILLIAMS
Aurecon, Australia

ID: 11083
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

GIS database for overhead lines resilience to extreme ice events

Anne WILLIAMS
Aurecon, Australia

ID: 11084
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Insulator set cold end fitting failures: understanding failure mechanisms and prioritizing replacements

Andreas LEM[1], Michael WILSON[2]
[1]Groundline Engineering, Australia; [2]Transpower, New Zealand

ID: 11106
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

How regular inspections and allowances for degradation in OHL's combine to underpin network reliability, and the implications for design and residual strength requirements given downturns in reliability and aging networks

Nathan SPENCER[1], Johnny SHAN[2]
[1]CoEng Pty Ltd, Australia; [2]CitiPower Pty and PowercorAustralia Ltd, Australia

ID: 11108
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Impact of Bushfire on Conductor Performance - Prioritising Rectification Works

Matthew HEATH, Charles KURNIAWAN, Brendan SHANAHAN
Transgrid, Australia

ID: 11124
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Overhead lines, birds electrocution, birds trip, anti - bird measures

New Precautionary Studies and Results for Reducing Bird Caused Faults in Over Head Lines

Muhammet Furkan YILMAZ[1], Ali OZTURK[2], Murathan YENICELI[1], Ümit AKTAS[1]
[1]Turkish Electrical Transmission Corporation (TEIAS) Türkiye; [2]Düzce University Türkiye

ID: 11126
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Grounding, CDEGS, Energy Transmission Line

Verification with Grounding Models and Field Performances Developed in the CDEGS Program for High Voltage Power Transmission Poles

B. Cem KARABAG, Bilgehan TEKSUT, H. Can CIVAN
Turkish Electrical Transmission Corporation (TEIAS) Türkiye

ID: 11160
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Wind induced acoustic emissions on glass insulators

Carina LINTNER[1], Oskar OBERZAUCHER[1], Michael LEONHARDSBERGER[1], Fabien VIRLOGEUX[2]
[1]Austrian Power Grid AG; [2]Sediver S.A.S.

ID: 11190
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Polymeric Insulation Failure Experiences and Strategies to Improve High Voltage Power System Reliability

María GÓMEZ, Juan MAYA
ISA Intercolombia

ID: 11194
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Incorporation of New Technologies (drones) in the Maintenance and Monitoring of the Condition of High-Voltage Transmission Lines in ISA-INTERCOLOMBIA

Natalia RESTREPO, Carlos PUELLO, Juan PEÑA
ISA Intercolombia

ID: 11198
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Geological Analysis and Geotechnical Maintenance Strategies in Transmission Lines. Guatemala and Colombia: Approaching Ground Challenges.

Johanna RODRIGUEZ[1], Juan MARTINEZ[2], Jady UPEGUI[1]
[1]Enlaza Grupo Energía Bogotá; [2]Trecsa

ID: 11225
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: ATPDraw, electromagnetic induction, electrical risks, transmission lines

Analysis of Electrical Risks by Electromagnetic Induction on Parallel High Voltage Overhead Transmission Lines

William Gonzalo FLORES RUIZ[1], Carlos Roberto TAPIA FARFAN[2]
[1]National University of Engineering, Peru; [2]ISA REP

ID: 11230
B2 OVERHEAD LINES - Full Papers

Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Drones, innovative methods, asset reliability, technological advances

The use of drones for preventive maintenance of high voltage transmission lines: business case and field experiences

Samuel A. ASTO[1], Daiana A. DA SILVA[2], Alejandra M. LUNA[1]
[1]ISA REP; [2]Military Engineering Institute, Brazil

ID: 11314
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Towards a Digital Twin for Management of OHL Risk

Ailidh MEEK, Matthew JONES, Charlie DODDS, Iain DIVERS
SP Energy Networks UK

ID: 11353
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: DLR, overhead line, sensor, neural network, distributed monitoring

Power System Management based on Distributed Line Monitoring

Levente RÁCZ, Dávid SZABÓ, Gábor GÖCSEI, Bálint NÉMETH
Budapest University of Technology and Economics

ID: 11357
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Live-line maintenance, accident analysis, work safety, overhead line, personal protective equipment

Analysis of Live Work Accidents in Transmission Lines and Recommendations to Improve Working Safety

Dávid SZABÓ[1], Dániel BALOGH[1], Bálint NÉMETH[1], Eduardo RAMIREZ-BETTONI[2]
[1]Budapest University of Technology and Economics; [2]Xcel Energy

ID: 11365
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Comparison of Conductors with Different Surface Treatment in Terms of Generated Acoustic Noise – Laboratory Experiment

Martin KNENICKY[1], Marek BROSCH[1], Ladislav MUSIL[1], Marek SINDLER[1], Tereza TRUNKATOVA[1], Jiri BREJCHA[2]
[1]EGU – HV Laboratory, a.s.; [2]CEPS, a.s.

ID: 11383
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: UAV; Transmission line Inspection; Enhancing Electrical Safety; Transmission line components Identification; Fault and Defect analysis; Insulators Cleaning

Autonomous Inspection and Fault Detection of Transmission Line Component Based on Unmanned Arial Vehicle (UAV)

Abdel Rahman Naser ALHEYASAT, Hikmat Salem Mitib ALHARAHSHEH
National Electric Power Company, Jordan, Hashemite Kingdom of

ID: 11471
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Assessment of Operating Life of Silicone Rubber HV Insulator Coatings in Harsh Desert Environment

Raouf ZNAIDI[1], Ahmad ALTHAGAFI[2]
[1]GCC Interconnection Authority, KSA; [2]GCC Interconnection Authority, KSA

ID: 11504
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Use Of Convolutional Neural Network For Defect Identification From Tower Images And Unsupervised Machine Learning Algorithms For Transmission Line Vulnerability Estimation

Neeraj JOSHI*, Sukdev MONDAL, Neelanjana JAIN, B.C. JHA, Virendra KUMAR, Harsh PAREEK, Sandeep Ramesh BANKAR, VMS Prakash YERUBANDI*, Vinay K CHOWDHARY, Alok RAJ, Vijay Prakash PURI, M S HEJIB, Dharambir KUMAR, Vibhay KUMAR, R K I TYAG
POWERGRID CORPORATION OF INDIA LIMITED, India

ID: 11508
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Comprehensive Rectification Methodology for Submerged Pile Foundation of Overhead Transmission Line Towers

Pankaj Kumar DWIVEDI, Nitesh Kumar SINHA, Rajesh GUPTA, Dr. Subir SEN, Abhay CHOUDHARY
Power Grid Corporation of India Limited, India

ID: 11515
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Transforming Transmission Line Surveys: An Innovative AI-Based Optimization Approach

Neeraj Singh GAUTAM*, Priti NAHAR, Rajesh GUPTA, Dr. Subir SEN, Abhay Chaudhary CHAUDHARY
Power Grid Corporation of India Limited, India

ID: 11524
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Residual Life Estimation of Overhead Transmission Lines based on Asset Health Indexing

Devaprasad PAUL*, Joseph George JOSE, Deo Nath JHA, Kuleshwar SAHU
POWERGRID, India

ID: 11553
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Assessment of long service composite insulators

Sanjay NARAIN
Cigre Southern Africa, South Africa

ID: 11630
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Implementation of AHI for risk-based asset management approach on overhead lines and the strategic value towards transmission grid

Franziska GEBHARDT, Roman SIMKIN
50 Hertz Transmission GmbH, Germany

ID: 11672
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

Use of Gantries as Medium-Term Support to Ensure Continuity of Service for OHL After Severe Structural Damage in an Impact Incident

Jan MAESSCHALCK[1], Kris NUYTS[2]
[1]ELIA ENGINEERING, Belgium; [2]SARENS, Belgium

ID: 11698
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Anti corrosion, Zinc flake, Galvanizing

Development and Demonstration of Eco-friendly Corrosion Protection Technology for Power Transmission Facilites

Taewan KIM[1], Younghong KIM[1], Jabin KOO[1], Hyung-kwon LEE[2]
[1]KEPCO, S.Korea; [2]KERI, S.Korea

ID: 11710
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL

The Innovative Project "ALTITUDE" - Automatic aerial Network inspection using Drones and Machine Learning

Georgios CHATZARGYROS[1], Vicky KOTOULA[1], Evangelia RIGATI[1], Dimitrios STIMONIARIS[2], Dimitrios TSIAMITROS[2], Apostolos PAPAKONSTANTINOU[3], Georgios LOUKOS[4], Sotirios CHRISTOPOULOS[4], Georgios DOUKAKIS[4], Konstantinos MARIOLIS[4], Konstantinos KAOUSIAS[4]
[1]Renel I.K.E, Greece; [2]INNORA, Greece; [3]SciDrones I.K.E/CUT, Greece/Cyprus; [4]Hellenic Electricity Distribution Network Operator (HEDNO), Greece

ID: 11776
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Artificial intelligence (AI), AC corona, Electric field intensity, Overhead power lines

Advanced Overhead Power Lines Electric Field and Stationary AC Corona Analysis Utilizing Artificial Intelligence

Adnan MUJEZINOVIC, Ajdin ALIHODŽIĆ, Emir TURAJLIĆ, Zijad BAJRAMOVIĆ
University of Sarajevo - Faculty of Electrical Engineering, Bosnia and Herzegovina

ID: 11826
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS2 - Asset Management, Strategies, Technologies and Methods for OHL
Keywords: Encroachment, Time-based and risk-based inspection, Artificial intelligence, Maintenance method

Risk-based inspection of overhead lines using artificial intelligence-based image processing system

Supanat WIBOONPHAN, Papop SIMABORVONSUT, Tanapong WIBOONSIRICHAI, Preecha TEERAWONG
Electricity Generating Authority of Thailand (EGAT), Thailand

PS3 - IMPACTS FROM CLIMATE CHANGE ON OHL

ID: 10183
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL

Analysis of ice shedding induced faults of multiple voltage levels overhead lines and its mitigation strategies

Kunpeng JI, Bin LIU, Yongfeng CHENG, Jialun YANG
China Electric Power Research Institute, China

ID: 10184
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL

Design and experimental analysis of arrester for ± 800kV UHVDC OHL

Shanqiang GU[1,2], Wei CAO[1,2], Jian LI[1,2], Shuai WAN[1,2], Jian WANG[3]
[1]Wuhan NARI Limited Company, China; [2]State Grid Electric Power Research Institute, China; [3]State Grid Corporation of China, China

ID: 10185
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL

Development of Galloping Distribution Maps for Overhead Transmission Lines with Specific Return Period in China

Jialun YANG, Bin LIU, Bin ZHAO
China Electric Power Research Institute,China

ID: 10186
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL

Potential Wildfire-induced Tripping Section Assessment of Transmission Line Based on Tree Identification and Flame Combustion

Linmeng FAN[1,2], You ZHOU[3], Enze ZHOU[1,4], Lei WANG[1,4]
[1]Electric Power Research Institute,China; [2]Southern Power Grid Co., Ltd.,China; [3]Changsha University of Science and Technology,China; [4]Guangdong Power Grid Co., Ltd.,China

ID: 10307
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL
Keywords: IRMA, Numerical model, Hurricane integration, methodology, OHL design rules

Hurricane IRMA feedback in the French West Indies

Pierrick PRIGENT, Jean MARTINON
EDF, France

ID: 10327
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL

Testing the Effectiveness of Covered Conductors for Wildfire Mitigation

Ben GEORGIN[1], Matt BOWERS[1], Alex HUDGINS[1], Hunly CHY[2], Arianne LUY[2]
[1]Exponent, Inc., United States of America; [2]SCE Company, United States of America

ID: 10608
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL

On-site Evaluation of ACSR Solar Absorptivity Using a Novel Probe Deployed by Robotic Means

Jonathan BELLEMARE, Ghislain LAMBERT, Sébastien LEPROHON, Marion NOURRY, Vincent Q. GUAY, Pierre-Luc RICHARD, Nicolas POULIOT
Hydro-Québec, Canada

ID: 10982
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL
Keywords: Atmospheric Corrosion Monitor, Artificial snow accretion test, Field monitoring, Insulator, Snow accretion

Packed Snow Accretion on Overhead Transmission Line Insulators - Field Monitoring and Snow Conductivity Measurement using Atmospheric Corrosion Monitor -

Manabu SAKATA[1], Yusaku SATO[1], Hiroki MIZOE[2], Masayoshi MASUDA[2], Ryota ICHIKAWA[3]
[1]Nippon Katan Ltd., Japan; [2]Tohoku Electric Power Co., Inc., Japan; [3]Tohoku Electric Power Network Co., Inc., Japan

ID: 10983
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL
Keywords: Auxiliary member, Semi-diamond Structure, Snow accumulation

Design and verification of countermeasure against snow accumulation on transmission towers

Kento FUJII[1], Katsuyuki ENDO[1], Akihiro WATANABE[1], Koichi MINAGAWA[2], Isamu HIROTA[2]
[1]Tohoku Electric Power Network Co., Inc., Japan; [2]TOMOE Corporation, Japan

ID: 11155
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL

Data analysis and technical description of the ice monitoring system at Austrian Power Grid

Oskar OBERZAUCHER[1], Carina LINTNER[1], Tommy MYRVIK[2], Vivi MATHIESEN[2]
[1]Austrian Power Grid AG; [2]Heimdall Power

ID: 11158
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL

Investigation of the future development of temperature and low wind velocity in climate change for the Austrian power grid

Kerstin WEINDL[1], Klemens REICH[1], Hans RESSL[2], Theresa SCHELLANDER-GORGAS[2], Max NUTZ[2]
[1]Austrian Power Grid; [2]Geosphere Austria

ID: 11195
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL

Deficiencies in the IEEE 1138 Standard for the Specification of an OPGW Cable Against Atmospheric Discharges

Yasert PEREZ, David GOMEZ, Juan MAYA
ISA Intercolombia

ID: 11196
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL

Satellite Images as a Tool for Risk Management in Transmission Lines: Results of a Pilot with Emphasis on Landslides

Alexander BEDOYA, Mallory SUAREZ
ISA Intercolombia

ID: 11223
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL
Keywords: transmission tower, grounding, impedance, design, improvement

Influence of transient impedance due to atmospheric discharges in the design of grounding of transmission towers

Hugo Eduardo BARREDA SÁNCHEZ
Redinter - Redeia

ID: 11507
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL

Measures to mitigate effect of cyclone on the transmission line structures

Karanvir Singh PUNDIR*, Nitesh Kumar SINHA, Rajesh GUPTA, Dr. Subir SEN, Abhay Choudhary CHOUDHARY
Power Grid Corporation of India Limited , India

ID: 11567
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL

Application of Interphase Spacers to Mitigate Extreme Wind-Induced Swinging on Transmission Lines in Malaysia

M Imran SHAMSUDIN, Nadiah S HUDI, M Jamry A. JAWAS
Tenaga Nasional Berhad, Malaysia

ID: 11570
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL

Operational Needs in Mitigating Bird Encroachment to Transmission Overhead Line Assets

Nadiah S HUDI, M Imran SHAMSUDIN
Tenaga Nasional Berhad, Malaysia

ID: 11635
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL

Climate change and its associated materials requirements

Franziska GEBHARDT[1], Milad MEHDIANPOUR[2]
[1]50 Hertz Transmission GmbH, Germany; [2]IPU Ingenieurgesellschaft Berlin mbH, Germany

ID: 11690
B2 OVERHEAD LINES - Full Papers
Topics: B2 PS3 - Impacts from Climate Change on OHL
Keywords: climate changes, design, overhead lines, transmission network

Impact Of Climate Changes on Designing of New Overhead Transmission Lines: Experiences from the Croatian Transmission System Operator

Goran LEVAČIĆ, Igor LUKAČEVIĆ, Krešimir MESIĆ, Mate LASIĆ, Igor IVANKOVIĆ
HOPS* Croatia

B3 - SUBSTATIONS AND ELECTRICAL INSTALLATIONS

PS1 - CHALLENGES AND NEW SOLUTIONS IN T&D SUBSTATION DESIGN AND CONSTRUCTION FOR ENERGY TRANSITION

ID: 10275
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Challenges and New Solutions in T&D Substation Design and Construction for Energy Transition
Keywords: Electrical vehicles, EV Charging station, Substation premises, Added value

Maximizing Value Of Substation Premises With EV Charging Station Integration

Ahmed Mohamed Refaat Mahmoud RASHED
Egyptian Electricity Transmission Company (EETC)

ID: 10322
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Challenges and New Solutions in T&D Substation Design and Construction for Energy Transition

Next Generation Distribution Center in a Box (DCIAB)

Jose MITRA, Kushal SINGH
Exelon/ComEd, United States of America

ID: 10337
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Challenges and New Solutions in T&D Substation Design and Construction for Energy Transition

Small Modular Reactor and Hydrogen Production: "Impacts on Substation Design"

George BECKER
POWER Engineers, United States of America

ID: 10338
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Challenges and New Solutions in T&D Substation Design and Construction for Energy Transition
Keywords: Offshore Substation (OSS), Floating Offshore Substation (FOSS), Finite Element Analysis (FEA), Wave Basin Model Test, Floater Design

Conceptual Design of Semi-submersible Floating Offshore HVAC Substation Solution

Hongbiao SONG[1], Hana ASSEFA[2], Zhaoxiang TANG[5], Yang OUYANG[3], Robert LUESCHER[3], Tobias STIRL[4]
[1]GE Vernova, United States of America; [2]GE Vernova, Norway; [3]GE Vernova, Switzerland; [4]GE Vernova, Germany; [5]Genesis Technip Energies, United States of America

ID: 10362
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Challenges and New Solutions in T&D Substation Design and Construction for Energy Transition

The 36 kV voltage level – a new standard solution for grid integration of renewable energy sources

Andrea VALANT
TERNA, Italy

ID: 10737
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Challenges and New Solutions in T&D Substation Design and Construction for Energy Transition
Keywords: offshore, floating, GIS, simulation, vibrations, experimental correlation

GIS for offshore and floating applications

Marcel STOECKLI[1], Yang OUYANG*[2], Lukas TREIER[2], Bernhard SPICHIGER[2], Robert LUESCHER[2], Song HONGBIAO[3]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]GE Vernova, Switzerland; [3]GE Vernova, USA

ID: 10738
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Challenges and New Solutions in T&D Substation Design and Construction for Energy Transition
Keywords: High voltage switchgear, SF6 alternatives, disconnector, earthing switch

420 kV SF6-free High Voltage Gas Insulated Switchgear Design, Type Tests and Product Footprint

Marcel STOECKLI[1], Navid MAHDIZADEH*[2], Vincent TILLIETTE[2], Denis TEHLAR[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy, Switzerland

ID: 10781
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Challenges and New Solutions in T&D Substation Design and Construction for Energy Transition
Keywords: Energy Transition, BESS, Grid Code Compliance, Grid Impact

First Step toward Carbon Neutrality using BESS Project in South Africa

Jung Bae KIM, Minsoo LEE
Hyosung Heavy Industries

ID: 10903
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Challenges and New Solutions in T&D Substation Design and Construction for Energy Transition

The role of increased standardisation in the delivery of substation infrastructure to enable a low carbon future in Ireland

Hugh CUNNINGHAM, Ivan CODD, Enda HARRINGTON, Brendan LINEHAN, Bernard O'SULLIVAN, Colm TWOMEY
Electricity Supply Board (Ireland)

ID: 11036
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Challenges and New Solutions in T&D Substation Design and Construction for Energy Transition

Experience with HVDC GIS application during commissioning and early operation phase

Maria KOSSE[1], Christoph KLEIN[1], Maximilian TUCZEK[2], Frank Rene RICHTER[3]
[1]Siemens Energy Global GmbH & CO. KG, Germany; [2]TenneT TSO GmbH, Germany; [3]50Hertz Transmission GmbH, Germany

ID: 11143
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Challenges and New Solutions in T&D Substation Design and Construction for Energy Transition

New test and commissioning tools and concepts for Low Power Instrument Transformers

Peter MENKE[1], Franz GATZE[2], Patrick GANSER[1], Federico CANAS[2], Max BUROW[1], Joerg BLUMSCHEIN[2]
[1]Siemens Energy, Germany; [2]Siemens AG, Germany

ID: 11147
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Challenges and New Solutions in T&D Substation Design and Construction for Energy Transition

Offshore floating HVAC and HVDC substations – Experiences in design of selected primary equipment

Douglas RAMSAY[1], Mark GEARY[1], Thomas HAMMER[2], Thorsten STEINHOFF[2], Matthias STEUER[2], Stephan VOSS[2], Joerg HAFERMAAS[2], Yana SHATEROVA[2]
[1]Corio Generation UK; [2]Siemens Energy Germany

ID: 11537
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Challenges and New Solutions in T&D Substation Design and Construction for Energy Transition

Optimization of overall HV cable length in hybrid transmission technologies used for evacuation of power from off-shore wind parks/Solar parks by implementation of compact transition station.

BB MUKHERJEE, Sasikiran KANDALAM*, PNV Murali PRAKASH
Power Grid Corp. of India Ltd., India

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Design, Modelling, and Computer Simulation of GIS/GIL Equipment in HVDC Substation for Human Safety Assessment in Steady State and Fault Conditions

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EV Changing Infrastructure Design Challenges And Solutions – Case Study

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Solutions And Challenges During Erection And Commissioning Of Digital Substation Having FOCT And Integration Of The System With Existing AIS Substation

Gorav VIG *, Atanu BISWAS, Mritunjay KR., Ranajit DEY, Vivek KAPIL, Aruna GULATI
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Challenges And Precautions During Design And Engineering Of Gas Insulated Switchgear (GIS) Substation Of Hydro Projects

Gorav VIG *, Sudhir KUMAR, Dileep SHUKLA, Vivek KAPIL, Aruna GULATI
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Novel Solution for Converting Existing 400kV I-Type One & a Half Breaker Scheme to D-Type for Evacuating Double Circuit Lines in Same Direction Using 3D Modelling

Nishant SINGH*, Vinay Anand ANAND, Sanjeev SHRIVASTAVA, Aruna GULATI
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Optimization Approach for the Layout design of 400/220kV Gas insulated Switchgear (GIS) Substations

Akhilesh KUMAR*, Aruna GULATI, Vivek KAPIL, Dileep K SHUKLA, Puneet CHAWLA
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Development of DC 320kV, 525kV GIS Cable terminations

Eui-hwan JUNG, Heon-gyeong LEE, Jin-ho NAM, Jung-nyun KIM
LS Cable&system, Republic of (South Korea)

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS1 - Challenges and New Solutions in T&D Substation Design and Construction for Energy Transition
Keywords: Substation, Station Service Voltage Transformer, SSVT, Auxiliary Power Supply, Electrical Installation

Design and Considerations for Station Service Voltage Transformer (SSVT) to Provide Low-Voltage Supply in EGAT's Substation

Koranee PHONGKHUMPHAI, Nabhat CHAIYAPHAN, Thanyathep NANTACHAI, Korrakot WONGNIYOM, Pornpimon SAWADDEEMONGKON
Electricity Generating Authority of Thailand (EGAT), Thailand

PS2 - RETURN ON OPERATIONAL EXPERIENCES FOR SUBSTATION MANAGEMENT

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Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: Capacitive Voltage Transformers, power plant substation, diagnosis

In situ monitoring of the precision shift of capacitive voltage transformers

Bernard PAYA[1], Alain JEANMAIRE[1], Benoît BRUCHON[2]
[1]EDF R&D, France; [2]EDF CIST-INGEUM, France

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: Asset management, load capacity, temperature monitoring, wireless sensors

Solutions for temporarily increasing the Reliable Installation Capacity

François GEGOT[1], Lars EBBERS[2], Robert VOSSE[3]
[1]Wika, France; [2]Qirion, Netherlands; [3]Alliander, Netherlands

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: SF6, Medium voltage switchgear, gases, Persistent Organic Pollutants (POPs) Regulation

Synthesis of the different technologies for removing SF6 from medium voltage switchgear

Christophe PREVE[1], Daniel PICCOZ[2]
[1]Schneider-Electric, France; [2]SASU Daniel Piccoz, France

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: SF6 Alternatives, AIS circuit breakers, AC transmission network, HV main technologies, Operation and maintenance

Integration, Operation and Maintenance of AIS Circuit Breakers using SF6 alternatives - experience with the 3 HV main technologies

Emmanuel LOPES[1], Minh NGUYEN[2], Benoit BRUCHON[1], Fabrice MARETTE[1]
[1]EDF, France; [2]RTE, France

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Seismic Resilience of Interconnected Substation Equipment: Lessons Learned from a Comprehensive Test and Modelling Program

Leon KEMPNER. JR.[1], M.V. SIVASELVAN[2]
[1]Bonneville Power Administration, United States of America; [2]University of Buffalo, United States of America

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Condition & Risk Assessment: Plans and Reality

Tony MCGRAIL[1], Reena DHIR[2], Carl JOHNSTONE[3], Jamie BEARDSALL[4]
[1]Doble Engineering, United States of America; [2]Manitoba Hydro, Canada; [3]i4 Asset Management, United Kingdom; [4]Drax Power, United Kingdom

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System Approach to Evaluation and Deployment of Substation Robotics

Poorvi PATEL[1], Dean GORDON[2], Sergo SAGARELLI[3], Dexter LEWIS[1], Sunny BELLARY[1]
[1]Electric Power Research Institute (EPRI), United States of America; [2]Con Edison, United States of America; [3]Black & Veatch, United States of America

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Evaluating and Comparing Substation Threat Mitigation Tactics: Substation Improvements for a More Resilient Power Grid

Paul SOMBOONYANON[1], Connor BOWEN[2]
[1]AEC Lionstech, United States of America; [2]Burns & McDonnell, United States of America

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Overcoming Challenges and Progressing Electrical Substations toward Digital Transformation

Paul SOMBOONYANON[1], Brian PALMER[2]
[1]AEC Lionstech, United States of America; [2]Burns & McDonnell, United Kingdom

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Monitoring System of Ground Loop Impedance to Verify Step and Touch Voltages

Fernando GARNACHO[1], Abderrahim KHAMLICHI[2], José R. VIDAL[2], Antonio GONZALEZ[3], José L. NAVARRO[4], Pascual SIMÓN[2]
[1]Universidad Politécnica de Madrid, Spain; [2]FFII, Spain; [3]EDP REDES ESPAÑA, Spain; [4]UFD-GRUPO NATURGY, Spain

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SCAN to BIM in Electrical Infrastructures: Data segmentation of Substations Point Cloud assisted by AI

Cecilia FATÁS PAÚL, Romina Inés LOBERA DUIZ, José Elías HERRERO JARABA
CIRCE Centro Tecnológico, Spain

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Driving Operational Excellence: Leveraging APM Technology for Predictive Alarming on SF6 Breakers

Ted ZALUCKI[1], Jim VESPALEC[2]
[1]Engineered Intelligence Inc., Canada; [2]American Transmission Co., USA

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: Initiatives to strengthen resilience, reliability and security, best practice and end-of-life management considering sustainability aspects

Impact of soil resistivity seasonal variation on substation earth electrode design – A case study

Theunus MARAIS
Eskom

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
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European Experience of Developing from Asset Health Index to Risk Method for Optimal Investment on Substation Assets

Jos SLANGEN[1], Qikai ZHUANG[2], Branislav PILAT[3], Despoina MAKRIDOU[4], Ilic VLADIMIR[5], Jan CERNOHORSKY[6], Laura COHEN[7], Uros KERIN[8]
[1]TenneT TSO B.V.; [2]TenneT TSO GmbH; [3]SEPS; [4]IPTO; [5]EMS; [6]CEPS; [7]Rte; [8]ELES

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management

A system risk approach for management and optimization of critical spare parts

Marcel STOECKLI[1], Enrico CONTE*[2], Andreas VOLLMER[2], Sourav ADHYA[3], Sakthivel DURAIAPPAN[4]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy, Switzerland; [3]Hitachi Energy, Poland; [4]Hitachi Energy, India

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: Transmission Systems Operation, Control, SMART GRIDS, Active Power Losses, Online Measurement and Monitoring

System for Real Time Monitoring and Optimising of Power Losses in High Voltage Substations - a Romanian Experience

Constantin MOLDOVEANU[1], Irene IONITA[1], Virgil BREZOIANU[1], Sorin ZAHARESCU[1], Ioan D HATEGAN[2], MIhai C MARCOLT[3]
[1]Nova Industrial SA; [2]Siemens Energy SRL; [3]CNTEE Transelectrica SA

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: Availability, HV GIS, MRE-Code, Service Continuity Guide

New Standards and Solutions for Service Continuity of HV GIS

Marcel STOECKLI[1], Jens HETTLER*[2], Mark KUSCHEL[3], Samuel PACHLATKO[4]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Swissgrid AG, Switzerland; [3]Siemens Energy AG, Germany; [4]Hitachi Energy AG, Switzerland

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Retrofill for 420 kV Gas-Insulated Lines: Technical Concept and Return of Experience

Marcel STOECKLI[1], Samuel PACHLATKO*[2], Michael GATZSCHE[2], Freddy VON ARX[2], Manuel NAEF[2], Mark WALDRON[3], Ismail PATEL[3]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy, Switzerland; [3]National Grid Electricity Transmission, United Kingdom

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Implementation of the new IEC and CIGRE requirements on service continuity to high voltage gas insulated switchgears

Marcel STOECKLI[1], Samuel PACHLATKO*[2], Denis TEHLAR[2], Josef HANSON[3], Jennifer-RuiQiong PAN[4], Benoit GODEAU[5], Thomas WIJNHOVEN[5]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy, Switzerland; [3]Hitachi Energy, Germany; [4]Hitachi Energy, China; [5]Elia, Belgium

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: Electric power substation; Hidraulic Power Generation; GEOBIM; Reality Capture, Geographic Information System (GIS); Cloud Points; Digital Twins; BIM

Case Studies - GEOBIM Substation and Power Generation Reality Capture for Digital Twin

Ana MAROTTI[1], Gerson LIMA[2], Daniel FERNANDES[3], Rodrigo AGUIAR[4], Lucas HOLANDA[5]
[1]Brazilian NC of CIGRE, Brazil; Eletrobras FURNAS; [2]Computer Graphics Works; [3]Eletrobras ELETRONORTE; [4]Eletrobras CGT ELETROSUL; [5]Eletrobras CHESF

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: Electric power substation; circuit breaker; online monitoring; integrated to the Asset Registry, Operating System and Geographic Information System (GIS); intelligent analysis; Artificial Intelligence; Digital Twins; BIM

Digital twins applied for intelligent analysis and real-time monitoring of circuit breakers in electrical power substations

Ana MAROTTI[1], Giovani BERNARDE[2], Sergio SILVEIRA[3], Clayton DUARTE PESSOA[1], Fabiana TEIXEIRA[1], Clodualdo SOUSA[2], Fabiano VILLANI[3]
[1]Brazilian NC of CIGRE, Brazil; Eletrobras FURNAS; [2]UNIFEI; [3]Imagem Geosistemas

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New Competencies and diagnostic Methods needed for the Application of Composite Insulators in Substations

Peter SIDENVALL
Independent Insulation Group Sweden AB, Sweden

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The Impact of Digital Transformation on the Asset Management System

Dmitry VODENNIKOV[1], Yulia ZHILKINA[1], Svetlana ZAKIROVA[2]
[1]PJSC ROSSETI, Russian Federation; [2]S&T Centre of Rosseti FGC UES, Russian Federation

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: SF6-free GIS, fluoro-nitrile, IEC 61850, LPIT, interoperability, condition monitoring, partial discharge

Experiences with commissioning of a 132 kV GIS SF6-free digital substation

Karl POLLESTAD[1], Jean-Luc RAYON[2], Christopher GEBS[1], Per Kristian FURUHEIM[1], Hans Kristian MEYER[3], Alban LUCIOL[2], Jean-François MIRONNEAU[2], Assan SARR[2], Loïc PREVOST[2], David LAPIERRE[2]
[1]Elvia Norway; [2]GE Renewable Energy France; [3]SINTEF Energy Research Norway

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Commissioning and operational experience with the first switchgear of its kind to integrate digital and greenhouse gas-free components for power transmission

Peter MENKE[1], Marcel ENGEL[2], Mark KUSCHEL[1], Fred OECHSLE[2], Julian SPRINGER[2], Gregor POLICHT[2], Tim FRITSCH[3]
[1]Siemens Energy, Germany; [2]Netze BW GmbH, Germany; [3]Siemens AG, Germany

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: Outdoor GIS, Engineering and design, Long-term reliability, Life-cycle management

Impact on Engineering and Lifetime Management of High Voltage Outdoor GIS

Toshiyuki SAIDA[1], Keisuke NAKAMURA[2], Tobias ZIESEMER[3], Jens KALLWEIT[4], Manuel NAEF[5], George BECKER[6]
[1]Toshiba Energy Systems & Solutions Co., Japan; [2]TEPCO Power Grid, Inc., Japan; [3]Siemens Energy Global GmbH & Co. KG, Germany; [4]GE Grid Solutions, Germany; [5]Hitachi Energy, Switzerland; [6]POWER Engineers, Inc., USA

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: Automatic diagnosis, Control and operating current, Hydraulic pump current, Monitoring system

Management experience of condition monitoring system and development of new IoT devices

Yuki YATABE, Shinya AICH, Takayuki KANAMORI, Tetsuya IKEDA, Yusuke TAKENAKA
Chubu Electric Power Grid Co., Inc., Japan

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: SF6-gas, Leakage, Management, Repair

Management of SF6 gas leakage and repair technology in gas insulated equipment

Keisuke NAKAMURA, Keisuke MURAKITA, Shigeyuki TSUKAO, Wataru ISHIKAWA, Harukazu AKIYAMA, Syuichi TAMURA
TEPCO Power Grid, Inc., Japan

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: Advanced Maintenance Technology, Aging Equipment, Asset Management, Diagnosis of Deterioration

Study on Advanced Maintenance Strategies and Asset Management for Substation Equipment in Japan

Kiyohiro TSUBOI[1], Shinya AICHI[1], Satoshi ICHIHARA[2], Kosho KAMATANI[2], Ryosuke ITOTANI[3], Koki SADAHIRO[3]
[1]Chubu Electric Power Grid Co., Inc., Japan; [2]TEPCO Power Grid, Inc., Japan; [3]Kansai Transmission & Distribution, Inc., Japan

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: Vegetable-oil transformers, SF6 alternative equipment, synthetic air insulation, remote maintenance system

Sustainable improvement on substation resilience and reliability by using eco-friendly equipment and remote maintenance systems

Ryosuke ITOTANI[1], Koki SADAHIRO[1], Hiroyuki HAMA[2], Kazuki SUGINO[2], Masashi TOKAI[3], Manabu TAKEDA[3]
[1]Kansai Transmission and Distribution, Inc., Japan; [2]Mitsubishi Electric Corporation, Japan; [3]DAIHEN Corporation, Japan

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: Condition monitoring, IEC61850, IED

Verification of substation condition monitoring by linking IEDs with existing substation equipment

Hiroko ISAJI, Yousuke OGURA, Masanobu YOSHIDA
Chubu Electric Power Co., Inc., Japan

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Retrofit GIS Service Solution for extended Lifetime Maintenance

Filip BENGTSSON
Hitachi Energy Sweden AB, Sweden

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SF6 reduction on existing brownfield GIS installations

Tobias ZIESEMER[1], Karsten KRAUSE[1], Gavin PERALTA[2]
[1]Siemens Energy Global GmbH & Co KG, Germany; [2]Siemens Energy Limited, United Kingdom

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Operational experience with dynamic current rating of busbar systems in 220-kV-substations

Ralf PUFFER[1], Richard WEISSNAR[2], Klemens REICH[2], Anita MACHL[2]
[1]RWTH Aachen University; [2]Austrian Power Grid AG

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SF6 Insulated Substations: Challenges and Lessons Learned for Improving ISA Group Operational Reliability and Sustainability.

Marcelo MEZA, Johan SÁNCHEZ
ISA Interconexión Eléctrica

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Sustainable Urban Electrical Substations: an Integral View for a Sustainable Transformation of the Energy Sector

Andrés LONDOÑO, Diego TAUTA, Juan SIERRA
EPM

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High Gradient Magnetic Fields Generated in Events on the 230 kV Electric Power Transmission Infrastructure: Human Exposure Analysis and Risk

Fabián ROJAS[1], Gerardo GERRA[1], Luis DIAZ[1], Carlos VARGAS[2]
[1]Enlaza Grupo Energía Bogotá; [2]Conecta

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Topics: B3 PS2 - Return on Operational Experiences for Substation Management

Development of an Application to Support Systems Integration and Operational Risk Assessment for Digital Substations and Smart Grids

Carlos SANCHEZ[1], Johan CASTRO[1], Germán RUEDA[1], Oscar TOBAR[1], Rodolfo GARCIA[2], Germán ZAPATA[1]
[1]Universidad Nacional; [2]Enel Colombia

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Methodology for the Condition Analysis of High Voltage Capacitor Banks (Proposal and application case)

Gerardo GUERRA[1], Fabian ROJAS[1], Edgar TORRES[1], Carlos VARGAS[2], José MORATAYA[2]
[1]Enlaza Grupo Energía Bogotá; [2]Conecta

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Return of experience on gas handling with C4-FN mixtures for high-voltage equipment

Matthew BARNETT[1], Ewan SCOTT[1], Manuel NAEF[2], Michael GATZSCHE[2], Maxime PERRET[3], Fabrice MORAND[4], Peter PILZECKER[5], Martin GOPPEL[5], Frederic LORAY[6], Chrystelle BASSET[6], Roland KURTE[7], Lars BLANZ[7], Neil GWINNUTT[8]
[1]SSEN Transmission UK; [2]Hitachi Energy Switzerland; [3]GE Vernova Switzerland; [4]GE Vernova France; [5]DILO Germany; [6]Air Liquide France; [7]WIKA Germany; [8]EMT United Kingdom

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Laboratory and Field Partial Discharge Monitoring of GIS using SF6 Alternatives

Malcolm SELTZER-GRANT[1], Lujia CHEN[2], Constantinos ONOUFRIOU[2]
[1]HVPD UK; [2]The University of Manchester UK

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Autonomous Inspection Robots for use in HVDC Converter Halls

Irid BUFI[1], Georg FRÜBING[1], Mark VAES[2], Dominic CUSK[3], David INGRAM[3], Charles PELZ[4], Jörg HAFERMAAS[4]
[1]50Hertz Transmission GmbH, Germany; [2]Elia System Operator S.A., Belgium; [3]Ross Robotics Ltd, United Kingdom, Great Britain; [4]Siemens Energy Global GmbH & Co. KG, Germany

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Compact photoacoustic sensor system for the continuous monitoring of SO2 and SF6 percentage in gas-insulated switchgears

Daniel STAIGER[1], Christian WEBER[2]
[1]WIKA Alexander Wiegand SE & Co. KG, Germany; [2]Fraunhofer IPM, Germany

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: : Qatar Transmission System (QTS), Transformer Cable Box, Mean Time to Repair (MTTR), Dissolved Gas Analysis (DGA), Breakdown Voltage (BDV), Water content in oil, Partial Discharge (PD), High Voltage (HV), Low Voltage (LV), Asset Performance Management

Study on Dissolved Gas Analysis of Oil filled Cable Boxes Power Transformers in KAHRAMAA Transmission Network

Zuhair ALSHAIBA[1], Rajesh THOBHANI[2], Sara ALBUHENDI[3], Taner DANISMENT[4], Chittranjan BHATNAGAR[5]
[1]Kahramaa, Qatar; [2]Kahramaa, Qatar; [3]Kahramaa, Qatar; [4]GE Renewable Energy, QATAR; [5]GE Renewable Energy, QATAR

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: B3 PS2 - Return on Operational Experiences for Substation Management
Keywords: Assessment, Key Performance Indicator (KPI), Operation & Maintenance (O&M), Personal Protective Equipment (PPE), Remote Racking Device (RRD), Safety Management System (SMS), Safe electrical arc flash standard (SEAFS)

Comparison and Description of Enhanced Department-Based Arc Flash Safety Assessment with Substation-Based Arc Flash Safety Assessment for the Improvement of Work Place Safety

Md KHAN Saudi Aramco, KSA

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Development of Asset Risk Mapping to Support Asset Management Decision Making in an Integrated Electricity Utility

Andreas Putro PURNOMOADI, Heri Setyo PURNOMO, Indera ARIFIANTO, Erny ANUGRAHANY, Ova KURNIAWAN, Anita PHARMATRISANTI, Herry NUGRAHA
PT. PLN (PERSERO), Indonesia

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Topics: B3 PS2 - Return on Operational Experiences for Substation Management

Challenges And Lessons Learnt Through Failure Experience And Initiatives To Strengthen Resilience Of The Gas Insulated Switchgear

Mayank RANA*, Pankaj Kumar JHA, M.S. HADA, Sandeep YADAV
POWER GRID CORPORATION OF INDIA LIMITED, India

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Improvement in reliability of substation by in situ replacement of 245kV Gas Insulated Switchgear at Borivali Receiving Station, Tata Power, Mumbai

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[1]Tenaga Nasional Berhad Malaysia; [2]TNB Research Sdn. Bhd. Malaysia

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[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Pfiffner Instrument Transformers, Switzerland

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[1]Tenaga Nasional Berhad, Malaysia; [2]Electricity Generation of Thailand

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Keywords: DC/DC converter, DC voltage control, Modular multilevel converter, Multi- terminal DC grid

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Ghazala SHAFIQUE[1,2], Frédéric COLAS[1,2], François GRUSON[1,2], Xavier GUILLAUD[1,3]
[1]L2EP, France; [2]Arts et Metiers, France; [3]Centrale Lille Institute, France

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Keywords: DC harmonics, EMT study, HVDC-LCC

Study and mitigation of DC harmonics on Corsica's SACOI HVDC-LCC station causing long unavailability, a case study.

Yannick VERNAY[1], Jordann BRIONNE[2], Julien MICHEL[1]
[1]RTE, France; [2]EDF, France

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Keywords: DC breakers, HVDC protection, interoperability, protection components sizing

A contribution to HVDC protection interoperability through components sizing

Myriam RATAJCZYK[1,2,3,4,5], Bertrand RAISON[2,3,4,5], Alberto BERTINATO[1], Pascal TORWELLE[1]
[1]SuperGrid Institute, France; [2]University Grenoble Alpes, France; [3]CNRS, France; [4]Grenoble INP, France; [5]G2Elab, France

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[1]Beijing Huairou Laboratory,China; [2]State Grid Smart Grid Research Institute Co., Ltd., China

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[1]State Grid Smart Grid Research Institute, China; [2]C-EPRI Electric Power Engineering Co., Ltd. , China; [3]Beijing Huairou Laboratory, China

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Jin ZHANG[1], Ming LI[2], Jie LIU[1], Zheng ZHAO[2], Tan LI[2]
[1]State Grid Corporation of China, China; [2]State grid economic and technological research Institute Co.,Ltd , China

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Key Technology of Baihetan-Jiangsu ±800kV Hybrid Cascaded UHVDC Transmission Project

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[1]State Grid Smart Grid Research Institute Co., Ltd, Beijing, China; [2]Northeast Electric Power University, Jilin, China

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The world's first series-connected multi-terminal LCC UHVDC transmission -- System studies for the Jinshang-Hubei ±800 kV project

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A Staged Approach for Upgrade of the Square Butte HVDC System

Christian WINTER[1], Peter SCHOMMER[1], Joanne HU[2], Bruno BISEWSKI[2]
[1]Minnesota Power, United States of America; [2]RBJ Engineering, Canada

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[1]DNV; [2]North Sea Wind Power Hub

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Ashish BANGAR[1], Amit KUMAR[2], Francisco CHACON[2], Nadew Adisu BELDA[1], Yogesh GUPTA[2], Olivier RUITON[2]
[1]TenneT; [2]GE Vernova

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Keywords: HVDC, Analysis System, Operational Reliability, Proactive Diagnostics

Development and Application of HVDC Analysis System for Improving Operational Reliability

Woojin CHO[1], Insoo PARK[1], Olivier CLEMENCON[1], Angeliki KAVVALAKI[2], Seonho LEE[3]
[1]KAPES, Korea, Republic of (South Korea); [2]General Electric, United Kingdom; [3]KEPCO, Korea, Republic of (South Korea)

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Keywords: Power Oscillation Damping Control, Hybrid Simulation

The experience of the Power Oscillation Damping Study based on the hybrid simulation method for the Bukdangjin 2nd project in South Korea

Hyunjae YOO[1], Kumar MANOJ[2], Panyoung SUNG[1], Olivier CLEMENCON[1]
[1]KAPES, Korea, Republic of (South Korea); [2]GE Grid Solution, UK

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Keywords: 800 KV Link, Multi-infeed, Variable Renewable Generation, Regional Interconnection, EMT Modelling

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Keywords: geology, geophysics, HVDC ground electrode, site selection

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[1]Hyosung, Korea, Republic of (South Korea); [2]Hyosung Heavy Industries, Korea, Republic of (South Korea)

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B4-PS1_The TRV(Transient Recovery Voltage) issue and solution for HVDC system in the Bukdangjin HVDC project in Republic of Korea

Panyoung SUNG[1], Clemencon OLIVIER[1], Jungho KIM[1], Sewan JOO[2] [1]KAPES; [2]KEPCO

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Keywords: DC TOV SCC, EMT study, HVDC-VSC.

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The Greenlink Interconnector - A new 504 MW HVDC Interconnector

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Measures to secure long lifetime of an LCC based HVDC link with a potentially aged cable

Magne MEISINGSET[1], Jon Ivar JUVIK[2], Kees KOREMAN[3], Thinus DU PLESSIS[4]
[1]Statnett SF Norway; [2]Statnett SF Norway; [3]Tennet The Netherlands; [4]Tennet The Netherlands

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Keywords: Aging equipment, Asset management, Control and protection system update, Life extension, Multiple vendor system, Thyristor module update

Refurbishment of the control and protection system devices and thyristor valve modules in the 300 MW Shin-Shinano No.2 Frequency Converter

Masanori TAKECHI[1], Masahito KANEKO[1], Shigenori KAKUNO[1], Taihei SATO[2], Takahiko KIKUI[3]
[1]TEPCO Power Grid, Inc., Japan; [2]Toshiba Energy Systems & Solutions Corporation, Japan; [3]Hitachi,Ltd, Japan

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Refurbishment and System Test of High Voltage Converter Unit 3 (HVCU3) at Vyborg Back-to-Back HVDC Link

Natalya LOZINOVA[1], Sergey KATANTSEV[2], Maxim PESHKOV[3], Olga SUSLOVA[1], Evgeniy ZMAZNOV[1]
[1]JSC «NIIPT», Russian Federation; [2]PJSC ROSSETI, Russian Federation; [3]JSC «R&D Center of FGC UES, Russian Federation

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The control of a back-to-back onshore and offshore VSC HVDC bipole system

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A classification framework for HVDC-based transmission grid architectures

Patrick DÜLLMANN[1], Lars OSTERKAMP[1], Sarah ANHAUS[1], Robert DIMITROVSKI[2], Paul MCNAMARA[3], Juan-Carlos GONZALEZ[4]
[1]RWTH Aachen University, Germany; [2]TenneT TSO GmbH, Germany; [3]EPRI Europe, Ireland; [4]Super Grid Institute, France

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Opportunities for the use of HVDC to support the energy transition in Australia

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HiL demonstration of onshore AC grid black start via an HVDC-connected offshore wind farm

Christopher KLEIN[1], Patrick DÜLLMANN[1], Lars OSTERKAMP[1], Willem LETERME[1], Philipp RUFFING[2], Tobias NEUMANN[2], S M Iftekharul HUQ[3], Daniel YATES[4]
[1]RWTH Aachen University, Germany; [2]Amprion GmbH, Germany; [3]Siemens Energy Global GmbH & Co. KG, Germany; [4]Carbon Trust, Great Britain

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Switching Voltage Capability of Air-Core Dry-Type VSC Converter Reactors

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Advanced Maintenance Recommendation for HVDC and FACTS Air-core Drytype Reactors

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Overvoltages experienced by Metallic Return Cables in Bipolar HVDC Configuration

Max GOERTZ[1], Simon WENIG[1], Daniel BARTH[1], Simon BECKLER[2]
[1]Mosaic Grid Solutions GmbH, Germany; [2]TransnetBW, Germany

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Fault Location of Star-Connected HVDC Transmission Integrated to Offshore Wind Farms Using System Dynamic Computation

Seyed Hassan ASHRAFI NIAKI[1], Zhe CHEN[1], Birgitte BAK-JENSEN[1], Shuju HU[2]
[1]Aalborg University; [2]Chinese Academy of Sciences

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Sunrise Wind: USA's first HVDC connected offshore wind farm

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[1]Ørsted; [2]Siemens Energy; [3]Siemens Gamesa Renewable Energy

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DC/DC Conversation and Distributed Grid based Solution of HVDC Tapping

Qi ZHANG[1], Filipe Faria SILVA[1], Roni IRNAWAN[2], Rian FATAH[2]
[1]Aalborg University; [2]Gadjah Mada University

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Keywords: Capacitor, Fire, LCC, VESDA, Valve Hall

HVDC Valve Hall Fire Incident: A Case Study at GCCIA Al Fadhili HVDC

Abdullah ALGHAMDI[1], Jayakumar MUTHUSAMY[2], Ranjith PANIGRAHI[3]
[1]GCCIA, KSA; [2]GCCIA, KSA; [3]GCCIA, KSA

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Dynamic Performance of Dual HVDC Terminals (±800 KV LCC and ±320 KV VSC) at the same busbar- Operational Expérience

Narendra KUMAR*, Puneet TYAGI, S. BHATTACHARYA, V. DIWAKAR, P. RAVI
POWERGRID, India

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Challenges, Design Considerations & Field Studies for Relocation of Earth Electrode Station- User's Perspective

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[1]POWERGRID, India; [2]MSETCL, India

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Operational Experience on the Black-Start Exercise of VSC Based HVDC Systems in Southern Regional Grid of India

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Grid-India, India

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Addressing Operational Contingencies Faced in Parallel Operation of ±800 kV 6000 MW Champa Kurukshetra HVDC Link.

Anoop KUMAR*, Keshav GUPTA, Gopesh Kumar JHAJHARIA, Vishnu Parkash SRIVASTAVA
POWERGRID, India

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Evolving of protection strategies for DMR Faults in the ±800 kV 6000 MW Champa Kurukshetra HVDC Link.

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A Methodology to Derisk HVDC and Offshore Wind Connections to a Network

Xiao-Ping ZHANG[1], Shuailong DAI[1], Chengyi WU[1], David LI[1], Dechao KONG[2], Xiaoyao ZHOU[2]
[1]University of Birmingham UK; [2]NG ESO

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220kV Direct-connected Static Synchronous Series Compensation and the First Demonstration Application in China

Yuhong WANG, Kunpeng ZHA, Xiong ZHAN, Gang ZHAO, Yuefeng YANG, Lanfang LI
C-EPRI Electric Power Engineering Co., Ltd , China

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Design of Hybrid Active AC filter Scheme in MinYue back-to-back DC Project

Yiming JI[1], Yiran CHANG[2], Yiming YANG[1], Fangjie WU[1], Ling WANG[1]
[1]State Grid Economic & Technological Research Institute , China; [2]RONGXIN HUIKO Electric Co., LTD , China

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Stability enhancement of weak Grids with high penetration of Renewables with grid-Forming STATCOM/Enhanced-STATCOM

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Hitachi Energy Sweden AB, Sweden

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On using converter controller DLLs for testing in a Hardware-in-Loop Testbed

Ravi SINGH[1], Utkarsh SINGH[2]
[1]DNV; [2]DNV, TU Delft

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Riddhi GHOSH
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Keywords: Large STATCOM units, SSO detection and mitigation, common control and coordination of STATCOM units, series compensation

Application of Large STATCOMs for Dynamic Reactive Support in California 500kV Series Compensated Transmission System

Joanne HU[1], Eric STAUFFER[2], Stefan SCHILLING[3], Bruno BISEWSKI[1], Mark MILBURN[2], Felix NABEIN[3]
[1]RBJ Engineering, Canada; [2]LS Power, USA; [3]Siemens Energy, Germany

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The Use of Thyristor Controlled Series Compensators to Mitigate SubSynchronous Resonance in Networks with Multiple Series Compensators

D.R. WEERAKOON[1], U.D. ANNAKKAGE[1], C. KARAWITA[2]
[1]University of Manitoba, Canada; [2]TransGrid Solutions Inc., Canada

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A family of scalable, transformer-coupled Static Synchronous Series Compensators for transmission and distribution operators, based on industrial-class converters

Javier CHIVITE, Pedro IZURZA
Ingeteam Power Technology, Spain

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Keywords: Control, Efficiency, Loss reduction, Power-electronic converter

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University of Cape Town

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Korea Electric Power Corporation, Korea, Republic of (South Korea)

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Keywords: Hunting Issues of SVCs

Hunting Issues in the Brazilian Interconnected Power System - A Case Study of SVCs Parnaiba III, Sobral III, Sao Luis II and Fortaleza II

Antonio Ricardo TENÓRIO[1], Saulo SILVA FILHO[1], Rodrigo PRAXEDES[2], Felipe SOBRINHO[3]
[1]Brazilian NC of CIGRE, Brazil; ONS; [2]ARGO; [3]Hitachi Energy

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Improved dynamic Voltage Control based on Network Sensitivity Characteristics

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EnergyVille/KU Leuven, Belgium

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Keywords: STATCOM, Voltage Source Converter(VSC), Sub-Synchronous Oscillation (SSO), Power Electronic Device Interaction (PEDI), Flicker, Photovoltaic Power Generation (PV), Power Conditioning System (PCS)

Verification of PEDI in Japan and suppression by STATCOM

Naoki TANI[1], Keigo NISHIDA[2], Hiroaki OSHIKAWA[2], Kohei ONOSATO[3], Toshiyuki FUJII[1]
[1]Mitsubishi Electric Corporation, Japan; [2]Kyushu Electric Power Transmission and Distribution Co., Inc., Japan; [3]Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan

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Subsynchronous Resonance Analysis for an M-SSSC FACTS Installation in the Atlantico Region of the Colombian Transmission System

Juan BOTERO[1], Carlos BORDA[1], Mohammad HAMMAD[2]
[1]Smart Wires Inc; [2]Siemens Energy

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Operation of Static Series Synchronous Compensators integrated into the Colombian Power System: Challenges, Experiences and Lessons Learned

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Reflection on applicable standards and learnings from actual failures of power inverters

Muhannad ALSUHAILY[1], Robert HEUCKELBACH[2], Ashutosh SHARMA[3], Sukant BHATTACHARYA[4]
[1]DNV, UAE; [2]DNV, The Netherlands; [3]DNV, UAE; [4]DNV, UAE

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Optimisation Of MSR & MSC Switching Instances During Auto Mode Operation Of STATCOM To Enhance The Life Of The Equipment

Siva BEHARA* BEHARA*, Naveen KUMAR
POWERGRID, India

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Control Strategies For Parallel Operation Of Statcoms – Securing For Bulk Renewable Energy Transmission

Prashant SALI, Karikalan M, Jaiganesh RAMKUMAR
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A novel DC transmission technology based on the Self-adaption statcom and line commutation converter

Weimin MA, Xiaolin SHEN, Chenguang LIANG
State Grid Economic and Technological Research Institute Co., LTD， China

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Application of Multi-ports Energy Router to Coordinated Control of Renewable Energy, Network, Load and Storage at County-level Power Grid

Chong ZHANG[1], Zhiyuan HE[1], Xiaotong JI[2], Huafeng WANG[1], Xueguang WU[1], Junda QIN[1]
[1]State Grid Smart Grid Research Institute Co., Ltd.， China; [2]State Grid Hubei Electric Power Co., Ltd.， China

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Analysis of Oscillation Mechanism of Renewable Energy Generation Integrated into MMC-HVDC Under Islanded and Grid-connected Modes

Yuntao XIAO, Guanghui LI, Weisheng WANG, Guoqing HE, Ni ZHEN
China Electric Power Research Institute, China

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Grid-Forming Control for VSC-HVDC System with Large-scale New Energy Integration

Xiuda MA, Yu LU, Jie TIAN, Changjiang ZHAN, Nannan WANG, Qiang ZOU, Gang LI
NR Electric Co., Ltd. , China

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Keywords: Dynamic Performance, EMT study, HVDC-VSC bipolar

Fault performance of HVDC-MMC Bipolar configuration with DC overhead-line

Hani SAAD[1], Isabelle GALARNEAU[2], Laurent HOULE[2], Martin FECTEAU[2], Omar SAAD[2]
[1]ACDC Transient, France; [2]Hydro-Quebec, Canada

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Keywords: Direct current system, medium voltage, power electronics.

Linear PV power plant based on MVDC collection network

Piotr DWORAKOWSKI[1], Silvain MARACHE[1], Eric LAMARD[2], Caroline RAMONDOU[2]
[1]SuperGrid Institute, France; [2]CNR, France

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Keywords: condition monitoring, TSEP, VCEon, IGBT, MMC

Online On-state voltage Condition Monitoring of IGBT power modules for MMC-HVDC applications

Nadine CHAPALAIN[1], Huai WANG[2]
[1]Mitsubishi Electric R&D Centre Europe, France; [2]Aalborg University, Denmark

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Modeling, Analysis, and Control of an Islanded Grid-Connected RES-Hydrogen DC Microgrid with Floating Solar Integration

Libin VARGHESE, Peng ZHANG
Stony Brook University, United States of America

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The innovative Damping Resistor System adopted in the Italian Transmission Grid

Gianluigi GEMELLI
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A new STATCOM topology equipped with short-time energy storage and Grid Forming control for HV network voltage and frequency regulation

Gianluca POSTIGLIONE
Nidec-ASI Italy

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Transient phenomena following pole-to-ground fault on MMC-HVDC system equipped with Half-bridge submodules and Hybrid DC breakers

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Dynamic demand control applied to synchronous grid forming controlled HVDC

Carl BARKER[1], Si DANG[1], Omar JASIM[1], Syed Aaqib HASSAN[2], Girish G[2], Kerry EVANS[3]
[1]GE Vernova UK; [2]GE Vernova India; [3]GE Vernova USA

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Harmonic Performance Analysis and Measurements in a European HVDC-connected 66 kV offshore Windfarm

Casper KARLSSON
Hitachi Energy Sweden AB, Sweden

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On the Role of Energy Storage in the Future HVDC Systems

Frans DIJKHUIZEN
Hitachi Energy Sweden AB, Sweden

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Topics: B4 PS3 - New Technologies and Concepts of DC and FACTS enabling Energy Transition
Keywords: Converter interactions, HVDC links, Modular multilevel converter (MMC), Offshore Wind

Analysis of Converter Interactions in a HVDC system

Pragati KIDAMBI, Jiayang WU, Shrinath KANNAN, Cornelis PLET, Farshid SALEHI, Riaan MARSHALL
DNV

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Application of Synchronous Grid Forming Back-to-Back HVDC System for System Frequency Support

Arash Fazel DARBANDI[1], Phaedra TAIAROL[1], Sharmen ANDREW[2], Ani CHOPRA[2]
[1]Stantec, Canada; [2]Berkshire Hathaway Energy Canada, Canada

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New VSC-HVDC interconnection between the Iberian Peninsula and Balearic Archipelago to enable energy transition

Javier RENEDO, Silvia SANZ VERDUGO, Antonio CORDÓN, Belén SEGURA, David CASTAÑEDA
Red Eléctrica, Spain

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Development of an EMT model of the Balearic power system

Javier RENEDO[1], Yousef PIPELZADEH[2], Dharshana MUTHUMUNI[3], Farid MOSALLAT[4], Silvia SANZ VERDUGO[1], Antonio CORDÓN[1], Edgar NUÑO[1], Macarena MARTÍN[1]
[1]Red Eléctrica, Spain; [2]MHI, UK; [3]MHI, Canada; [4]Canada

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On the performance of Generic grid forming RMS model under standardized test contingencies

Benjamin PAZ[1], Hazem KARBOUJ[2], Shivraman MUDALIYAR[2], Deepak RAMASUBRAMANIAN[3], Xiaoyao ZHOU[2]
[1]EPRI Europe, Spain; [2]National Grid ESO, UK; [3]EPRI, USA

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Battery storage with power oscillation damper for improved stability performance

Manfred MANCHEN NamPower

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DC Circuit Breaker feasibility study - protection system design

Domagoj HART[1], Amjad MOUHAIDALI[1], Alberto BERTINATO[1], Colin FOOTE[2], Suresh RANGASAMY[2], Benjamin MARSHALL[2]
[1]Supergrid Institute, France; [2]SSEN, UK

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Keywords: Energy Storage, Grid-Forming Control, Pumped-Storage Hydropower, Static Frequency Converter

Grid-Forming Variable-Speed Full Converter Pumped-Storage Hydropower

Marcel STOECKLI[1], Alexandre CHRISTE*[2], Mats LARSSON[2], Christoph HAEDERLI[2], Michail VASILADIOTIS[2], Tobias THURNHERR[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy Switzerland Ltd, Switzerland

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Bi-mode Insulated Gate Transistor BIGT - An Outstanding Key Component in Present and Future HVDC Systems

Marcel STOECKLI[1], Evgeny TSYPLAKOV*[2], Boni BOKSTEEN[2], Luca DE MICHIELIS[2], Ying Jiang HAFNER[3], Gontran PAQUES[2], Jurgen HAFNER[3]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy Semiconductors, Switzerland; [3]Hitachi Energy, Sweden

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Grid Connection of Offshore Wind with Grid Forming Turbines

Marcel STOECKLI[1], Mats LARSSON*[2], Jiuping PAN[3], Alberto BOLZONI[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy, Switzerland; [3]Hitachi Energy, United States

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Expandability of offshore HVDC grids during (in) development planning considering protection system design

Geraint CHAFFEY[1], Merijn VAN DEYCK[1], Mudar ABEDRABBO[1], Willem LETERME[1], Hakan ERGUN[1], Dirk VAN HERTEM[1], Ervin SPAHIC[2], Dennis DE DECKER[2]
[1]KU Leuven and EnergyVille, Belgium; [2]WindGrid, Elia Group, Belgium

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Functional Modelling for HVDC grids – State-of-the-art and future Outlook

Geraint CHAFFEY[1], Ilka JAHN[2], Melanie HOFFMANN[3], Rodrigo ALVAREZ VALENZUELA[4], Eduardo PRIETO ARAUJO[5], Staffan NORRGA[6]
[1]KU Leuven and EnergyVille, Belgium; [2]RWTH Aachen, Germany; [3]TUBS, Germany; [4]Siemens Energy, Germany; [5]UPC, Spain; [6]KTH, Sweden

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Keywords: DC, DER, Power quality, Simulation, Stability

DC System power quality and stability assessment and management: method, simulation, and on-site validation

Xavier YANG[1], Xingyan NIU[1], Xialin LI[2], Yifeng WANG[2], Wei LI[2], Pengfei LI[3]
[1]EDF R&D, France; [2]Tianjin University, China; [3]Hebei Unviversity, China

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Identification of options for the suppression of fault characteristics relevant to HVDC Cable Systems, to facilitate efficient DCCB specifications

Geoff LOVE[1], Ben MARSHALL[2], Perry HOFBAUER[3]
[1]EPRI; [2]The National HVDC Centre; [3]SSEN Transmission

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Application of VSC-HVDC Dynamic Capacity: Technical, commercial and legal opportunities and challenges

Kevin SCHOENLEBER[1], Rickard EKSTROM[2], Peter LUNDBERG[2], Nils ENGLUND[2], Jens REIFSCHNEIDER[3], Andreas WASSERRAB[3], Mark THIELE[3], Robert FELLER[3]
[1]Hitachi Energy Research, Germany; [2]Hitachi Energy, Sweden; [3]TenneT TSO, Germany

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Topics: B4 PS3 - New Technologies and Concepts of DC and FACTS enabling Energy Transition
Keywords: HVDC, DCCB, Multi-terminal

High-speed DC Breakers: Enabling Multi-vendor DC Switching Stations

Frederick PAGE[1], Yu ARAI[1], Takashi INAGAKI[1], Tomas MODEER[2], Staffan NORRGA[2], Simon NEE[2]
[1]Mitsubishi Electric Corporation, Japan; [2]Scibreak AB, Sweden

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Assessment of Operational Challenges of HVDC Multi-Purpose Interconnectors with Low Short Circuit Levels

Asif KHAN[1], Wasim AHMAD[1], Nikhil SHARMA[1], Ben GOMERSALL[1], Benjamin MARSHALL[1], Richard POOLE[2]
[1]The National HVDC Centre, SSEN UK; [2]National Grid Ventures UK

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Grid Forming Solution for Offshore Wind Park with HVDC Connection

Roberto ROSSO[1], Mohammad SUWAN[1], Mian WANG[1], Nicholas CHEROUVIM[1], Philipp RUFFING[2], Eduard Wiebe WIEBE[2], Tobias NEUMANN[2]
[1]Siemens Energy, Germany; [2]Amprion GmbH, Germany

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A Battery Energy Storage System Application for Primary Frequency Regulation Service in Colombia

Oscar TOBAR[1], Gabriel SANCHEZ[1], John CANDELO[1], Johan CASTRO[1], Germán ZAPATA[1], Rodolfo GARCÍA[2]
[1]Universidad Nacional; [2]Enel Colombia

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Modular Static Synchronous Series Compensator (M-SSSC): EMT Modeling for Real Time and Offline Applications

Camilo ORDONEZ
Smart Wires Inc

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: B4 PS3 - New Technologies and Concepts of DC and FACTS enabling Energy Transition
Keywords: Hybrid STATCOM, STATCOM, Synchronous condenser

A study on the mitigation effect of hybrid STATCOM system on low inertia and voltage regulation issues

JooYong JUNG[1,2], Kyungsub JUNG[1], NamKyu KIM[1], Young-Jin KWON[1]
[1]Hyosung Corporation, Republic of Korea; [2]Yonsei University, Republic of Korea

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Modelling and analysis of transient interactions between power electronic interfaced devices and the AC grid

Daniel BARTH[1], Max GOERTZ[1], Simon WENIG[1], Marco Lindner LINDNER[2], Niklas Phil OLDEHINKEL[2]
[1]Mosaic Grid Solutions GmbH, Germany; [2]TransnetBW, Germany

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Insulation Coordination Criteria of VSC-HVDC Overhead Power Lines in Colombia Considering Climatic and Environmental Conditions

Hernan RESTREPO[1], Cristian C. ACOSTA[2], Alejandro PALACIO[3], Eros ESCOBAR[3], Antonio PEDRAZA[1], Jorge GONZALEZ[3], Ernesto PÉREZ[2]
[1]ISA Interconexión Eléctrica; [2]Universidad Nacional; [3]Universidad pontificia Bolivariana

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Dynamic Analysis of a Synchronverter with Virtual Inertia for Wind Power System Integration

Kah Yung YAP, Osazee Edo IDEHEN, Jakob Boss SKÅRHØJ
Orsted A/S Denmark

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Energy Dissipation Strategies for Offshore MT-HVDC systems

Alban DUVIVIER[1], Nicolaos CUTULULIS[1], Oscar S.-ROMANO[1], Peter Jan RANDWIJK[2], Li YANG[3]
[1]DTU; [2]Energinet; [3]KU Leuven

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DC Voltage Control Strategy for NEOM Multi-terminal HVDC Grid

Peng LI, Md HABIBURRAHMAN, Grain ADAM
ENOWA, NEOM, KSA

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An 100% renewable power system through innovative HVDC technology-based power system architecture

Ying HAFNER[1], Nand SINGH[2], Grain ADAM[2]
[1]Hitachi Energy, KSA; [2]ENOWA, KSA

B5 - PROTECTION AND AUTOMATION

PS1 - PRACTICAL EXPERIENCES AND NEW DEVELOPMENTS OF PROCESS BUS

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: centralised protection, IEC 61850, process bus, testing, virtualisation

Functional Testing of virtualized and centralized Protection Systems

Janne STARCK[1], Juanita DOMINGUEZ[2], Rob COGGAN[3], Jani VALTARI[1]
[1]ABB Oy; [2]OMICRON Electronics; [3]Energy Queensland

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Keywords: centralised protection, IEC 61850, virtualisation, wide-area protection

Demonstration of enhanced and virtualised Protection of the Distribution Network

Anna KULMALA[1], Ontrei RAIPALA[1], Petri HOVILA[1], Boris-Emanuel YAZADZHIYAN[2], Colin SCOBLE[2], Deepa S. KUMAR[3], Ibrahim ABDULHADI[3]
[1]ABB Oy; [2]UK Power Networks; [3]PNDC

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Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus

Integration and Application of merging unit and intelligent terminal in smart substation based on IEC 61850

Chen FAN[1], Zhiqiang YAO[1], Naichao CHANG[2], Yu LIU[2], Zhihuai SHU[2], Zhongqing LI[1], Renhui DOU[1], Jiangwen MENG[1]
[1]China Electric Power Research Institute, China; [2]State Grid Corporation of China, China

ID: 10261
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: Process Interface Unit, Requirements, interface, interoperability framework, configuration chain

Process Interface Unit requirements related to industrial deployment

Volker LEITLOFF, Jean-Etienne LEMAIRE, Yann LELOUP, Frédéric FOUSSERET, Maud MERLEY, Alexandre AZEVEDO
RTE, France

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: Digital Substation, Hydraulic Power Plant, Intelligent Electronic Device (IED), Merging Unit (MU), Nuclear Power Plants

IEC 61850 digital substations technologies applied to power plants

Valentin BOUVIGNIES, Damien JOUAN, Edouard THEZELAIS
EDF, France

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Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: Process bus implementation

Review by WG B5.69 of published Experience Feedback on Process Bus Implementation

Volker LEITLOFF*[1], Alex APOSTOLOV[2], Thomas CHARTON[3], Rannveig LØKEN[4], Julien SAUNIER[5], Dieter BINON[6], Takaya SHONO[7], René TROOST[8], Sakis MELIOPOULOS[9]
[1]RTE, France; [2]OMICRON, United-states; [3]National grid, Great Britain; [4]Statnett, Norway; [5]Hitachy Energy, France; [6]ELIA, Belgique; [7]Toshiba, Japan; [8]Sedin, Netherlands; [9]Georgia tech, United-states

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: Digital Substation, Intelligent Electronic Device (IED), Merging Unit (MU), Process Bus, Protection Automation and Control Systems (PACS)

Digital substation with process bus: grid operator and PACS manufacturer feedback 2 years after the commissioning

Gérard CHAROT[1], Valentin BOUVIGNIES[2], Julien TISSERAND[3], Samir EL HADI[3], Apolline MAZAS[1], Sylvain AUPETIT[2]
[1]Siemens, France; [2]EDF, France; [3]EDM, France

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Object Modeling of Process-near Interface Intelligent Electronic Devices in Digital Substations

Alexander APOSTOLOV
OMICRON electronics, United States of America

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Interoperability of protection devices among a multi-vendor IEC 61850 process bus system

Emiliano CASALE
TERNA, Italy

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Challenges experienced with the development of a standardised approach for specifying and configuring multi-vendor process bus systems

Jennifer MACKENZIE, Daniel LAFFERTY, Jorge SOLAR MULAS, Catherine EDWARDS
SP Energy Networks UK

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Implementation and Testing of Protection Systems Connected to Low Power Instrument Transformers in High Voltage Switchgear

Dhanabal MANI[1], Niclas WETTERSTRAND[2], Peter MENKE[3], Thomas NEUMEIER[4]
[1]Megger Dallas, United States of America; [2]Megger Group, Sweden; [3]Siemens Energy, Germany; [4]Siemens AG, Germany

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Unified Grid Control Platform Requirements of Process Bus

Paul MYRDA[1], Herb FALK[2]
[1]EPRI, United States of America; [2]OTB Consulting, United States of America

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Quiet Revolution: How Low-Power Instrument Transformers and Digital Secondary Systems are Changing What is Possible

Veselin SKENDZIC[1], Peter MENKE[2], Normann FISCHER[1]
[1]Schweitzer Engineering Laboratories, Inc., United States of America; [2]Siemens Energy, Germany

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Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: Centralized P&C, Process Bus, Virtualization

Assessment of Time-Critical IEC 61850 Process Bus Communications in a Virtualized Protection and Control System

Ana Cristina ALEIXO, Fernando GOMES, Carlos ARANTES, José VENTURA, João PERES, Rui JORGE
EFACEC Energia, S.A., Portugal

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Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: Digital Substation, Redundancy, Resilience, Synchronism, Top-Down Engineering

DSAS Rollout Experience - Picking the Ripe Fruits

João PERES, Sara COSTA, Rui JORGE
EFACEC Energia, S.A., Portugal

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Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: Current Interface Module (CIM), Current Merging Sensor (CMS), Modular Merging Unit solution (MMU solution), Process Bus, Proof of Concept (PoC), Virtual Merging Unit (VMU), Voltage Interface Module (VIM), Voltage Merging Sensor (VMS)

Performance Evaluation of Modular Merging Solution and Process Bus Output for Distance Protection with Merging Sensors Prototype

Marieke HEERZE[1], Peter HEMMER[1], Nicolas BRANCHE[2]
[1]Locamation; [2]RTE

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Impact on Busbar Protection by mixed analogue Input Chains in digital Substations

Jianping WANG
Hitachi Energy Sweden AB, Sweden

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System Architectures for Virtualisation and Hardware Consolidation

David MACDONALD[1], Mital KANABAR[2], Camilo DE ARRIBA[1], Thomas CHARTON[3], Ibukunolu OLADUNJOYE[3]
[1]GE Grid Automation, Spain; [2]GE Grid Automation, Canada; [3]National Grid, UK

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Implementation of an IEC 61850 MMS interface for Control and Protection Platforms (CPC)

Carlos ALBERO[1], Miguel Ángel OLIVÁN[1], Yasmina GALVE[1], Carlos RODRÍGUEZ DEL CASTILLO[2]
[1]CIRCE Research Centre, Spain; [2]Elewit, Spain

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Practical implementation of full Digital PACS in a Multi-vendor Environment

Dieter BINON, Florian SOYEZ
ELIA GROUP, Belgium

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Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: IEC 61850 process bus, digital substation, retrofit

Experiences with process bus technology for substation retrofit

Marcel STOECKLI[1], Stefan MEIER*[2], Rajesh K. YADAV[2], Yuji KIMURA[3]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy, Switzerland; [3]Hitachi Energy, Japan

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: IEC 61850-9-2 process bus, transformer protection

Practical experiences with process bus based transformer protection system

Marcel STOECKLI[1], Stefan MEIER*[2], Ruben MARTINI[3], Markus HELWIG[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy, Switzerland; [3]OFIMA, Switzerland

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: digital substation (DS), merging unit (MU), PTP, time synchronization system, protection, automation and control (PAC), IED 61850-9-2, digital exchange

SV-stream Processing in the Event of Synchronization Loss by Publishers

Mikhail BEZDENEZHNYKH, Nikolai DONI, Ivan KOSHELKOV
EKRA Research and Production Enterprise Ltd., Russian Federation

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: transmission line differential protection, IEC 61850-9-2(SV), process bus, cybersecurity, relay protection prototype

Pilot Operation of Transmission Lines Differential Protection with Information Exchange According to IEC-61850-9-2 (SV)

Aleksandr KULIKOV[1], Anton LOSKUTOV[1], Vladimir ZININ[2], Anton PETROV[3]
[1]NNSTU n.a. R. E. Alekseev, Russian Federation; [2]LLC NPP "ALIMP", Russian Federation; [3]JSC "NIPOM", Russian Federation

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: protection and automation, digital substation, process bus, virtual IEDs, migration of functions, pilot operation

Development and Pilot Operation of the Intelligent PAC System Using the Concept of Virtual IEDs and Migration of Functions

Andrey LEBEDEV[1], Alexander VOLOSHIN[1], Andrey ZHUKOV[2], Vitaly AKULICHEV[3]
[1]National Research University «MPEI», Russian Federation; [2]JSC SO UPS, Russian Federation; [3]Rosseti Center, Russian Federation

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Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus

Developments and Practical Experiences of Merging Unit

Dmitry ULYANOV[1], Andrey MARTYNOV[1], Alexey MOKEEV[2], Sergei PISKUNOV[2]
[1]Energoservice, Russian Federation; [2]NARFU, Russian Federation

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: IEC 61850; Digital substations;

Experience and Challenges in the Practical Implementation of Four Digital Substations in Brazil

Denys LELLYS[1], Pablo HUMERES[2], Júlio Cesar LIMA[3]
[1]Brazilian NC of CIGRE, Brazil; GE Vernova; [2]CGT Eletrosul; [3]PUC Minas University

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Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: digital substation, IEC 61850, innovative, process bus

Digital Substation: Lessons Learned by CPFL in Process Bus Application

Wagner HOKAMA[1], Julia Beatriz CONCEICAO[1], Douglas FERREIRA[2], Daniel BERNARDON[3]
[1]Brazilian NC of CIGRE, Brazil; CPFL Energia; [2]Automalógica; [3]UFSM University

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Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus

LPIT operational experiences and challenges in a Norwegian digital substation

Karl POLLESTAD[1], Thomas JUDENDORFER[2], Hans Kristian MEYER[3], Christopher GEBS[1]
[1]Elvia Norway; [2]Trench Germany; [3]SINTEF Energy Research Norway

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: IEC 61850-9-2LE, IEC 61869-9, Process Bus, Sampled Values

Advantages and Challenges in Implementing the IEC 61869-9 Standard versus IEC 61850-9-2-LE in the Digitization of the Right Bank Substation

Gustavo MERELES[1], João JORGE[2], Jose CHIARADIA[1], Marcos MENDES[1]
[1]Itaipu Binacional; [2]Omicron Brazil

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Experience from integration, functional and performance testing of virtualised wide area protection

Deepa SHAJI KUMAR[1], Ibrahim ABDULHADI[1], Boris Emanuel YAZADZHIYAN[2], Colin SCOBLE[2], Outrei RAIPALA[3], Anna KULMALA[3]
[1]PNDC UK; [2]UK Power Networks UK; [3]ABB Oy Finland

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Using process bus over substation boundaries with multi-vendor line differential protection

Philipp STACHEL[1], Yann GOSTELI[2], Adolf FREI[3], Stefan FLEMMING[1]
[1]Siemens AG, Germany; [2]CKW AG, Switzerland; [3]Hitachi Energy Ltd, Switzerland

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Experiences from a substation pilot project implementing process bus based partly centralized protection and control

Thomas LIEBACH[1], Bendic RITT[2]
[1]Siemens AG, Germany; [2]Stromnetz Hamburg, Germany

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The Full Digital Substation Success in Vietnam

Chee-Pinp TEOH[1], Van Ha NGO[2], Than Tuan BUI[3], Hung HOANG[4], Dang-Thoang VO[4], Chin-Fei CHOW[5], Simon RICHARDS[1]
[1]GE VERNOVA UK; [2]AIT Corporation Vietnam; [3]EGRID Vietnam; [4]GE VERNOVA Vietnam; [5]GE VERNOVA Singapore

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Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus

Assessment of Distributed and Centralized Protection: Comparison of Response Times for Protective Dynamic System on Process Bus

Johan CASTRO[1], Germán RUEDA[2], Rodolfo GARCÍA[3], César HERNÁNDEZ[4], Germán ZAPATA[5], Oscar TOBAR[6]
[1]Universidad Nacional; [2]Universidad Nacional; [3]Enel Colombia; [4]Universidad Nacional; [5]Universidad Nacional; [6]Universidad Nacional

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: IEC 61850, Process bus, MU, Ethernet, Transfer Time, Protection Relay

Merging unit performance evaluation and issues for multivendor configuration in process bus

Hiroki DOI[1], Noriyuki UEDA[1], Akihiro TANAKA[1], Kenji KONDOU[2], Makoto MIZUNO[2], Yusaku SANO[2]
[1]Central Research Institute of Electric Power Industry, Japan; [2]TEPCO Power Grid, Incorporated, Japan

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: Process bus based protection systems, Process bus in one and half circuit breaker bus station, IEC 61850 sample value applications, IEC 61850 GOOSE message application, process bus implementing in diameter substation

Case Study: IEC 61850 Process Bus-Based Protection System Applications For One and Half Breaker Bus System in NEPCO 400 Kv stations

Hussien ALMOMANI, Mohammad DAWOOD
National Electric Power Company, Jordan, Hashemite Kingdom of

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Process bus project with Digital Twin Synergies

Aruldoss ARUMUGAM, Cedric HARISPURU
Siemens AG Germany

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Transition from device management to application management for Protection & Control through virtualization and centralization

Matthias REIS, Marcus STOLLFUSS, Saurabh TALWAR
Siemens AG, Germany

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How a well-designed, optimized time synchronization concept can increase the reliability and availability of a digital switchgear's protection system

Stefan FLEMMING[1], Andrej GOERBING[1], Joerg WEILBIER[1], Igor KOGAN[1], Ji CHEN[2], Lu WANG[2]
[1]Siemens AG, Germany; [2]Siemens Power Automation Ltd. China

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Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus

Interoperability Challenges in Multi-Vendor Digital Substations: PTP Time Synchronization and Profile Compatibility

César HERNÁNDEZ[1], Johan CASTRO[2], Oscar TOBAR[3], German RUEDA[4], Germán ZAPATA[5], Rodolfo GARCÍA[6]
[1]Universidad Nacional; [2]Universidad Nacional; [3]Universidad Nacional; [4]Universidad Nacional; [5]Universidad Nacional; [6]Enel Colombia

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Utility Experience of FEED for IEC 61850 Process Bus based Protection and Automation system for 765/400/220KV Greenfield Substation

Subir Sen SEN, Rajil SRIVASTAVA, Abhay KUMAR, S.J. LAHIRI, Mr ANURAG, M.S. HADA, C.P AWASTHI, Sitesh BADERIA*
Powergrid Corporation of India Limited, India

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Impact of IEC 61869-9 Based Sampled Values on Network Optimization and Protection System Performance in a Process Bus Based Digital Substation

Dr Subir SEN, B.B MUKHERJEE, Abhay KUMAR, Mr ABHISHEK, C.P. AWASTHI, Yashwant K, Sitesh BADERIA, Pradeep PATIL, Ritesh KUMAR*
Power Grid Corporation of India Ltd, India

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Commissioning & Operational Experiences of Brownfield & Greenfield Process Bus Substations in POWERGRID

Jeetesh KUMAR*, Gopinath S S, Joydip GHOSH, B. B. SINGH, M.K. JHA
POWERGRID, India

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A comprehensive approach towards implementing the Process Bus based Substation Automation system in Substations and its benefits.

Vikram GANDOTRA*, Laurent TOOGNAZZI, Hamza EHTISHAM, Nimish RASTOGI
Siemens Ltd, India

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Reliable Time Synchronization for IEC 61850 Substations by Distributed Time Sources and Visibility

Raymond SHIEH, King WU, Li PENG
Moxa Taïwan

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Experience and Challenge in Deploying the IEC 61850 Driven Digital Substation within Indonesia Utility Context

Eko PRASETYO, Fermi TRAFIANTO, Amiruddin AMIRUDDIN, Andhy D SETYAWAN
PT. PLN (Persero), Indonesia

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS1 - Practical Experiences and new Developments of Process Bus
Keywords: IEC 61850 Process bus Application, IEC 61850 PRP Architecture, Sampled Values, Virtualization, Hybrid PACS, Distribution of Functions, Domain-Specific Language for PAC (PacDSL)

Identifying Additional Value for Process Bus Implementation of PACS

Nirmal NAIR
University of Auckland, New Zealand

PS2 - ACCEPTANCE, COMMISSIONING, AND FIELD TESTING FOR PROTECTION, AUTOMATION AND CONTROL SYSTEMS

ID: 10103
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Acceptance, Commissioning, and Field Testing for Protection, Automation and Control Systems
Keywords: Field testing, MPLS-TP, Teleprotection, Line differential, inter-substation communications

Field testing, Experiences and Results with Line Differential and Teleprotection Applications in TDM/MPLS-TP Hybrid Networks

Sebastian SJÖGREN, Teemu VIINIKAINEN, Mikko HOLMGREN
Fingrid Oyj

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Acceptance, Commissioning, and Field Testing for Protection, Automation and Control Systems
Keywords: distance protection, zone settings, IBRs, PQ-diagram, reactive power capacity

Coordinating Zone Settings of Distance Protection with Reactive Power Capabilities and Voltage Support of Inverter-based Resources

Mikko HOLMGREN, Minna LUOJUS, Lasse LINNAMAA
Fingrid Oyj

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Topics: B5 PS2 - Acceptance, Commissioning, and Field Testing for Protection, Automation and Control Systems
Keywords: converter-connected generation, distance relay, harmonics, protection

Performance of distance Relays in the Finnish Power System under high Penetration of Converter-connected Generation

Valtteri HYTTI, Pauli PARTINEN
Fingrid Oyj

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Topics: B5 PS2 - Acceptance, Commissioning, and Field Testing for Protection, Automation and Control Systems
Keywords: Distance protection, harmonics during faults, power system studies, secondary injection tests

Experiences, Secondary Injection testing and Grid Studies on Distance Protection and Current and Voltage Harmonics during Power System Faults

Mikko HOLMGREN, Juho TUOMINEN, Paavo OJAVALLI
Fingrid Oyj

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Topics: B5 PS2 - Acceptance, Commissioning, and Field Testing for Protection, Automation and Control Systems
Keywords: R#SPACE, Protection Automation, Control system

Testing approach for Rte's R#SPACE Protection Automation and Control System

Maud MERLEY*, Jean-Etienne LEMAIRE, Yann LELOUP, Alexandre AZEVEDO, Xavier MICHAUT, Volker LEITLOFF
RTE, France

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SAS2021 Project: benefits of standardization on acceptance, commissioning, and field testing during the whole PACS lifecycle

Alessio TESTARELLA
TERNA, Italy

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Improving the Efficiency of Acceptance, Commissioning, and Maintenance Testing of IEC 61850-based Digital Substations

Alexander APOSTOLOV
OMICRON electronics, United States of America

ID: 10423
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Acceptance, Commissioning, and Field Testing for Protection, Automation and Control Systems
Keywords: Digital Substation, IEC 61850, UCAIug, IOP

A Consultant's Experience in the UCA International Users Group Interoperability Tests

Keith GRAY[1], Sina KARIMI[2], Chris DYER[1]
[1]POWER Engineers, Inc., United States of America; [2]POWER Engineers Canada, Inc., Canada

ID: 10424
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Acceptance, Commissioning, and Field Testing for Protection, Automation and Control Systems
Keywords: HIL (Hardware-in-the-Loop), IBR (Inverter-Based Resource), Modelling, Relay

Use of Detailed Real-Time System Models to Evaluate Relay Performance Impacted by High Penetration of Inverter-Based Resources

Yi HU[1], Henry CHAO[1], Zheyuan CHENG[1], Juergen HOLBACH[1], Thai Thanh NGUYEN[2], E. Louis SEITER[3], Michael RAZANOUSKY[4]
[1]Quanta Technology, United States of America; [2]New York Power Authority, United States of America; [3]National Grid, United States of America; [4]New York State Energy Research and Development Authority, United States of America

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: B5 PS2 - Acceptance, Commissioning, and Field Testing for Protection, Automation and Control Systems
Keywords: Synchrophasors, Testing, Protection, Control

Life-cycle Testing of Synchrophasor Systems

Mladen KEZUNOVIC
Texas A&M University, United States of America

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Topics: B5 PS2 - Acceptance, Commissioning, and Field Testing for Protection, Automation and Control Systems

Protection and Control of Active Distribution Systems

Sakis MELIOPOULOS[1], George COKKINIDES[1], Glenn WILSON[2], Kenneth WILHELM[3], Rebecca RYE[4]
[1]Georgia Tech, United States of America; [2]Southern Company, United States of America; [3]Avista, United States of America; [4]Dominion Energy, United States of America

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Evolution of Testing Practices at ComEd

Steven WALKER, Matt DUBOIS, Pat SCANNELL. JR., Bill HORN
Commonwealth Edison, United States of America

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Topics: B5 PS2 - Acceptance, Commissioning, and Field Testing for Protection, Automation and Control Systems

Distributed Fault Detection, Isolation and Service Restoration for Open-loop Electric Distribution Systems

Palberz KHALEDIAN[1], Yujie YIN[2], Amin ZAMANI[2], Farid KATIRAEI[2], John WILTSHIRE[3], Roy LUO[4], Ben ROSENFELD[4], Shawn DEANGELO[4], Drazena BROCILO[4], Selver CORHODZIC[4] [1]Quanta Technology, United States of America; [2]Quanta Technology, Canada; [3]Meta Platforms, Ireland; [4]Meta Platforms, United States of America

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Advanced MV network automation functions considering large scale integration of DER

Clara GOUVEIA[1], Everton ALVES[1], André MELIM[1], Jorge PEREIRA[1], António CARRAPATOSO[1], Nuno FONSECA[1], José ANDRADE[1], Ana Cristina ALEIXO[2], Carlos ARANTES[2]
[1]INESC TEC, Portugal; [2]EFACEC Energia, S.A., Portugal

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Implementation of line differential protection in the 30 kV distribution network of i-DE

Iñaki OJANGUREN[1], Ziorta LLONA[2], Oscar HERNANDEZ[1], Isabel LOUREIRO[1], Juan Maria GARCIA[2]
[1]i-DE, Spain; [2]Ingeteam, Spain

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Topics: B5 PS2 - Acceptance, Commissioning, and Field Testing for Protection, Automation and Control Systems

Development and Implementation of a WAMPAC Algorithm for Detecting Real-Time Voltage Instability Phenomena in Electric Power Systems

Anibal Antonio PRADA HURTADO[1], Eduardo MARTINEZ CARRASCO[1], Jose SALDANA[1], Carlos ALBERO CASTILLÓN[1], Konstantinos F. KROMMYDAS[2]
[1]CIRCE Centro Tecnológico, Spain; [2]Indep. Power Transmission Operator, Greece

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IEC61850 Engineering of a Digital Substation: Common User Vision on Top-down Engineering

Thomas STERCKX[1], Florian SOYEZ[1], Maud MERLEY[2]
[1]ELIA, Belgium; [2]RTE, France

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Keywords: Distribution networks, distribution-phasor measurement unit, fault location, simple reactance

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Marcel STOECKLI[1], Mayank NAGENDRAN*[2], Lorenzo ZANNI[2], Paolo ROMANO[2], Farnoosh RAHMATIAN[3]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Zaphiro Technologies, Switzerland; [3]NuGrid Power Corporation, United States

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LLC «NPP «Dinamika», Russian Federation

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JSC STC UPS, Russian Federation

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Keywords: fault location technology, cable line, overhead line, electrical network topology, single phase-to-earth fault, short circuit

Experimental Verification of Fault Location Technology in Power Distribution Networks with Complex Topology

Andrey KUCHERIAVENKOV, Pavel GOROZHANKIN, Ekaterina KARTASHEVA
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Keywords: PACS, PMU, PDC, synchrophasor, WAMS

Development and Commissioning of PACS for Operating Modes of the Power System Based on PMU Data

Andrey ZHUKOV[1], Evgeniy SATSUK[1], Dmitrii DUBININ[1], Stepan DMITRIEV[2], Jury IVANOV[3], Alexander HOHRIN[3]
[1]JSC SO UPS, Russian Federation; [2]Ural Federal University, Russian Federation; [3]Prosoft systems, Russian Federation

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Methods for Configuring, Testing and Inspecting Automatic Excitation Regulators for Synchronous Generators during Commissioning

Andrey ZHUKOV[1], Evgeniy SATSUK[1], Tatiana KLIMOVA[2], Andrei GERASIMOV[1]
[1]JSC SO UPS, Russian Federation; [2]National Research University «MPEI», Russian Federation

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Keywords: IEC 61850; Automating commissioning tests; accepting remote maintenance; guaranteeing inventory integrity

Automating commissioning tests, accepting remote maintenance and guaranteeing inventory integrity using a Device Management System

Adriano PIRES, David MACDONALD, Mital KANABAR, Shobhit MEHTA
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Felipe LOPES[1], Moisés DAVI[2], Giovanni FABRIS[3], Mário OLESKOVICZ[2], Raphael REIS[1]
[1]Brazilian NC of CIGRE, Brazil; UFPB University; [2]USP University; [3]Eletrobras ELETROSUL

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Keywords: Interoperability, Process Bus, PTP, Time Synchronization

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Brazilian NC of CIGRE, Brazil; Belden

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Keywords: Auditor, Digital Substation, Process Bus, Stand-Alone Merging Unit

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Keywords: IEC 61850; Multivendor Test Platform

Practical Approach to The Requirements and Strategies for Monitoring the IEC 61850 Process Bus in a Multivendor Test Platform

Pablo HUMERES FLORES[1], Mateus ALEXANDRINO[1], Júlio Cesar MARQUES DE LIMA[2], Denise BORGES DE OLIVEIRA[3], Jorge DAMASCENO[4], Denys LELLYS[5], José Eduardo DA ROCHA ALVES JUNIOR[6], João JORGE[7], Paulo Sergio PEREIRA JUNIOR[8]
[1]Brazilian NC of CIGRE, Brazil; CGT ELETROSUL; [2]PUC Minas University; [3]ONS; [4]Siemens; [5]GE Vernova; [6]Eletrobras CEPEL; [7]Omicron Energy; [8]Conprove

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Keywords: IEC 61850; vPACS; Test

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Paulo Sergio PEREIRA JUNIOR, Rodolfo CABRAL BERNARDINO, Gustavo SILVA SALGE, Cristiano MOREIRA MARTINS, Paulo Sergio PEREIRA, Gustavo ESPINHA LOURENÇO
Brazilian NC of CIGRE, Brazil; CONPROVE

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Keywords: Electrical Commissioning, FAT, SAT, Test Plan

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Rafael DE OLIVEIRA FERNANDES[1], Ricardo DUTRA[2]
[1]Brazilian NC of CIGRE, Brazil; ARGO Energia; [2]State Grid

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Lab Environment for fully digital Substation Solution Validation - technical Solution and testing Solution

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Vattenfall Distribution Sweden AB, Sweden

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KEPCO Research Institute

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Keywords: LPIT, PACS, on-site calibration procedure, a certification process

Certification and On-site Calibration of Metering System Based on LPIT

Vladan LAPČEVIĆ[1], Peter MENKE[2], Thomas NEUMEIER[3], Vladimir RAJOVIĆ[4], Tatjana CINCAR-VUJOVIĆ[5], Rade DERETA[6], Michael FREIBURG[7]
[1]Meter&Control, Serbia; [2]Siemens Energy, Germany; [3]Siemens, Germany; [4]University of Belgrade, School of Electrical Engineering, Serbia; [5]Electrodistribution of Serbia, Serbia; [6]Directorate of Measures and Precious Metals, Serbia; [7]TH Köln – University of applied sciences, Germany

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[1]PSI Software AG, Germany; [2]FAU Nürnberg, Germany

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Acceptance and Commissioning of a Wide-Area Broken Conductor Detection System for Distribution Networks

Michael STANBURY
Ausgrid, Australia

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Testing of Travelling Wave Fault Locators

Jörg BLUMSCHEIN[1], Bruno Alencar ARRAES[1], Tiago Fernandes BARBOSA[2]
[1]Siemens AG, Germany; [2]Eletrosul, Brazil

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Christof BRANDAUER[1], Filip PRÖSTL ANDRÉN[2], Catalin GAVRILUTA[2], Thomas STRASSER[2], Armin VEICHTLBAUER[3], Gerald STEINMAURER[3], Jürgen RESCH[4], Sebastian SCHÖNDORFER[4]
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[1]GE Grid Solutions UK; [2]GE Grid Solutions USA; [3]GE Grid Solutions India; [4]GE Grid Solutions Hong Kong; [5]CLP Hong Kong

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Performance of Distance and Directional Overcurrent protections in a HVDC connected Offshore Windfarm

Chris SMITH[1], Jose JARAMILLO[2], Mauricio CORREA[3]
[1]RWE UK; [2]IEB Colombia; [3]GE Vernova France

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Keywords: Automation, Automorphic testing, IEC 61850, Virtualized protection

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Keywords: Digital substation, Engineering process, IEC 61850, SCL (System Configuration Language), OCL (Object Constraint Language), XML, XSD (XML Schema Definition)

Introduction to IEC 61850-6-3 OCL: Machine-processable rules for validation of IEC 61850 XML-based files

Aurélie DEHOUCK[1], Sina KARIMI[2], Christophe DYER[3], Keith GRAY[3]
[1]EDF R&D, France; [2]POWER Engineers, Inc., Canada; [3]POWER Engineers, Inc., USA

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Performance of the Overcurrent Function in the Event of Loss of Information in the Process Bus Using a Merging Unit Developed in ATP-EMTP

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EMT Based Protection Coordination Study Considering M-SSSC FACTS Technology in the Atlántico Region of the Colombian Transmission System

Alejandro DUQUE[1], Dilan CARO[1], David URBAEZ[1], German GUTIERREZ[2], Jhon CALDERON[3], Carlos BORDA[1]
[1]Smart Wires Inc; [2]ISA Intercolombia; [3]ISA Interconexión Eléctrica

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Enhancing Protection Schemes for Inverter-Based Renewable Generation in Transmission Networks

Oswaldo ARENAS[1], Sebastián MANRIQUE[2]
[1]ISA Intercolombia; [2]FEDERAL UNIVERSITY OF TECHNOLOGY - PARANÁ

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Keywords: Blackout, Black start, Grid protection relay, Grid restoration

Performance Test of Grid Protection Relay for Black Start

Tomoya ISHII[1], Kenzo UENISHI[1], Iori NAKAYAMA[1], Mai ARAKI[2]
[1]Kansai Transmission & Distribution Co, Inc., Japan; [2]Enegate Co., Ltd., Japan

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Keywords: Autonomous decentralized system, Post-fault calculation, Special Protection Scheme(SPS), RMS digital simulation

Development and testing of response-based wide area SPS without telecommunication

Tomohiro KURUSHIMA[1], Yoshihiro MATSUBARA[2], Jun YASUE[2], Tadaaki YASUDA[2], Koji SAKAGUCHI[1], Toru MAEDA[1]
[1]Mitsubishi Electric Corp., Japan; [2]TEPCO Power Grid, Inc., Japan

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Keywords: N-1 Inter Trip Scheme, Interoperability, IEC 61850, MMS protocol

IEC 61850 Compliant N-1 Inter Trip Scheme Suitable for Japanese Connect and Manage

Ryuichi KAWAZOE[1], Shotaro SAKAI[1], Kazuhiro KOJIMA[1], Hironori IMAEDA[2], Yutaka ANDO[2]
[1]Chubu Electric Power Grid Co., Inc., Japan; [2]C-tech Corp., Japan

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Keywords: Load Shedding, Resilience, Security of supply, Special Protection Scheme, Transient Stability

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Gaurav BANSAL[1], Abdulrahman AHLI[2], Mahmoud HUSSEIN[3]
[1]TRANSCO, UAE; [2]TRANSCO, UAE; [3]TRANSCO, UAE

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[1]Ørsted Wind Power A/S; [2]ATCO

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TATA Power Company, India

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Keywords: Protection coordination, protection relay, transmission network, wide area assessment

A wide Area protection coordination assessment for the Albanian transmission System

Aristotelis TSIMTSIOS[1], Vassilis PAPASPILIOTOPOULOS[1], Vassilis KLEFTAKIS[1], Mohammad DJAMALI[2]
[1]PROTASIS SA, Greece; [2]Fichtner GmbH & Co. KG, Germany

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Sebastian HINCAPIE[1], Jhon CALDERON[2], Carlos BORDA[1], Alejandro DUQUE[1], Pablo MACEDO[1], Juan GALLEGO[3]
[1]Smart Wires Inc; [2]ISA Interconexión Eléctrica; [3]Transelca

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Keywords: Digital transformation, Smart test solutions, Power grid, Maintenance, Commissioning, Artificial Intelligence, Data analysis

Digital Transformation of the Power Grid and Smart Testing Solution for Commissioning and Maintenance

Anas ABDULKHADER
GCC CIGRE, Qatar

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Keywords: Commissioning, Digital substation, FAT, Protection Systems, SAT

Experience in Protection System Commissioning for Digital Substation Pilot Project in Thailand

Wanlert TANAYUWANNA, Banthoeng KONGKAEO, Sunphead CHAIPUNHA
Electricity Generating Authority of Thailand (EGAT), Thailand

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[1]ESIG, United States of America; [2]RSE SpA, Italy; [3]PUC, Chile; [4]Hydro-Quebec, Canada; [5]Terna SpA, Italy; [6]TU Graz, Austria; [7]UAST Wien, Austria; [8]University of Birmingham, United Kingdom; [9]US Department of Energy, United States of America; [10]EC JRC, The Netherlands

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Jun WEN[1], Maigha FNU[2], Sherry LI[3], Sarah CARKNER[4], Hyekyung KIM[5], Logan LILLIS[6], Shuying ZHEN[7], Beth LAROSE[8], Katherine INGE[9]
[1]Southern California Edison, United States of America; [2]Commonwealth Edison, United States of America; [3]GE Digital, United States of America; [4]New York ISO, United States of America; [5]Argonne National Lab, United States of America; [6]Burns & McDonnell, United States of America; [7]GE Renewable Energy, United States of America; [8]GE Power, United States of America; [9]MPR Associates, United States of America

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Metropolitan Area and Regional Power System Planning Approach and Correlation with Energy Sector Integration in Energy Transition Period Based on JWG C1/C4.36 Experience

Stanislav UTTS[1], Valdson Simoes DE JESUS[2], Megan LUND[3], Denis PILENIEKS[1]
[1]JSC SO UPS, Russian Federation; [2]Eletrobras, Brazil; [3]IESO, Canada

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Changing the Planning Process of Power System of Russia Development to Improve the Accuracy, Efficiency and Openness of Planning at the Time of Energy Transition

Fedor OPADCHIY, Denis PILENIEKS, Stanislav UTTS
JSC SO UPS, Russian Federation

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Keywords: Transmission Margin Contracts; Wind and Solar Generators

Competitive Process for Transmission Margin Contracting by Wind and Solar Generators in Brazil's Transmission Network

Laércio GUEDES[1], Thiago PRADO[2], Sumara TICOM[1], Fernando MACHADO[1], Ivair FREIRIA[1], Lucas SANTOS E SILVA[3], Alexandre DANTAS[1], Roseane NUNES[1], Maria Paula SALVADOR[1], Andreia Maia MONTEIRO[1]
[1]Brazilian NC of CIGRE, Brazil; ONS; [2]Ministério das Minas e Energia - MME; [3]Consultant

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[1]TÜBİTAK MRC Türkiye; [2]Turkish Electrical Transmission Corporation (TEİAŞ) Türkiye

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[1]EDF, France; [2]Centrale-Supelec, France

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[1]Huazhong University of Science and Technology, China; [2]Hitachi Energy, Switzerland; [3]Hitachi Energy Research, China

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[1]BH K CIGRE, Bosnia and Herzegovina; [2]Elektroprivreda BiH, Sarajevo, Bosnia and Herzegovina

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Brazilian NC of CIGRE, Brazil; EPE

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Dženana TOMAŠEVIĆ[1], Tatjana KONJIĆ[2], Jelena PONOĆKO[3]
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[1]Statnett / Norwegian University of Life Sciences Norway; [2]Technical University of Denmark -DTU / Statnett Denmark; [3]Norwegian University of Life Sciences Norway; [4]Statnett Norway

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[1]50Hertz Transmission GmbH, Germany; [2]Hamburger Energiewerke GmbH, Germany

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100% RES Power System Supported by Flexibility Resources

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[1]ENOWA, KSA; [2]ENOWA, KSA; [3]Hitachi Energy, Switzerland; [4]Hitachi Energy, Switzerland

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[1]Ørsted Wind Power; [2]Technical University of Denmark (DTU)

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Sebastien PEZZA[1], Sandrine SELOSSE[2], Edi ASSOUMOU[2], Caroline BONO[1], Fabien BRICAULT[1]
[1]EDF, France; [2]Mines Paris PSL, France

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State Grid Zhejiang Electric Power Research Institute , Hangzhou, China

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China Electricity Council, China

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RTE, France

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Creating a Sustainable National Electric Infrastructure While Maintaining Reliability and Resiliency of the Grid

Vijay VITTAL[1], Anjan BOSE[2], Damir NOVOSEL[3], Mark LAUBY[4], Chanan SINGH[5], Gordon van WELIE[6]
[1]Arizona State University, United States of America; [2]Washington State University, United States of America; [3]Quanta Technology, United States of America; [4]NERC, United States of America; [5]Texas A&M University, United States of America; [6]ISO New England, United States of America

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[1]PSE Innowacje, Poland; [2]Silesian University of Technology, Poland

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Keywords: Resilience

Governance and its importance for the success of an electric power company from the point of view of resilience

Josias MATOS DE ARAUJO[1], Antonio SIMÕES PIRES[2], Marcelo COSTA DE ARAUJO[3]
[1]Brazilian NC of CIGRE, Brazil; Eng Smart Lead; [2]Consultant; [3]Eletronorte

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[1]Brazilian NC of CIGRE, Brazil; ABBRAGET; [2]Thymos Energia; [3]PSQ

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[1]GHD UK; [2]UK Power Networks UK

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[1]The National HVDC Centre UK; [2]EPRI International Ireland; [3]Engie Impact Belgium

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[1]XM; [2]Colombia Inteligente

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Keywords: Resilience, Transmission Planning, Risk Maps

Proposed Methodology for Incorporating Resilience Criteria into Transmission Planning based on Risk Mapping

Lilian HERNANDEZ[1], Francisco BECERRA[2], Roger MELLADO[3]
[1]Comisión Nacional de Energía, Chile; [2]STM, Chile; [3]Coordinador Eléctrico Nacional, Chile

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Improving Distribution Network Climate Resilience Using Statistical Models For Conventional And Technology Agnostic Solutions

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POWERGRID, India

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Keywords: HVDC, Renewable, transmission, power grid

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Grain ADAM[1], Nand SINGH[2], Ying JIANG HAFNER[3], Mauro MONGE[4]
[1]ENOWA, KSA; [2]ENOWA, KSA; [3]Hitachi Energy, SWEDEN; [4]Hitachi Energy, SWEDEN

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Mingqian XU[1], Qiming YANG[1], Gengfeng LI[1], Minghao LI[1], Wenqiu ZOU[1], Chenlin JI[2]
[1]Xi'an Jiaotong University, China; [2]Wuxi Power Supply Company of State Grid Jiangsu Electric Power Co. , China

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Matthew CAHER[1], Gary KOBET[1], Ian GRANT[1], Christopher BALCH[2], Anna KELBERT[3]
[1]Tennessee Valley Authority, United States of America; [2]CIRES/NOAA, United States of America; [3]United States Geological Survey, United States of America

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Weather and Operational Uncertainty in Electricity Market Operations: Stochastic Nodal Adequacy Pricing Approach

Russ PHILBRICK[1], Alex RUDKEVICH[2], Richard TABORS[3], F. Selin YANIKARA[2]
[1]Polaris System Optimization, United States of America; [2]Newton Energy Group, United States of America; [3]Tabors Caramanis Rudkevich, United States of America

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Keywords: Adaptation, Infrastructure resilience, Natural hazards, Wildfires

Increasing the resilience of electric transmission grid to extreme events

Pedro MARQUES[1], Luís Mário RIBEIRO[2], João GASPAR[1], Miguel ALMEIDA[2]
[1]REN, Portugal; [2]ADAI/UC, Portugal

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Keywords: direct transfer trip, interlocking, sequence network, surge arrester, resonance

Mitigating the Risk of Damaging Overvoltages Caused by Back Feeding an Isolated 230 kV Cable System

Bruce CHEN, Baike SHEN, Anil PRADHAN, Edward BURT
BC Hydro, Canada

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Vladimir DIYACHKOV, Igor OKSHIN
JSC SO UPS, Russian Federation

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Topics: C2 PS1 - Create Operational Resilience to Extreme/Unpredictable Events
Keywords: Photovoltaic Power Generation, Satellite Image, Snow Cover, Solar Radiation

Advanced Forecasting of Photovoltaic Power Generation in Kansai Area Considering Snow CoverAdvanced Forecasting of Photovoltaic Power Generation in Kansai Area Considering Snow Cover

Shiho NAKATA[1], Takayuki YOSHIDA[1], Shota MIYAKE[1], Masaaki SAWASAKI[1], Nozom TAKADA[2], Naoki INABA[2]
[1]Kansai Transmission & Distribution, Inc., Japan; [2]Meteorological Engineering Center, Inc., Japan

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Keywords: information dissemination, reserve margin, supply capacity countermeasures, unseasonably weather

Tight supply-demand due to unseasonably hot weather and the establishment of countermeasures to deal with the situation

Toshiro KATAOKA, Koji ENYA
TEPCO Power Grid, Inc., Japan

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Operational Envelope for Low Inertia Operational Scenarios

Priyanko GUHA THAKURTA[1], Dusko NEDIC[2], Philip RYAN[1]
[1]EirGrid; [2]Energy Exemplar

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Keywords: Alarm Management, SCADA, Data Engineering, Machine Learning, Operation

Comprehensible Alarm Text Clustering for Reconfiguration and Real-Time Support

Jhelum CHAKRAVORTY[1], David MARINO[1], Antony HILLIARD[1], Faeza HAFIZ[2], Susanne SCHMITT[3], Georgios MITRENTSIS[3], Giancarlo DALLE AVE[1], Zhaohan SUN[1]
[1]Hitachi Energy Research, Canada; [2]Hitachi Energy Research, USA; [3]Hitachi Energy Research, Germany

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Keywords: Power System Resilience

Power System Resilience: Some Lessons Learned & Best Practices Already Identified, and Other Proposed Measures to Improve Power System Operational Resilience

Paulo GOMES[1], Nelson MARTINS[2]
[1]Brazilian NC of CIGRE, Brazil; PSQ; [2]Brazilian National Engineering Academy

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Topics: C2 PS1 - Create Operational Resilience to Extreme/Unpredictable Events
Keywords: HVDC; Electrode; integrated operation

Electrode sharing in the Madeira's HVDC and Xingu's HVDC systems – Synergy for an integrated operation

Guilherme AMBONI[1], Ana Bárbara FERNANDES NEVES[1], Edinoel PADOVANI[1], Hanni GONÇALVES[1], Hannah Maria CALDEIRA ALGENKORTE[1], Paulo Eduardo MARTINS QUINTÃO[1], Karina STOCKLER HERSZTERG[1], Sergio Luiz SARDINHA[1], Fernando CATTAN JUSAN[1], Rafael ZYMLER[1], Andre Luiz BARBOSA CORREA[1], Paulo Victor SANTOS[2], Mário ALBUQUERQUE[3], Edson CARVALHO[4], Victor TEIXEIRA[5]
[1]Brazilian NC of CIGRE, Brazil; ONS; [2]Eletrobras ELETRONORTE; [3]IE MADEIRA; [4]BMTE; [5]XRTE State Grid

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C2 POWER SYSTEM OPERATION AND CONTROL - Full Papers
Topics: C2 PS1 - Create Operational Resilience to Extreme/Unpredictable Events
Keywords: Commutation Failure, Neural Network, Synchronized Measurement, Predictive Index

Commutation Failure Prediction in the HVDC Multi-Infeed Scenario in Brazil Using Neural Network Technique Application

Rafael DE OLIVEIRA FERNANDES, Maria Cristina DIAS TAVARES
Brazilian NC of CIGRE, Brazil; Unicamp University

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Keywords: Energy Quality, Insulation Deterioration, Voltage Spikes, Atmospheric Effects, Lightning Strike, Surge Arresters, Pre-Surge Arrester, Network Protection, Fire Prevention

Mitigating Overvoltage-Induced Arcing and Forest Fire Hazards: A Novel Network Protection Strategy with Series-Connected Surge Arrester Device

Necati KESKIN[1], Sude KOZALIOGLU[1], Mehmet MUNGAN[2]
[1]ADM Electricity Dis. Inc. Türkiye; [2]Enerpower Energy Türkiye

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Pioneering Development and Deployment of Distribution Linear State Estimator: One Utility's Journey

Ali ALVI[1], Thomas ALFORD[1], Marianna VAIMAN[2], Farnoosh RAHMATIAN[3]
[1]ComEd, United States of America; [2]V&R Energy, United States of America; [3]NuGrid Power Corp., Canada

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Impacts of High Renewable Integration on Interconnector Transient Stability – Case Study of Australian Grid

Germane ATHANASIUS, Rodney REUBEN
APD Engineering, Australia

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Keywords: 2021 Jordan blackout, power system resilience, black start units (BSUs), non-black start units (NBSUs), power plant response, preparedness and response strategies, Samra Power Plant, artificial intelligence (AI) techniques, restoration sequences, power gr

Enhancing Power system Resilience: A Case Study of Samra Power Plant Preparedness and Power Restoration during Blackout 2021 in Jordan

Yousef MASHAGBEH, Sara ZYOUD
Samra Electric Power Company, Jordan, Hashemite Kingdom of

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Keywords: power distribution networks, operational resilience, control center, Irbid district electricity company, renewable energy projects

Operational Resilience for Irbid District Electricity Company (IDECO)

Zayed ALHAMMOURI, Haneen BAIDAS
IDECO

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Field test report of an AI based anomaly detection system for monitoring process data in the electrical power system

Stefan DALHUES[1], Jasper LAMMERING[1], Lilia MICHAILOV[2], Niclas HILDEBRANDT[2], Wesley DRECHSEL[1], Matthias RECKLEBEN[1], Tobias PLETZER[1], Alexander GORTZ[2], Andreas KUBIS[1], Jana BREUER[3], Lorenz SOLEYMANI[4], Paul GRAPE[5], Youssef ALLOUCHE[6]
[1]PSI Software AG, Germany; [2]PSI Fuzzy Logik und Neuro Systeme GmbH, Germany; [3]Schleswig-Holstein Netz GmbH, Germany; [4]Avacon Netz GmbH, Germany; [5]E.DIS Netz GmbH, Germany; [6]Bayernwerk AG Germany

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Holistic Approach to Solving the Current Zero Missing Phenomenon in Cable Compensated Networks

Fabian KOEHLER, Ryan TUMILTY, Mark STOCKTON, Mark HOLLAND
SSEN Transmission UK

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Development of a Platform for Energy and Power Demand Forecasting Using Advanced Prediction Models, Considering Variables of the Electrical System Operation

Leonardo SANDOVAL[1], Maria ASPRILLA[1], Luis SANTANDER[2], Maria HERNANDEZ[1]
[1]Celsia; [2]Guane Enterprises

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Operation Strategy & Impact Assessment of Extreme Severe Cyclonic Storm 'Biparjoy' on Indian Power System

Akhil GUPTA*[1], Tushar R MOHAPATRA[1], Aman GAUTAM[1], Rohit ANAND[1], M ANANTHAKRISHNAN[1], B M SHAH[2]
[1]Grid Controller of India Limited, India; [2]Gujarat Energy Transmission Corporation

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Keywords: Power System Stability, Voltage and Frequency Recovery, and Oscillation

Analytical review of major disturbances in the electric power system and their impact on the overall power system stability and reliability

Ahmed TAHA, Zain ALABDEEN
Emirates Water & Electricity Company, UAE

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Topics: C2 PS1 - Create Operational Resilience to Extreme/Unpredictable Events
Keywords: Interarea mode, Prony's method, Real-time mode estimation

Real-Time Estimation of Interarea Oscillation Mode Using Sliding Window Prony's Method

Manuel Leonardo SOSA RIOS[1], Oscar Miguel SANTACRUZ SILVERO[1], Luis Fernando COSTA ALBERTO[2], Glauco NERY TARANTO[3]
[1]Itaipu Binacional; [2]University of São Paulo; [3]Federal University of Rio de Janeiro

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Operational Planning for High-Demand Periods in the Indian Power System: Leveraging Operational Experience and Policy Interventions

Talluri SUDHEER*, Anuj KUMAR, Rohit ANAND, Ashok KUMAR, S. C. SAXENA
Grid Controller of India Ltd. India, India

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Topics: C2 PS1 - Create Operational Resilience to Extreme/Unpredictable Events
Keywords: meteorological parameters, power system operation and planning, probabilistic forecasting, short-term load forecasting

Assessment of meteorological parameters' effects and impacts on short-term probabilistic load forecasting: a case study of Croatia

Lucija MATULIN[1], Tomislav PLAVŠIĆ[1], Tomislav CAPUDER[2], Jadranko KUČICA[1]
[1]Croatian Transmission System Operator Plc., HOPS, Croatia; [2]University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia

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Keywords: DLR, Dynamic Line Rating, meteorological data, network operations, short term prediction

Short term prediction of Dynamic Line Rating for network operations

Marcel STOECKLI[1], Stefano GRASSI*[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]GILYTICS AG, Switzerland

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Methodology of calculating Balancing Reserves in Georgian Power System

David TKESHELASHVILI, Irakli VAKHTANGADZE, Irakli GORDIASHVILI, Ivane MCHEDLISHVILI, Archil KOKHTASHVILI
Georgian State Electrosystem

PS2 - CHANGES ON SYSTEM OPERATION AND CONTROL CONSIDERING THE ENERGY TRANSITION

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Approximate optimal control of wind-HESS system for online frequency regulation based on fuzzy logic control

Zao TANG[1], Jia LIU[1], Pingliang ZENG[1], Peng LI[2]
[1]Hangzhou Dianzi University, China; [2]North China Electric Power University, China

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Topics: C2 PS2 - Changes on System Operation and Control Considering the Energy Transition
Keywords: Ring distribution network, Technical energy losses, Repairing time, Power load flow, Switching strategy

Switching Strategy for Minimizing Energy Losses in Ring Distribution Network during Repairing Time

Abd-El Fattah S. HAMMAD[1], Hossam A. ABD EL GHANY[2], Ahmed M. AZMY[2]
[1]Behira Electricity Distribution Company; [2]Faculty of Engineering, Tanta University

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Topics: C2 PS2 - Changes on System Operation and Control Considering the Energy Transition
Keywords: Automatic Voltage regulators (AVR), French transmission system, SVR

Impact of an enhanced secondary controller on the voltage regulation perfor- mance in the French Transmission System

Julien CALLEC, Adrien GUIRONNET, Carmen CARDOZO, Philippe JUSTON
RTE, France

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Quantification of GFM Inverters in Island Grid Stability and Load Shedding Events

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[1]LUMA Energy, United States of America; [2]LUMA Energy, Canada; [3]Pacific Northwest National Laboratory (PNNL), United States of America

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Keywords: Solar Photovoltaic, Inverter-based Resource, Modeling

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Alex SHATTUCK, Ryan QUINT, Aung THANT, Rich BAUER
North American Electric Reliability Corporation (NERC), United States of America

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Keywords: Adaptive Capability, Continental Europe Synchronous Area, Inter-area Oscillation, Phasor Measurement Unit (PMU), Wide-area Damping Control

Mitigating Continental Europe North-South Oscillations Using An Adaptive Wide-area Damping Controller: Field Implementation and Testing

Lin ZHU[1], Evangelos FARANTATOS[1], Xinlan JIA[2], Wenpeng YU[2], Yi ZHAO[2], Yilu LIU[2], Salvatore TESSITORE[3], Pietro PAU[3], Guido COLETTA[3], Cosimo PISANI[3], Giorgio GIANNUZZI[3]
[1]Electric Power Research Institute (EPRI), United States of America; [2]University of Tennessee, United States of America; [3]Terna, Italy

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Comparative Study of Grid Forming Batteries and Synchronous Condensers for Improving Power System Stability in Weak Grid Networks

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Coordinated Reactive Power Compensation: A Collaborative DSO-TSO Approach

Rita LOPES MOURÃO[1], Gonçalo SANTOS[1], Miguel LOURO[1], José VIEIRA COUTO[2], Filipe RIBEIRO[2]
[1]E-Redes, Portugal; [2]REN, Portugal

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GridOptions Tool: Real-World Day-Ahead Congestion Management using Topological Remedial Actions

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[1]TenneT TSO; [2]Artelys; [3]TU Delft

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Improving Frequency Defence Schemes for Critical System Conditions in the Continental European Power System

Padraig BUCKLEY[1], Aleksandar BORIČIĆ[2], Martijn JANSSEN[4], Timothy PLEVIER[4], Jorrit BOS[3], Danny KLAAR[3], Marjam POPOV[1]
[1]Delft University of Technology, Faculty of EEMCS; [2]Delft University of Technology, Faculty of EEMCS & TenneT TSO; [3]TenneT TSO; [4]Alliander N.V.

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Protection Schemes for Renewable Energy Sources Integration in Romanian Power Grid

Roxana A ISTRATE[1], Costel CONSTANTIN[1], Lucian TOMA[2]
[1]CNTEE Transelectrica SA; [2]University Politehnica of Bucharest

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Optimal allocation of Distributed Energy Sources and Capacitor Banks in Distribution Network using Genetic Algorithm

Nikolina MRAKOVIC[1], Zoran MILJANIC[2]
[1]Montenegrin Transmission System; [2]Faculty of Electrical Engineering

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Voltage control sandbox in the Spanish Power System

Juan PEIRÓ, Pablo MARTÍNEZ-FRESNEDA, José Luis PRESA, Nicolás SANTOS, Agustín DÍAZ, Marta CABALLERO
Red Eléctrica, Spain

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C2 POWER SYSTEM OPERATION AND CONTROL - Full Papers
Topics: C2 PS2 - Changes on System Operation and Control Considering the Energy Transition
Keywords: Power system inertia, VRE, PFR, RoCoF

Effects of increasing variable renewable energy (VRE) integration on the power system inertia - South African power system

Fiona OLOO
The Council for Scientific and Industrial Research

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Standards-based interoperable Testbed for Development and Assessment of stability monitoring Applications in the Nordic interconnected Grid

Emil HILLBERG
RISE, Sweden

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Challenges of Frequency and Transient Stability arising from the Increased Renewable Energy

Tae-Gyun KIM, Joo-Yong KIM, Hoon-Chul SHIN, Jun-Young JOO
Korea Power Exchange, Korea, Republic of (South Korea)

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Outage Planning Automation and Optimization at Swiss Electricity Transmission Grid with High Shares of Hydropower Generation

Marcel STOECKLI[1], Davood RAOOFSHEIBANI*[2], Evangelos VRETTOS[2], Felipe ALVAREZ[2], Beat LOETSCHER[2], Jose ANICETO[2], Adrian SCHULZE[2], Oliver HAUBENSAK[2], Matthias BUCHER[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Swissgrid AG, Switzerland

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Topics: C2 PS2 - Changes on System Operation and Control Considering the Energy Transition
Keywords: Control of power system stability, Multi-purpose, BESS, RES

Development of multi-purpose cooperative control method of BESS for a power system with a high share of RES

Ryo YAMAGUCHI[1], Shigeyuki SUGIMOTO[1], Suresh Chand VERMA[1], Kotaro HATTORI[2]
[1]Chubu Electric Power Co., Inc., Japan; [2]Chubu Electric Power Grid Co., Inc., Japan

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Topics: C2 PS2 - Changes on System Operation and Control Considering the Energy Transition
Keywords: Distribution network, Electricity demand, Hydrogen, Modelling, Renewable Energy, Time-series data

Development of Future Energy Service Demand Model for Integrated Assessment of High Penetration Renewable Power Generations

Takeyoshi KATO, Chiyori URABE Nagoya University, Japan

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Keywords: Wind Generation, Synthetic Inertia, Load-Generation Control, Underfrequency, Overfrequency, Power System Dynamics

Operation Performance of the Brazilian Electric System with the Contribution of Frequency Controls from the Wind Farms

Flávia FERREIRA, Dilton VASCONCELOS, Leonardo SANTOS, Darlanny DINIZ, Arlindo LINS
Brazilian NC of CIGRE, Brazil; ONS

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Wide Area Monitoring and Protection - Application Developments and IT infrastructure

Kjetil O. UHLEN[1], Kjell P. MYHREN[2], Hallvar HAUGDAL[3], Daniel BALTENSPERGER[1]
[1]NTNU Norway; [2]Statnett Norway; [3]SINTEF Energy Norway

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Adaptive Parameterization of Grid-Supporting Inverters: An Investigation into Complex Coupling Effects for Islanded Operation

Carina LEHMAL, Ziqian ZHANG, Herwig RENNER, Robert SCHÜRHUBER
Graz University of Technology

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Power sharing and secondary frequency control for Greek island systems supplied by RES+storage hybrid stations and thermal generating plants

Apostolos PAPAKONSTANTINOU, Georgios PSARROS, Stavros PAPATHANASSIOU
NTUA, Greece

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Advanced functionalities for managing Wind Parks in non-interconnected Islands

Stefanos KOKKINELIS, Despoina KOUKOULA, Charalampos PAPPAS, Eleni LAMPRINIDI, Konstantinos KAOUSIAS, Andreas REPPAS, Theodora PATSAKA
HEDNO S.A., Greece

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Data driven modelling and short-term forecasting of the residual inertia contribution from embedded generators and motors in the load - The Great Britain case study

Adnan KHALIL[1], Antonio ENAS[2], Fei TENG[3], Giuseppe DESTINO[2]
[1]Reactive Technologies, Australia; [2]Reactive Technologies, UK; [3]Imperial College London, UK

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Topics: C2 PS2 - Changes on System Operation and Control Considering the Energy Transition

Impact of the balancing strategy in future meshed HVDC offshore systems

Felix RUDOLPH[1], Simon KRAHL[2], Albert MOSER[3]
[1]FGH GmbH, Germany; [2]FGH e.V., Germany; [3]IAEW, RWTH Aachen, Germany

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Keywords: Variable Renewable Energy, ESCR, EMS-SCADA

Real Time System Strength Monitoring in the Chilean National Electric System

Jorge VARGAS, Rodrigo ESPINOZA, Victor VELAR, Gretchen ZBINDEN
Coordinador Eléctrico Nacional, Chile

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Operation And Control Challenges With Large Penetration Of Renewable Energy Resources In The Indian Grid

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Solar Forecasting for Medium Voltage Distributed Energy Resource across a region

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Tenaga Nasional Berhad, Malaysia

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A Concept for Frequency Control and Power Balancing in NEOM Grid of the Future

Lie XU[1], Ramon GIMENEZ[2], Md HABIBURRAHMAN[3], Nagaraju POGAKU[3], Peng LI[3], Nand SINGH[3], Grain ADAM[3]
[1]University of Strathclyde,UK; [2]University Polytechnic of Valencia,SPAIN; [3]ENOWA, NEOM, KSA

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Topics: C2 PS2 - Changes on System Operation and Control Considering the Energy Transition
Keywords: Hydroelectric plants, Itaipu Binacional, Monte Carlo simulation, short-term operation planning, uncertainties

Itaipu's experience using Monte Carlo Simulation based tool for short-term operation planning

Ricci OVIEDO, Reinaldo GONZALEZ, Rafael ANDRADE
Itaipu Binacional

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The Role of PSPPs in the Implementation of the Strategy of Accelerated Development of Renewable Energy Sources in the Countries of South-Eastern Europe SEERC

Yuriy LANDAU
UKRHYDROPROJECT PRJSC

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Topics: C2 PS2 - Changes on System Operation and Control Considering the Energy Transition
Keywords: Solar photovoltaic (PV), Intra-hour power generation forecasting, Artificial neural network (ANN), Satellite imagery, Power system operation

Enhanced Intra-hour Solar PV Power Generation Forecast with Satellite Imagery

Jarudate VORASEE, Surat ASVAPOOSITKUL, Somphop ASADAMONGKOL, Somruedee TIPMABUTR
Electricity Generating Authority of Thailand (EGAT), Thailand

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An approach to evaluate Under-frequency Load Shedding System of Power System with high share of distributed sourceA

Viet Anh VO HAI*, Tuan NGUYEN ANH, Duc DINH XUAN, Long LONG VO MINH, Quynh PHAM, Ha HOANG MINH, Man LE CONG
EVNCRLDC Vietnam

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C2 POWER SYSTEM OPERATION AND CONTROL - Full Papers
Topics: C2 PS2 - Changes on System Operation and Control Considering the Energy Transition
Keywords: Battery Energy Storage System (BESS), Automatic Frequency Restoration Reserve (aFRR), Area Control Error (ACE), Battery Energy Storage Systems (BESS), Automatic Generation Control (AGC), control strategy, frequency response, renewable sources.

Optimized Integration of Battery Energy Storage for aFRR in Kosovo Transmission System Operator: A Hybrid Approach for Grid Stability and Battery Longevity

Gazmend KABASHI, Rexhep SELIMI, Sabri MUSIQI
Kosovo Transmission, System and Market Operator - KOSTT

C3 - POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE

PS1 - PUBLIC ACCEPTANCE AND STAKEHOLDER ENGAGEMENT IN POWER SYSTEM GENERATION, TRANSMISSION & DISTRIBUTION INFRASTRUCTURES

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The fully insulated electro-optic sensor solves the measurement problem of the electric field environment near residential buildings below ultra-high voltage transmission lines

Xing FAN[1], Zhehao PEI[1], Tao WEN[2], Weijiang CHEN[3]
[1]Xi'an Jiaotong University, China; [2]Hefei University of Technology, China; [3]State Grid Corporation of China, China

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Topics: C3 PS1 - Public Acceptance and Stakeholder Engagement in Power System Generation, Transmission & Distribution Infrastructures
Keywords: Submarine power cables, marine environment, Electromagnetic field, marine fishes, AC&DC currents

Effects of submarine power cables (SPC): in situ and in vitro experiments on juvenile fishes and scallops

Lisa GARNIER[1], Damien SAFFROY[1], Gaetan MORIN[1], Helene CLAUDEL[1], Francois DESCHAMPS[1], Aurélie JOLIVET[2], Laurent CHAUVAUD[3], Anaïs GUDEFIN[4], Gilles LECAILLON[4], Stephen D. SIMPSON[5], Andrew N. RADFORD[5], Philippe LENFANT[6]
[1]RTE, France; [2]TBM Environnement, France; [3]CNRS - UBO, France; [4]ECOCEAN SAS, France; [5]University of Bristol, United Kingdom; [6]University of Perpignan, France

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Topics: C3 PS1 - Public Acceptance and Stakeholder Engagement in Power System Generation, Transmission & Distribution Infrastructures
Keywords: avifauna, power lines, collision, video detection

Bird collisions with power lines: an exploratory study for semi-automated recording of avifauna movements

Lisa GARNIER[1], Anaelle BRANDT[1], Cécile SAINT-SIMON[1], Henri-Pierre ROCHE[2]
[1]RTE, France; [2]Biodiv-Wind, France

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Topics: C3 PS1 - Public Acceptance and Stakeholder Engagement in Power System Generation, Transmission & Distribution Infrastructures
Keywords: biodiversity, ecology, nature, asset management

Harmonizing Nature's Symphony: Biodiversity as a powerful tool for public acceptance

Paul HARTMAN[1], Claire DEURVORST[2], Henk SANDERS[2]
[1]Antea Group; [2]TenneT

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A geodesign-based framework that implements BIM methodology with GIS tools and involve stakeholders in transmission infrastructures projects

Francisco Javier MORENO MARIMBALDO
Red Eléctrica, Spain

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Public acceptance of Facilities in Power Transmission Network in Montenegro

Ljiljana VUČINIĆ, Gordana PEROVIĆ
Crnogorski elektroprenosni sistem

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Proactive environmental authorization process enabling faster and flexible transmission grid expansion in South Africa

Kevin LEASK
KfW

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Multidisciplinary approach to managing wildlife risk in a DSO

Rudi KRUGER
Eskom

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Topics: C3 PS1 - Public Acceptance and Stakeholder Engagement in Power System Generation, Transmission & Distribution Infrastructures
Keywords: electrical environment analysis, power facilities, electromagnetic fields, HVAC, HVDC, distribution lines

Development of Integrated Electrical Environment Analysis Software for Power Facilities

Seungwoo LEE, Yoonseog LIM, Hosung AN, Younghong KIM, Koo-yong SHIN
KEPCO, South Korea

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Levels of Electromagnetic Field in the Vicinity of Transmission Overhead Power Lines with Special Conductors

Maja GRBIC[1], Nada CUROVIC[2], Ivan MILANOV[3], Aleksandar PAVLOVIC[1]
[1]Nikola Tesla Institute of Electrical Engineering, Republic of Serbia; [2]Elektromreza Srbije JSC, Republic of Serbia; [3]Elektroistok – Projektni biro, Republic of Serbia

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS1 - Public Acceptance and Stakeholder Engagement in Power System Generation, Transmission & Distribution Infrastructures
Keywords: Social Impact Assessment, Social License to Operate, Stakeholder Engagement, Stakeholder Perception Mapping

Periodic Stakeholder Perception Mapping combining Social Impact and Relationship Assessments: A strategy to evaluate and enhance levels of social legitimacy for enterprises

Delfim ROCHA
Brazilian NC of CIGRE, Brazil; Ferreira Rocha Assessoria e Serviços Socioambientais

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Topics: C3 PS1 - Public Acceptance and Stakeholder Engagement in Power System Generation, Transmission & Distribution Infrastructures
Keywords: Hydropower Decommissioning Process

Stakeholder Engagement in the Hydropower Decommissioning Process: a Groundbreaking Study in Latin America

Raquel LOURES[1], Marcelo MICHERIF[2], Mariana COELHO[2], Eduardo VAN DEN BERG[3], Paulo POMPEU[3], Adriano LEMOS[1], Yuri CALDEIRA[1], Rafael SOUZA[1]
[1]Brazilian NC of CIGRE, Brazil; Cemig GT; [2]SC Empreendimentos; [3]UFLA University

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Topics: C3 PS1 - Public Acceptance and Stakeholder Engagement in Power System Generation, Transmission & Distribution Infrastructures
Keywords: Socio-Environmental Programmes

Indicator Systems to Measure Efficacy and Effectiveness of Socio-Environmental Programmes of Hydroelectric Power Plants

Ricardo CAVALCANTI FURTADO, Maria F. G. FURTADO, Marcelo FURTADO, Elena FLORISSI
Brazilian NC of CIGRE, Brazil; Diversa Sustainability

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS1 - Public Acceptance and Stakeholder Engagement in Power System Generation, Transmission & Distribution Infrastructures
Keywords: area planning, carbon emission, land-use change, mitigation, peat, soil carbon

Highlighting forgotten emissions: Calculate and mitigate carbon loss from infrastructure construction on peatland

Ellen TORSÆTER[1], Magni O. KYRKJEEIDE[2]
[1]Statnett SF Norway; [2]NINA Norway

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS1 - Public Acceptance and Stakeholder Engagement in Power System Generation, Transmission & Distribution Infrastructures
Keywords: public, risk perception, project feasibility

Dialogue as an Important Link for Increasing the Level of Projects Feasibiltiy

Katarina Ana LESTAN[1], Ana CERK[2], Urška KUGOVNIK[3], Erik MARČENKO[4], Masa DJURICA[5], Maja IVANOVSKI[6], Damjan KOVACIC[7], Andrej SUSTERSIC[8], Rudi VONCINA[9]
[1]Elektroinštitut Milan Vidmar (EIMV); [2]Elektroinštitut Milan Vidmar (EIMV); [3]Elektroinštitut Milan Vidmar (EIMV); [4]Elektroinštitut Milan Vidmar (EIMV); [5]Elektroinštitut Milan Vidmar (EIMV); [6]Elektroinštitut Milan Vidmar (EIMV); [7]Elektroinštitut Milan Vidmar (EIMV); [8]Elektroinštitut Milan Vidmar (EIMV); [9]Elektroinštitut Milan Vidmar (EIMV)

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS1 - Public Acceptance and Stakeholder Engagement in Power System Generation, Transmission & Distribution Infrastructures
Keywords: Feed-in Tariff, Land Use, Photovoltaic power generation

Investigation on Current Trend of Land Use of Installation Site for Photovoltaic Power Generation Systems

Takeyoshi KATO, Chiyori URABE
Nagoya University, Japan

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Multi-Agent Systems as a Tool for Modelling Stakeholders' and Public Engagement in Power Systems Operation and Development: Hydro Power Case Study

Stanislav EROSHENKO, Alexandra KHALYASMAA, Pavel MATRENIN, Dmitry KLIMENKO
Ural Federal University, Russian Federation

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Topics: C3 PS1 - Public Acceptance and Stakeholder Engagement in Power System Generation, Transmission & Distribution Infrastructures

Assessing the Sustainability of Future Regional Energy Systems: Integrating Stakeholder Perspectives

Peter NOGLIK[1], Witold POGANIETZ[2], Johannes GAISER[2], Ines JENDRITZKI[2]
[1]Hitachi Energy Germany AG, Germany; [2]Karlsruhe Institute of Technology, Germany

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Offsetting Projects to Guarantee the no net Biodiversity Loss in Power Transmission Infrastructure.

Obed MONCADA, Juliana RUIZ, María RUIZ
ISA Intercolombia

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Topics: C3 PS1 - Public Acceptance and Stakeholder Engagement in Power System Generation, Transmission & Distribution Infrastructures

Bird Vocalizations and Audible Transmission Line (TL) Noise: Frequency Overlap Analysis for Two 230 kV TLs

Fabián ROJAS[1], William MEJÍA[1], Yenny MESA[1], Camilo ACOSTA[1], Jose RUIZ[2]
[1]Enlaza Grupo Energía Bogotá; [2]Conecta

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Topics: C3 PS1 - Public Acceptance and Stakeholder Engagement in Power System Generation, Transmission & Distribution Infrastructures

Design & Development of India's 1st Indigenous Pivoted Type Insulated Cross Arm for 400kV Transmission Line

Ashish Kr SINGH*, Mahendra CHAURASIA, Chandra KANT, Neeraj Singh GAUTAM, Rajesh GUPTA, Dr Subir SEN, Abhay CHOUDHARY
POWERGRID Corporation Of India Limited, India

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS1 - Public Acceptance and Stakeholder Engagement in Power System Generation, Transmission & Distribution Infrastructures
Keywords: 3D visualization, Augmented Reality, Virtual Reality, T&D, stakeholder engagement

Improved stakeholder engagement and public participation with Augmented and Virtual Reality

Marcel STOECKLI[1], Stefano GRASSI*[2], Salvador BAYARRI[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]GILYTICS AG, Switzerland

PS2 - CLIMATE CHANGE AND IMPACT ON POWER SYSTEM, A HOLISTIC APPROACH

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS2 - Climate Change and Impact on Power System, a Holistic Approach
Keywords: Near to Zero Liquid Discharge (NZLD) - Egyptian Electricity Holding Company (EEHC) – Water rationalization - Dissolved Air Flotation process- Filtration system

Adaptation Measures: Lessons learned & criteria to be considered for the future and existing infrastructures

Marwa Mansour HUSSEIN[1], Maher Aziz BEDROUS[2], Ismail Yehia Ali ELSAWI[1]
[1]Eyptian Electricity Holding Company EEHC; [2]Senior Counsellor for Energy & Environment

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS2 - Climate Change and Impact on Power System, a Holistic Approach

Climate Change Impacts on Low Power Output of Photovoltaic in China

Zongpeng SONG, Bo WANG, Xiaolin LIU, Zheng WANG
China Electric Power Research Institute, China

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS2 - Climate Change and Impact on Power System, a Holistic Approach
Keywords: power system, prospective, climate pojections, integration of climate information, energy systems planning

Use of state-of-the-art climate projections for power system

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RTE, France

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Future projections of extreme conditions affecting the Italian Energy System with a multi-hazard approach

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RSE, Italy

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Hosting Capacity Enhancement Strategies - Providing Impetus to Decarbonization Efforts

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Commonwealth Edison, United States of America

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From Risk to Resilience: Quantifying the Financial Impact of Proactive Civil and Structural Infrastructure Improvements in Substations

Charlie {Chun} LI[1], Brian P. HERRMANN[1], Matthew D. UBER[2]
[1]Burns & McDonnell, United States of America; [2]J-Power USA, United States of America

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Topics: C3 PS2 - Climate Change and Impact on Power System, a Holistic Approach

The impact of climate change on the Dutch transmission grid: Risks and mitigation strategies

Joris VAN BREEJEN[1], Astrid SCHELLINGS-KOEKOEK[2]
[1]TenneT TSO; [2]Movares

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS2 - Climate Change and Impact on Power System, a Holistic Approach
Keywords: capacity expansion planning, climate impact, energy planning, European energy system, weather variability

Impact of Climate and Weather Variability on Energy System Planning

Marcel STOECKLI[1], Sebastian PORRAS APARICIO*[2], Alexandre OUDALOV[2], Georgios MAVROMATIDIS[3]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy, Switzerland; [3]ETH Zurich, Switzerland

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Impacts on T&D products by climate change and visa verse

Martin A. STOESSL[1], Ewald SCHWEIGER[2], Eduardo GOMEZ HENNIG[3]
[1]Siemens Energy Austria; [2]Siemens Energy Germany; [3]Siemens Energy Canada

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Methodology for the Use of Live Line Works as an Effective Solution During Environmental Phenomena and Regulatory Changes in Developing Countries

William SANTANA, Juan VARELA
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Risk Management of Fluvio-Torrential Events on Electric Transmission Infrastructure in the Face of Climate Change: Lessons Learned from the Mocoa Disaster

Judy VALVERDE, Hernán CORTÉS
Enlaza Grupo Energía Bogotá

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Climate Change Adaptation in Distribution Network Planning: A Resilient Approach for Sustainable Power Systems

Priyanshu PRALIYA*, Ankur SANGWAN, Sovik SHARMA, Akash KUMAR
Tata Power Delhi Distribution Limited, India

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS2 - Climate Change and Impact on Power System, a Holistic Approach
Keywords: Electrical resilience, Climate change, Climate resilience, Renewable energy sources, Institutional Energy framework, Pollution, Energy taxation, Kuwait

Achieving electrical resilience in the face of climate change in Kuwait

Nayef ALHADAD[1], Jana ALI[2]
[1]Kuwait Authority for Partnership Projects, KUWAIT; [2]Kuwait Authority for Partnership Projects, KUWAIT

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Topics: C3 PS2 - Climate Change and Impact on Power System, a Holistic Approach

1 Electricity network analysis towards 2030: A Danish study case

Marco SARETTA, Alexander SIEMSEN, Carolina ESCUDERO, Lisa CALEARO
Rambøll Danmark A/S

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS2 - Climate Change and Impact on Power System, a Holistic Approach
Keywords: damages, components reliability, climate change, analytic hierarchy process

Faults and damages in the distribution network due to impact of climate change

Krešimir UGARKOVIC, Ivan ANDRIĆ, Hrvoje JELIĆ, Dinko HRKEC
HEP ODS d.o.o., Croatia

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS2 - Climate Change and Impact on Power System, a Holistic Approach

Development of Trinity Renewable Energy for the Future of East Nusa Tenggara Electricity

Halomoan PARNINGOTAN, Tommy NOVIANTO, Ansats Pram Andreas SIMAMORA, Cristine C BUBRE
PT.PLN (Persero), Indonesia

ID: 11829
C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS2 - Climate Change and Impact on Power System, a Holistic Approach
Keywords: Distributed energy resources, Transmission losses, Local resources, Renewable energy forecast system, SCADA system

Distributed Energy Resources (DER) Management Monitoring System for Case Study in Lopburi Province of Thailand to create Local 100% Renewable Energy Generation with Grid Enhancement Evaluation

Chaowalit KAWEEWAT, Warit RATCHATAKOMUT
Electricity Generating Authority of Thailand (EGAT), Thailand

PS3 - SUSTAINABILITY STARTING FOR THE SUPPLY CHAIN

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS3 - Sustainability Starting for the Supply Chain
Keywords: Ecodesign, Green Procurement, Grids supply chain, LCA, Sustainability

Ecodesign aspects to enhance circularity and boost sustainable

Marcela MANTILLA, Pascale PRIEUR, Samuel NGUEFEU
RTE, France

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS3 - Sustainability Starting for the Supply Chain
Keywords: Product Circularity, High-Voltage equipment, Circularity Strategies, Critical Raw Materials, Life Cycle

Circularity for High-Voltage Equipment

Matheo CHOMEL, Christophe PERRIER, Eliott PEREZ, Clémence DUMOULIN, Samara VANTIL, Thomas BERTELOOT
GE Grid Solutions, France

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS3 - Sustainability Starting for the Supply Chain
Keywords: Carbon footprint, Air-Insulate (AIS), Gas-Insulated Switchgears (GIS), Power transformers, optimized solution from HV products

Towards Global Net-Zero in High-Voltage Equipment

Mathéo CHOMEL, Christophe PERRIER, Eliott PEREZ, Clémence DUMOULIN, Samara VANTIL, Thomas BERTELOOT
GE Grid Solutions, France

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS3 - Sustainability Starting for the Supply Chain
Keywords: Construction, Embodied Carbon, Power Infrastructure, Sustainability

A Framework for Sustainability-centric Decision Making in the Selection of Construction Materials for Power System Projects

Alexander D. PAGNOTTA, Lyndsey COVERT
Burns & McDonnell, United States of America

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS3 - Sustainability Starting for the Supply Chain
Keywords: Audible Noise, Corona Effect, HV Overhead Transmission Line

Audible noise reduction of high-voltage overhead lines by applying an eco-design approach while considering impact on the environment

Nebojša PETROVIĆ[1], Iva SALOM[2], Nada CUROVIĆ[1], Vladimir ČELEBIĆ[2], Valerijan AKSIĆ[1], Dejan TODOROVIĆ[3], Milenko KABOVIĆ[2]
[1]Elektromreža Srbije JSC, Serbia; [2]Institute Mihajlo Pupin, University of Belgrade, Serbia; [3]Dirigent acoustics LLC, Serbia

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS3 - Sustainability Starting for the Supply Chain
Keywords: Carbon footprint; life cycle assessment; sustainability, water footprint

A step forward on sustainability in the electricity sector: putting LCA on the table

Denise MATOS, Katia GARCIA, Alexandre MOLLICA, Igor RAUPP, Juliano ABREU, João Gabriel LASSIO
Brazilian NC of CIGRE, Brazil; Eletrobras CEPEL

ID: 11067
C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS3 - Sustainability Starting for the Supply Chain
Keywords: Charging facility, Electric vehicle, Modelling, Renewable Energy, Road Traffic Census

Development of EV Charging Demand Estimation Model based on Road Traffic Census Data for Impact Assessment of High Penetration EV

Takeyoshi KATO, Chiyori URABE
Nagoya University, Japan

ID: 11078
C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS3 - Sustainability Starting for the Supply Chain
Keywords: Battery energy storage systems, Influenceable parameters, Life cycle assessment, Lithium-ion batteries

Identifying key factors to mitigate life cycle carbon emissions of stationary battery energy storage systems

Reiko TAKAHASHI[1], Hideki NODA[2], Koji NEGISHI[1], Takenori KOBAYASHI[1], Mami MIZUTANI[2]
[1]Toshiba Energy Systems & Solutions Corporation, Japan; [2]Toshiba Infrastructure Systems & Solutions Corporation, Japan

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C3 POWER SYSTEM SUSTAINABILITY AND ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: C3 PS3 - Sustainability Starting for the Supply Chain

Tackling Scope 3 GHG Emissions of Grid Investments: Creation of Accounting Platform and CO2 Models for Tracking Emissions of Purchased Goods and Works

Vincent DU FOUR, Philipp VON NORMANN
Elia Group, Belgium

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Matthias SCHICK[1], Christina LOSIFIDOU[2], Marcel HILGERS[1], Georg PUKEL[3]
[1]Thyssenkrupp Electrical Steel, Germany; [2]Siemens Energy, Germany; [3]Siemens Energy, Austria

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RENOVA: Traceability System for the Trading of Renewable Energies in the Chilean Electric Market based on Blockchain Technology

Juan AVALOS, Barbara ACEVEDO, Juan Carlos OLMEDO
Coordinador Eléctrico Nacional, Chile

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Antti HARJULA[1], Christian FLYTKJÆR[2], Robert ROGERSTEN[3], Herman HÖRNEQUIST[3], Olli-Pekka JANHUNEN[1], Jun Bum KWON[2], Eli Maria STENSETH[4], Knut Styve HORNNES[4]
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Carmen CARDOZO[1], J. L. MARIN[2], M. DE MIGUEL[2], G. OMS[2], Adrien GUIRONNET[1]
[1]RTE R&D, France; [2]Grupo AIA, Spain

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Keywords: Co-simulation, EMT-type simulation, FMI, HVDC transmission, Interactions

Parallel simulation of a wide-area EMT model with high penetration of power electronic converters using co-simulation: a real case study

Boris BRUNED, Mehdi OUAFI, Ambroise PETIT, Valentin COSTAN, Yannick VERNAY
RTE, France

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Keywords: Power systems, Inverted-Bases Resources (IBR), Battery energy storage systems (BESS°, Renewable energy sources (RES)

Study of new types of dynamic interactions in power systems with mixed classical and renewable generation

Pamela ZOGHBY[1,2,3], Bogdan MARINESCU[2,3], Antoine ROSSE[1], Grégoire PRIME[1]
[1]EDF R&D, France; [2]Ecole Centrale Nantes, France; [3]LS2N, France

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Keywords: Fault Characteristics, IEEE 1547-2018, IEEE 2800, Inverter-Based Resources, Sub-Transmission Interconnection

Fault Current Modelling of Inverter-Based Resources at the Intersection of Transmission and Distribution System

Maigha MAIGHA, Mohit SINGH, Sean W. CARR
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Location and Sizing of Grid Forming Devices in Transmission Power Networks

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Electric Power Research Institute (EPRI), United States of America

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Unlocking Capability in Transmission Connected Inverters for Improved Reliability of Transmission Power Networks

Deepak RAMASUBRAMANIAN[1], Sushrut THAKAR[1], Julia MATEVOSYAN[2]
[1]Electric Power Research Institute (EPRI), United States of America; [2]Energy System Integration Group (ESIG), United States of America

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Collector System Equivalencing with Frequency-Dependent Representation for Electromagnetic Transient Models

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Mitsubishi Electric Power Products, Inc., United States of America

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Keywords: Battery Energy Storage System, Grid Forming, Inverter-Based Resource, Modeling

Grid Forming Functional Specifications and Verification Tests for North American Bulk Power System Connected Battery Energy Storage Systems

Aung THANT[1], Hongtao MA[1], Andrew ISAACS[2], Lukas UNRUH[2], Ryan QUINT[1], Deepak RAMASUBRAMANIAN[3], Julia MATEVOSYAN[4], Andy HOKE[5]
[1]North American Electric Reliability Corporation (NERC), United States of America; [2]Electranix, Canada; [3]Electric Power Research Institute (EPRI), United States of America; [4]Energy Systems Integration Group (ESIG), United States of America; [5]National Renewable Energy Laboratory (NREL), United States of America

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Inertia Trend Analysis in the U.S. Eastern Interconnection with Field Measurement Data

Chengwen ZHANG[1], Mark BALDWIN[2], Hongyu LI[1], Zhihao JIANG[1], Yilu LIU[1]
[1]University of Tennessee, United States of America; [2]Dominion Energy, United States of America

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Evaluation of Primary Frequency Response from Inverter-based Resources with 1% Droop Setting

Shruti RAO[1], Jason MACDOWELL[1], Sheila MANZ[1], Sebastian ACHILLES[1], Nicholas MILLER[2], Nitika MAGO[3], Weifeng LI[3], Pengwei DU[3], Luis HINOJOSA[3], Shun Hsien {Fred} HUANG[3]
[1]GE Consulting Services, United States of America; [2]Hickory Ledge Consulting LLC, United States of America; [3]Electric Reliability Council of Texas (ERCOT), United States of America

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Simultaneous Voltage and Power Oscillation Damping Control: Towards robust and scalable Grid Requirements and control Solutions

Joakim BJÖRK
Svenska kraftnät, Sweden

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Updated Open Model for Dynamic Analysis of Inverter-Based Plants

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Comparison of Various Sub-synchronous Oscillations Screening Methods with Detailed EMT Simulation Analysis

Amela BASIC-BILIC[1], Arash Fazel DARBANDI[1], Sharmen ANDREW[2], Ani CHOPRA[2], Phaedra TAIAROL[1]
[1]Stantec, Canada; [2]Berkshire Hathaway Energy Canada, Canada

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Keywords: Distribution System State Estimation, Distribution-Phasor Measurement Units, D-PMU, Optimal D-PMU Placement

Optimal D-PMU Placement for Enhanced Distribution System State Estimation Accuracy

Marcel STOECKLI[1], Riccardo VASAPOLLO*[2], Lorenzo ZANNI[2], Paolo ROMANO[2], Ali ABUR[3], Mario PAOLONE[4]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Zaphiro Technologies, Switzerland; [3]Northeastern University, USA; [4]EPFL, Switzerland

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Impact on Frequency Stability of the Feedback in the active Power Control for synchronous Generation

Lena MAX
Protrol AB, Sweden

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Impact of active Distribution Networks on Power System Stability – a Case Study

Frédéric SABOT[1], Pierre HENNEAUX[1], Ifigeneia S. LAMPRIANIDOU[2], Panagiotis N. PAPADOPOULOS[2], Keith BELL[2]
[1]BEAMS, Université libre de Bruxelles, Belgium; [2]Dept. of Electronic and Electrical Engineering, University of Strathclyde, United Kingdom

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Development of Look Ahead Reactive Power Resource Optimisation Tool for Voltage Security in IBR Dominated Systems

Mohammad JAFARIAN[1], Marta VAL ESCUDERO[1], Conor KAVANAGH[1], Niall RUTHERFORD[1], Roberto TEGAS[1], Eoin KENNEDY[1], Diarmaid GILLESPIE[1], Mary HENNESSY[1], Narsi VEMPATI[2], Roger TREINEN[2], Fernando MAGNAGO[2], Joseph BRIGHT[2], Mauro PRAIS[2]
[1]EirGrid; [2]Resource Innovations

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Enhancing the Evaluation of Rate of Change of Frequency During Fault Contingencies Simulated in Phasor-Domain Tools

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EirGrid

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Keywords: digital twin, simulation model, validation, verification, power system, project management, digitization, decarbonization

Digital Twin of the Electric Power System of Slovenia for the Purposes of Security and Stability Analysis in the Era of Energy Transition

Milos MAKSIC[1], Luka ZIDARIC[2], Aleksandar MOMIROVSKI[3]
[1]Elektroinštitut Milan Vidmar (EIMV); [2]Elektroinštitut Milan Vidmar (EIMV); [3]Elektroinštitut Milan Vidmar (EIMV)

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DNV Sweden AB, Sweden

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Keywords: Power System, Frequency Stability, Frequency Containment Reserve, Demand-Side Device, Lighting Device

Experimental Evaluation of Lighting Device's Potential for Securing Frequency Control Reserve Using Demand-Side Devices

Hayato SATOH, Ayako YASUOKA, Muneki MASUDA
Central Research Institute of Electric Power Industry, Japan

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Automatic Detection of Subsynchronous Oscillations

Diptargha CHAKRAVORTY[1], Alexandru Christian NEAGU[2], Jochen I CREMER[2]
[1]TNEI Services Ltd UK; [2]Delft University of Technology Netherlands

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Framework for Identification of Subsynchronous Oscillation Risks

Diptargha CHAKRAVORTY[1], Jaime TRIVINO[1], Sami ABDELRAHMAN[2]
[1]TNEI Services Ltd UK; [2]National Grid ESO UK

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Identifying potential sub-synchronous oscillations using impedance scan approach

Shahil SHAH[1], Jingwei LU[2], Nilesh MODI[1]
[1]National Renewable Energy Laboratory, USA; [2]Australian Energy Market Operator, Australia

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Large scale grid forming BESS replaces synchronous generation enabling high renewable penetration & low system load in Australia's major northern grid

Brendan TRUONG[1], Stanislav CHEREVATSKIY[2], Stephen SPROUL[2], Vimeshan PILLAY[1], Heath LANG[3]
[1]Power and Water, Australia; [2]Hitachi Energy, Australia; [3]Owners Engineer - Territory Generation, Australia

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Automated Testing of Smart Grid Controls using a System Level Approach

Filip PRÖSTL ANDRÉN[1], Catalin GAVRILUTA[1], Denis VETTORETTI[1], Marco MITTELSDORF[2]
[1]AIT Austrian Institute of Technology; [2]Fraunhofer ISE

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On the use of the congestion forecast processes for early warning of increased risk of major disturbances

Benoît BLETTERIE[1], Martin LENZ[1], Mike Alexander LAGLER[1], Herwig RENNER[2]
[1]Austrian Power Grid; [2]Graz University of Technology

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Development of a Type-4 Wind Turbine Generator Prototype to Test Grid-Forming Control Capabilities

Vishmidhan RAVINDRABABU, Siddhant ARYA, Sean Leslie MARTIN, Harith UDAWATTE, Salah HAJTALEB, Behrooz BAHRANI
Monash University, Australia

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Maximizing the Generator Hosting Capacity Using Grid-Forming BESS

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Investigation of Grid Forming System Strength Solutions in Victoria

Logan PETERS[1], Yiju MA[1], Qiyang LEI[2]
[1]Australian Energy Market Operator, Australia; [2]University of NSW, Australia

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Keywords: Phasor Measurement Units, Real Time Monitoring, Voltage Stability Assessment, Power System Security, Oscillation Damping

PMU Applications for Voltage Stability monitoring and Oscillation analysis

Costas VOURNAS[1], Panos MANDOULIDIS[1], Orestis DARMIS[1], Stavros TSAKIRIS[2], Spiros CHOUNTASIS[2], George KORRES[1]
[1]ECE NTUA, Greece; [2]IPTO, Greece

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Frequency Stability and Fast Frequency Response in Hybrid AC-DC Transmission Grids: A Comparative Study of EMT and RMS Modelling Approaches

Soham CHOUDHURY, Aaron HEBING, Anna PFENDLER, Niklas David STURM, Xiong XIAO, Jutta HANSON
Technical University of Darmstadt, Department of Electrical Engineering and Information Technology, Institute of Electrical Power Supply with Integration of Renewable Energies

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Minimum Modelling Detail on P2P VSC HVDC Connection Considering Grid Strength

Roni IRNAWAN[1], Rian Fatah MOCHAMAD[1], Filipe Faria DASILVA[2], Qi ZHANG[2]
[1]Universitas Gajah Mada, Indonesia; [2]Aalborg University, Denmark

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Coordinated Grid Resiliency Improvement With Multiple Transmission-Level BESS Units

Tarik DONLAGIC
Siemens AG, Germany

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Keywords: Photovoltaic (PV), Distributed Resources (DR), Sudden Voltage Change, Point of Common Coupling (PCC), Gird Impact Study (GIS), Energy and Mineral Regulation Commission (EMRC).

A Novel Methodology for Grid Impact Studies of Photovoltaic Systems

Saddam ALTAMIM, Sawsan ABDELAH, Ahmad ALSAYIS
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Impact of Inverter-Based Generating Systems on Synchronous Machine Subsynchronous Torsional Interactions

Aleksandar KARISIK, Tony BERTES
DIgSILENT Pacific, Australia

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Oscillation Modes Identification Via Singular Value Decomposition and Principal Component Analysis

Carlos FERRANDON[1], Abraham ALVAREZ[1], Zia EMIN[1], Jonathan CERVANTES[2]
[1]PSC UK; [2]Energinet Denmark

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Load Model Evolution for the Colombian Power System

Neby CASTRILLÓN[1], Juan GONZÁLEZ[1], Estefania GALLEGO[1], Natalia BARROS[1], Sebastián LOAIZA[2], Juan MESA[2], Juan GALINDO[3], Juan HOYOS[3]
[1]XM; [2]University Pascual Bravo; [3]Universidad Nacional

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Keywords: EMT Analysis, Inverter-Based Resources, RES, SCR

EMT Modeling and Analysis of the Chile's Power Grid with High Penetration of Inverter-Based Renewable Energy Sources

Victor VELAR, Rodrigo ESPINOZA, Eugenio QUINTANA, Simon VELOSO
Coordinador Eléctrico Nacional, Chile

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Dynamic Performance Assessment of Hybrid Inverter based Resources (wind and Solar): Indian Context

Himanshi HIMANSHI*, Anil Kr. MEENA, Ashok PAL, P C GARG
CTUIL, India

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STATCOM Modelling Assessment and Performance Analysis in Rajasthan Renewable Complex of India

Ebin Cherian MATHEW*, Priyam JAIN, Gaurab DASH, Aman GAUTAM, Rahul SHUKLA, Manas Ranjan CHAND, Vivek PANDEY, Surajit BANERJEE, S.C. SAXENA
Grid Controller of India Limited, India

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Strategies for Mitigation of Oscillations in IBR Penetrated Network in India

Ebin Cherian MATHEW *, Aman GAUTAM
Grid Controller of India Limited, India

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Enhancing Fast Voltage Stability in Battery Energy Storage Systems (BESS)

Lakshmi NAIR*, Vignesh V
Indian Institute of Technology, India

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KAHRAMAA's experience in installing Wide Area Monitoring System (WAMS) in the Transmission Network

Noora ALDERHIM
Qatar General Electricity & Water Corporation "KAHRAMAA", Qatar

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Modelling and Control of Offshore Hybrid Power Plants considering Aggregation of Plant Technologies

Aivaras CELNA[1], Kaushik DAS[2], Mikkel GRYNING[1], Mohammad Kazem BAKHSHIZADEH[1], Poul SØRENSEN[2]
[1]Ørsted Wind Power; [2]Technical University of Denmark (DTU)

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EMT Model Validation Throughout the Entire Lifecycle of Type IV Offshore Wind Turbines and Power Plants

Gabriel Miguel Gomes GUERREIRO[1], Ranjan SHARMA[2], Frank MARTIN[2], Guangya YANG[3]
[1]Siemens Gamesa (SGRE)/Technical University of Denmark (DTU); [2]SGRE; [3]DTU

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Enabling System-Level EMT Studies of Danish Power Systems

Yicheng LIAO[1], Liang LU[1], Jun Bum KWON[1], Nan QIN[1], Dharshana MUTHUMUNI[2], Yousef PIPELZADEH[2], Karl DIRKS[2]
[1]Energinet; [2]Power Systems Technology Centre

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Topics: C4 PS1 - Power System Dynamic Analysis in the Energy Transition: Challenges, Opportunities and Advances
Keywords: Maximum Loadability Index, Reactive Compensation actions, Real-Time Monitoring, Voltage Collapse Prevention

Maximum Loadability Index for Voltage Stability Monitoring and used for collapse prevention

Enrique Ramon CHAPARRO VIVEROS, Jhonatan ANDRADE DOS SANTOS
Itaipu Binacional

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SSSC Model Validation Experience for the Colombian Power System

Neby CASTRILLÓN, Jaime PINZÓN, Juan GONZÁLEZ, Maria ZAPATA, Camilo MORENO
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Comprehensive Analysis of Colombian Power System Oscillations

Juan GONZÁLEZ, Neby CASTRILLÓN, Victor MEZA
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Topics: C4 PS1 - Power System Dynamic Analysis in the Energy Transition: Challenges, Opportunities and Advances
Keywords: Data Center, LV diesel generators, secure operation, model validation

Evaluation of the robust operation of a diesel Generator Pool in new proposed Data Center electrical topology considering specific Generator manufacturer

Georgios KARVELIS[1], Christos AGATHOKLEOUS[1], Vassilis BAKOLAS[1], Drazena BROCILO[2], John WILTSHIRE[2], Salver CORHODZIC[2]
[1]PROTASIS SA, Greece; [2]META, USA

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Topics: C4 PS1 - Power System Dynamic Analysis in the Energy Transition: Challenges, Opportunities and Advances

TOTEM: Transmission Owners Tools for EMT Modelling

Yousef PIPELZADEH[1], Dharshana MUTHUMUNI[2], Karl DIRKS[2]
[1]Manitoba Hydro International UK; [2]Manitoba Hydro International Canada

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Enhancing Dynamic Performance Validation of Transient Stability Models using Argentina's Phasor Measurement Units

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CAMMESA

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Keywords: Generator Parameters Validation, Wide Area Momitoring System (WAMS), Particle Swarm Optimization (PSO), On-line Model Validation, Event-based data

Non-Intrusive Validation of Generator Parameters in Grid Modernization: Leveraging WAMS Data and PSO Optimization

Yossawin BUREETAN, Kantitat SASOMPHOLSAWAT, Agapol PUKPRAYURA, Witchaya PIMJAIPONG
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Assessing the dynamic performance provision of a VSC-HVDC Interconnector on the Frequency and Angle Stability of a Low Inertia Isolated Power System

Melios HADJIKYPRIS, Georgios KOUVAROS, Andreas ARMENAKIS
Electricity Authority of Cyprus

PS2 - POWER QUALITY (PQ) AND ELECTROMAGNETIC COMPATIBILITY (EMC) ANALYSIS IN THE ENERGY TRANSITION: CHALLENGES, OPPORTUNITIES AND ADVANCES

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Keywords: EMT simulation, harmonic studies, sensitivity analysis, wind parks

Sensitivity analysis methods for wind farm harmonic studies

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Keywords: Geomagnetic Disturbance, Geoelectric Field Map, Nearest Neighbour Search, Geomagnetically-Induced Current

Real Time Geomagnetic Disturbance Analysis of Bulk Power System Grid using Geoelectric Field Grid Maps

Krishnat PATIL[1], Christopher BALCH[2]
[1]Siemens Power Technologies International, United States of America; [2]CIRES & NOAA Space Weather Prediction Center, United States of America

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Emission and Aggregation Characteristics of Some End Use Loads Sold in the US

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Electric Power Research Institute (EPRI), United States of America

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Topics: C4 PS2 - Power Quality (PQ) and Electromagnetic Compatibility (EMC) Analysis in the Energy Transition: Challenges, Opportunities and Advances
Keywords: Power Quality, voltage unbalance, negative phase sequence, overhead lines

Voltage unbalance in overhead lines with EHV and HV circuits combined in the same tower

Jeroen VAN WAES[1], Frederik GROEMAN[2], Tam MAI[2], Kees KOREMAN[3]
[1]TenneT TSO / Eindhoven University; [2]DNV; [3]TenneT TSO

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A suggested protocol for measuring power quality disturbance between 2 kHz and 150 kHz in distribution networks

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Post-Energy Transition Voltage Dips Assessment: A Dutch Transmission Network Case Study

Roozbeh TORKZADEH[1], Jeroen VAN WAES[2], Sjef COBBEN[1]
[1]Eindhoven University of Technology; [2]TenneT TSO BV and Eindhoven University of Technology

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Keywords: Geomagnetically induced currents, Power quality, Reactive power Q-loss, Voltage stability

Towards a novel approach to voltage magnitude, harmonics, and voltage stability in the presence of GICs

David OYEDOKUN
University of Cape Town

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A systematic Methodology to determine RFI generated by the EUT of in-situ Measurements at Substations

Emil ERIKSSON
Hitachi Energy Sweden AB, Sweden

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Voltage Harmonics Trends based on Field Measurements on the Irish Transmission Network

Daphne SCHWANZ[1], Aisling CARROLL[2], Deva KUMAR[1], Chandrasekaran SUBRAMANIAN[1], Oisin GOULDING[1], Alan ROGERS[1]
[1]EirGrid; [2]University College Dublin

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Voltage Quality Monitoring in the Irish Distribution Network - Insights from Smart Meter Event Analysis

Jack HERRING, Tara NÍ REACHTAGÁIN, Ciaran GEANEY, Martin CAMPION, Padraig COUGHLAN
Electricity Supply Board (Ireland)

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Topics: C4 PS2 - Power Quality (PQ) and Electromagnetic Compatibility (EMC) Analysis in the Energy Transition: Challenges, Opportunities and Advances
Keywords: GIC; Digital Fault Recorder

A Geomagnetically Induced Currents (GIC) monitoring system based on Digital Fault Recorders (DFR)

Alexandre PINHEL[1], Paulo DE CARVALHO[1], José LIMA[1], Walmer SOARES[1], Renato PERNAS[1], Rodrigo DANTAS[2], Adriano PIRES[2], Marcelo AGOSTINI[2]
[1]Brazilian NC of CIGRE, Brazil; Eletrobras FURNAS; [2]GE

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Topics: C4 PS2 - Power Quality (PQ) and Electromagnetic Compatibility (EMC) Analysis in the Energy Transition: Challenges, Opportunities and Advances
Keywords: Harmonic Voltage; Harmonic Current; Superposition Method

Reduction of the Influence of the Background Harmonic Voltage on the Assessment of Harmonic Current at WT Terminals by the Application of the Superposition Method

Miguel P. DE CARLI, Leonardo O. GRANDER
Brazilian NC of CIGRE, Brazil; Eletrobras CGT ELETROSUL

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Keywords: Home appliance, Microgrid, Power quality, Voltage flickering

Evaluation of the impact of power quality on each home appliance

Tomoaki SHOJI, Masahiko HASEGAWA
TEPCO HD, Inc., Japan

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Topics: C4 PS2 - Power Quality (PQ) and Electromagnetic Compatibility (EMC) Analysis in the Energy Transition: Challenges, Opportunities and Advances
Keywords: power system, electromagnetic compatibility, investigation method, power plants and substations, monitoring system

EMC in DC Power Systems

Ruslan BORISOV[1], Andrey GOLDUN[2], Maxim SMIRNOV[2]
[1]National Research University «MPEI», Russian Federation; [2]RPC ELNAP Ltd., Russian Federation

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Power Quality Assessment of Renewable Energy Zone

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HATCH, Australia

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Keywords: HVDC, GIS, VFTO, EMC

EMC Issues within HVDC System under GIS Environment

Keesang SONG[1], Insoo PARK[1], Gearoid OHEIDHIN[2], Olivier CLEMENCON[2]
[1]KAPES, Republic of Korea; [2]GE Grid Solutions, United Kingdom

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Harmonic Assessment of Cablified Transmission Grid Expansion using a Measurement-Validated Simulation Model – A Case from Denmark

Vladislav AKHMATOV, Mikkel SØRENSEN, Troels JAKOBSEN, Bjarne Christian GELLERT
Energinet Eltransmission

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Exploratory Analyses of Power System Harmonic Measurements Using Principal Component Analysis

Bjarne S. BUKH[1], Vladislav AKHMATOV[1], Chris L. SKOVGAARD[1], Filipe F. DA SILVA[2], Claus LETH BAK[2]
[1]Energinet; [2]Aalborg University

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Flexible network model to study the impact of future changes in transmission systems on harmonic levels and impedance

Ana M BLANC, Max DOMAGK
Dresden University of Technology, Germany

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Multi-Platform Analysis for Harmonic Emission Assessment of M-SSSC FACTS Devices in the Santa Marta Substation (Colombia)

Juan BOTERO[1], Carlos BORDA[1], Jhon CALDERON[2]
[1]Smart Wires Inc; [2]ISA Interconexión Eléctrica

PS3 - INSULATION CO-ORDINATION AND LIGHTNING INTERFERENCE ANALYSIS: CHALLENGES, OPPORTUNITIES AND ADVANCES

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C4 POWER SYSTEM TECHNICAL PERFORMANCE - Full Papers
Topics: C4 PS3 - Insulation Co-Ordination and Lightning Interference Analysis: Challenges, Opportunities and Advances
Keywords: ATP, Grounding Grid, Lightning stroke, Soil Resistivity, Transmission Line Approach (TL), Frequency content, Uniform Soil

Effect of frequency content on the effective area of grounding grid at uniform soil resistivity

Adel Z. EL DEIN[1], Sara YASSIN OMAR[2]
[1]Aswan University, Thebes Technological University; [2]Upper Egypt Electricity Distribution Company

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C4 POWER SYSTEM TECHNICAL PERFORMANCE - Full Papers
Topics: C4 PS3 - Insulation Co-Ordination and Lightning Interference Analysis: Challenges, Opportunities and Advances
Keywords: Overvoltage withstand, transformers, TOV, insulation coordination

Transformer withstand capability to temporary overvoltages: a general determination method from standard input data

Manuel MARTINEZ-DURO
EDF, France

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Topics: C4 PS3 - Insulation Co-Ordination and Lightning Interference Analysis: Challenges, Opportunities and Advances
Keywords: Incipient Fault Detection, Online Condition Assessment, Condition Based Maintenance, Waveform Analytics

Utilizing Substation-based Monitoring to Improve Condition Assessment of Distribution Networks

Jeffrey WISCHKAEMPER, B. Don RUSSELL, Carl BENNER, Karthick MANIVANNAN
Texas A&M University, United States of America

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Long Tail Withstand Voltage Test (TOV) on the HVDC Cable and Accessories of the Italy-France Interconnection: a comparison between laboratory and infield results

Grazia BERARDI
PRYSMIAN GROUP, Italy

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Contamination Map and Design Optimization for Increased Transmission Reliability and Resilience: The Italian Experience

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TERNA, Italy

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Tower grounding electrodes: field measurement, modelling, behaviour vs lightning and improvement

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Study of the Affecting Parameters of the Restrike Overvoltages Originated during Disconnector Switching

Fernando LAGOS, Zoltan ROMAN
GE Vernova, United States of America

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Topics: C4 PS3 - Insulation Co-Ordination and Lightning Interference Analysis: Challenges, Opportunities and Advances
Keywords: Protection, System Interaction, Transients, Transformer Modeling

Enhancing Power Transformer Reliability: High-Frequency Modeling,Transient Interactions, and Overvoltage Protection Scheme

F. NASIRPOUR[1], B. BEHDANI[1], A. HEIDARY[1], M. GHAFFARIAN NIASAR[1], A. LEKIĆ[1], F. GHASSEMI[2], K. VELITSIKAKIS[3], M. VAN RIET[4], M. WILKINSON[5], M. VAN DER MEIJDEN[3], S. NAUTA[4], I. TANNEMAAT[3], J. VEENS[5], M. POPOV[1]
[1]Delft University of Technology, Faculty of EEMCS; [2]National Grid Electricity Transmission plc; [3]TenneT TSO B.V.; [4]Alliander N.V.; [5]Royal SMIT Transformers B.V.

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Topics: C4 PS3 - Insulation Co-Ordination and Lightning Interference Analysis: Challenges, Opportunities and Advances
Keywords: non-standard waveform, temporary overvoltage, TOV, vacuum circuit breaker, re-ignition

Service Experience in the Dutch Transmission Grid with Non-standard Waveforms & their Impact on the Component Insulation

K. VELITSIKAKIS, I. TANNEMAAT
TenneT TSO B.V.

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Topics: C4 PS3 - Insulation Co-Ordination and Lightning Interference Analysis: Challenges, Opportunities and Advances
Keywords: Earthing impedance, high frequency, measurement, lightning strike, simulation

A methodology of measuring, modelling and simulating of high frequency earthing impedance

Aman LAMBA, Jiayang WU, Ebbo DE MEULENMEESTER, Onno NOBEL, Leo LANGENDIJK
DNV

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Topics: C4 PS3 - Insulation Co-Ordination and Lightning Interference Analysis: Challenges, Opportunities and Advances
Keywords: harmonics, EHV cables, inrush currents, overvoltages

Overvoltages with high harmonics when connecting step-up transformers in a pumped-storage power plant: A case study

Marcel STOECKLI[1], Florian BRANTSCHEN*[2], Romain BIRBAUM[2], Cecile JOST[3], Yan ZHANG[3], Yves PANNATIER[4], Georg KOEPPL[5]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Alpiq SA, Switzerland; [3]Swissgrid AG, Switzerland; [4]HYDRO Exploitation SA, Switzerland; [5]self employed, Switzerland

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Simplified Methods and Models for Calculation of Switching Overvoltages on Transmission Lines including Effects of corona Discharges

Jan LUNDQUIST
Independent Insulation Group Sweden AB, Sweden

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Keywords: SF6 Gas Insulated Substation; Very Fast Transient Overvoltage Analysis

Very Fast Transient Overvoltage Analysis in Clean Air and SF6 Gas Insulated Substation Modules Using the Extended Transmission Line Theory

Edgar RIBEIRO[1], Angélica ROCHA[2], Alberto DE CONTI[3]
[1]Brazilian NC of CIGRE, Brazil; NSA Consultoria e Informática LTDA; [2]ATG Engenharia LTDA; [3]Universidade Federal de Minas Gerais

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Keywords: Lightning; Climate Characterization

Climate Characterization and Historical Changes in Density and Intensity of Lightning around the 500 kV Bacabeira-Parnaíba Transmission Line

Euro PINTO DE ALMEIDA[1], Ana Clara MARQUES[2], Pedro REGOTO[2], Luciano RITTER[2], Thiago Luiz FERREIRA[1], William MEJIA[3], Fernando DINIZ[1], Rafael SILVA ALÍPIO[4], Fabian ROJAS[3], Oscar GONZALEZ[3]
[1]Brazilian NC of CIGRE, Brazil; Argo Energia; [2]Climatempo; [3]Enlaza GEB; [4]Cefet-MG University

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Keywords: Transient Overvoltage, Isolated Systems, Mitigation, Shifting Voltage, Intermittent Earth-Fault

Voltage Scaling Phenomenon in Isolated Systems - Approach and Proposal for Mitigation Analysis of a Real Case in Brazil

Rafael DE OLIVEIRA FERNANDES, Caio ELEUTÉRIO
Brazilian NC of CIGRE, Brazil; ARGO Energia

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Keywords: Electromagnetic transient analysis, FDTD method, Lightning overvoltage, Substation, Switching overvoltage

Recent progress in three-dimensional FDTD-based electromagnetic transient analysis of electric power facilities

Akiyoshi TATEMATSU[1], Yoshihiro BABA[2], Toshiaki UEDA[3], Toshihiro TSUBOI[4], Soichi MORIGUCHI[5]
[1]Central Res. Inst. of Electric Power Industry, Japan; [2]Doshisha University, Japan; [3]Daido University, Japan; [4]Tokyo Electric Power Company, Japan; [5]Chubu Electric Power Grid Co, Inc., Japan

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Topics: C4 PS3 - Insulation Co-Ordination and Lightning Interference Analysis: Challenges, Opportunities and Advances
Keywords: Effective Length, Ground Return Impedance, High Frequency Cable Model, Impulsive Grounding Impedance

Effect of cable sheaths on grounding performance of wind power plants in high frequency region

Melih GÜNERI[1], Bora ALBOYACI[2]
[1]Kratis Engineering Türkiye; [2]Kocaeli University Türkiye

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Topics: C4 PS3 - Insulation Co-Ordination and Lightning Interference Analysis: Challenges, Opportunities and Advances
Keywords: ATPDraw, backflashover, lightning overvoltage, transmission line modelling

Evaluation of the Impact of Underbuilt Wire on Backflashover Critical Current in Transmission Line

William Gonzalo FLORES RUIZ[1], Jaimis S. LEON COLQUI[2], Jose PISSOLATO FILHO[2]
[1]National University of Engineering, Peru; [2]State University of Campinas, Brazil

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Transient switching mitigation in 115kV offshore platforms sensitive loads by introducing controlled switching device in three-phase gang-operated breakers

Nabil FARES[1], Thaiban RAJAB[2]
[1]Saudi Aramco, KSA; [2]Saudi Aramco, KSA

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POWERGRID Experience on Insulation Coordination of High Voltage Substations Located at High Terrain and Snow Bound Area

Kiran Singh SINGH, Pankaj Kumar KUMAR, Rakesh Kumar KUMAR, Naveen Srivastava SRIVASTAVA
POWERGRID, India

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Ferro Resonance in 765 KV Overcompensated Transmission Lines

Dr Subir SEN, B.B MUKHERJI, Mr ABHISHEK, G.A. SHINDE*, Pradeep PATIL, Pankaj MAHATA, Ashish SHARMA
POWERGRID Corporation of India Ltd, India

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Topics: C4 PS3 - Insulation Co-Ordination and Lightning Interference Analysis: Challenges, Opportunities and Advances
Keywords: lightning current, measurement, surge arrester, waveshape

Measurement of lightning current circulating in line arresters and through the transmission line tower

Silvia SINČIĆ[1], Ivo UGLEŠIĆ[2], Alan ŽUPAN[1]
[1]Croatian Transmission System Operator (HOPS), Croatia; [2]Faculty of Electrical Engineering and Computing University of Zagreb, Croatia

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Topics: C4 PS3 - Insulation Co-Ordination and Lightning Interference Analysis: Challenges, Opportunities and Advances
Keywords: Critical flashover voltage, EMTP simulations, HV testing, insulator string flashover model, lightning overvoltages

Modelling of Flashover on Insulator Strings of Overhead Lines Due to Lightning Overvoltages

Bozidar FILIPOVIC-GRCIC[1], Nina STIPETIC[1], Franjo VUKOVIC[1], Dalibor FILIPOVIC-GRCIC[2]
[1]University of Zagreb Faculty of Electrical Engineering and Computing, Zagreb, Croatia; [2]Končar – Electrical Engineering Institute Ltd., Croatia

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Continuous Monitoring and Algorithmic Prediction of lightning threat on Transmission Lines

Leonardo PORRAS[1], Ronald DICKSON[1], Guillermo FONSECA[1], Daniel ARANGUREN[2]
[1]ISA Intercolombia; [2]Keraunos SAS

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Statistical Methodology for TRV Analysis for M-SSSC Solutions in the Santa Marta Substation (Colombia)

Dilan CARO[1], Jhon CALDERON[2], Juan BOTERO[1], Alejandro DUQUE[1], Jennyfer MARIN[1]
[1]Smart Wires Inc; [2]ISA Interconexión Eléctrica

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Analysis of Several Hypotheses that Caused the Explosion of a 500 kV Current Transformer During Disconnector Operations

German GUTIERREZ, Juan RODRIGUEZ
ISA Intercolombia

C5 - ELECTRICITY MARKETS AND REGULATION

PS1 - CHARACTERISTICS OF A RESILIENT MARKET AND ITS REGULATORY REGIME

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Topics: C5 PS1 - Characteristics of a Resilient Market and its Regulatory Regime
Keywords: efficient management, blackout risks, European power network integration, crisis

Robust risk management of large disruptions applying 'common peril' to reconcile effectiveness, efficiency and fairness

Antoine GOUTALAND[1], Blanche SEGRESTIN[2], Kevin LEVILLAIN[2], Gerald VIGNAL[1]
[1]RTE, France; [2]MINES Paris PSL, France

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Topics: C5 PS1 - Characteristics of a Resilient Market and its Regulatory Regime
Keywords: Electricity Markets, External Shocks, Governance, Resilience

CONCEPT Future Electricity Market Design to Ensure Resilient and Efficient Operations

Jan VAN PUTTEN[1], Greg THORPE[2], John GING[3], Vivek PANDEY[4], Zak JOUNDI[5], Anisha CHOPRA[4], Gourav MUKHERJEE[4], Juan BOGAS[6], Amjad ANVARI-MOGHADDAM[7], Danny KLAAR[1]
[1]TenneT TSO B.V.; [2]Oakley Greenwood; [3]Eirgrid; [4]Posoco; [5]Miso; [6]OMIE; [7]Aalborg university

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[1]Carbon Zero LLC, Russian Federation; [2]SKM Market Predictor AS, Russian Federation; [3]JSC Administrator of the Wholesale Electricity Market Trading System, Russian Federation; [4]SKM Market Predictor AS, Finland; [5]JSC Novavind, Russian Federation

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Keywords: Prosumer, Peer-to-Peer (P2P) Energy Trading, ERC Sandbox, Hyperledger Fabric Blockchain, Wheeling Charge

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Keywords: socially vulnerable customers, total cost of delivering electricity solar power plants, prosumer facility, public supplier, financing model

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[1]FERK, Mostar, Bosnia and Herzegovina; [2]Elektroprivreda BiH, Sarajevo, Bosnia and Herzegovina; [3]Elektroprivreda HZ HB, Mostar, Bosnia and Herzegovina; [4]NOS BiH, Sarajevo, Bosnia and Herzegovina

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[1]Brazilian NC of CIGRE, Brazil; CCEE; [2]Hitachi Energy

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[1]Association NP Market Council, Russian Federation; [2]SKM Market Predictor AS, Norway

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[1]GCC Interconnection Authority, KSA; [2]GCC Interconnection Authority, KSA

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Keywords: Intraday auctions, Cross-zonal capacity, Market Coupling, Croatian electricity market

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[1]SP Energy Networks UK; [2]Octopus Energy UK

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Evaluating Demand Flexibility as a Distribution Planning Alternative

Jouni PEPPANEN[1], Angela CHUANG[1], Alison O'CONNELL[2]
[1]Electric Power Research Institute (EPRI), United States of America; [2]Electric Power Research Institute (EPRI), Ireland

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Keywords: Dynamic Stability, Electric Vehicles, Equipment Standards, Grid Transformation

Modelling and Studying Increasing Electric Vehicle Charging Loads on Bulk Power System Dynamic Performance: Insights and Recommendations

John Paul SKEATH[1], Ryan QUINT[1], Joe ETO[2], Parag MITRA[3], Lakshmi SUNDARESH[3], Shruti RAO[4]
[1]North American Electric Reliability Corporation (NERC), United States of America; [2]Lawrence Berkeley National Laboratory (LBNL), United States of America; [3]Electric Power Research Institute (EPRI), United States of America; [4]GE Consulting Services, United States of America

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Ensuring ADMS Functionality and Flexibility with Hardware-in-the-Loop Verification

Josh SNODGRASS[1], Chris HUFF[2], Aleksandar PARMAKOVIC[3]
[1]POWER Engineers, Inc., United States of America; [2]Pacific Gas and Electric, United States of America; [3]Schneider Electric, Serbia

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Keywords: Ancillary Service, Energy Storage, Grid Edge Solution, Market Revenue, Renewable

Business Cases for Energy Storage Project at Distribution Level Participating in European Electricity Markets with Examples of Real Projects

Takashi USAMI[1], Hamideh BITARAF[2], Ernesto SORESSI[3]
[1]Hitachi, United States of America; [2]Hitachi Energy, United States of America; [3]Hitachi Energy, Italy

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Coordinated voltage control between Medium and Low Voltage distribution grids with market-based flexibility

Clara GOUVEIA[1], Gil SAMPAIO[1], Fábio RETORTA[1], Ricardo BESSA[1], José VILLAR[1], Rita LOPES MOURÃO[2], Christian MERCKX[3]
[1]INESC TEC, Portugal; [2]E-Redes, Portugal; [3]ENGIE, Belgium

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Na LI[1], Anton ISHCHENKO[2], Simon TINDEMANS[1], Kenneth BRUNINX[1]
[1]Delft University of Technology; [2]Phase to Phase BV

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Methodology and benefits of integrating a BESS system in the operation of an isolated power systems

Laura CASADO FULGUEIRAS[1], Miquel ESCOTO SIMO[1], Pedro FREITAS RIBEIRO[2], Jose Antonio MORI DE SANTIAGO[1], Renato VERISSIMO[2]
[1]Siemens, Spain; [2]Siemens, Portugal

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Keywords: Energy Router, Flexibility, Optimal Operation, Linearized AC Power Flow, Voltage Stability

Optimal Operation of Distribution System with Energy Router for Distribution Network Flexibility

Dongjun HAN, Seungwoo NAM, Dongjun WON
Inha Univercity, Korea, Republic of (South Korea)

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Keywords: Flexible distribution, DSO, Grid Connected, Microgrid, BESS

Grid Connected Microgrid for Flexible Distribution Network Operation using BESS in South Korea

Il-Hyung LIM, Kwang-Hoon YOON
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Keywords: electric vehicle, charging station, demand side management, V2G

Development of an Electric Vehicle Charging Control System for Substation Load Management

Vyacheslav VORONIN[1], Fedor NEPSHA[2]
[1]T.F. Gorbachev Kuzbass State Technical University, Russian Federation; [2]RTSoft Smart Grid, LLC, Russian Federation

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Rethinking Distribution Network Operational Planning with Flexibility Resources

Merkebu Z. DEGEFA[1], Gunnar VIST[2], Mathias F. ELIASSEN[3], Ashild VATNE[4], Leif E. NESSE[5], Line BERGEFJORD[6], Iver BAKKEN SPERSTAD[1], Bjørn SLOTH[7]
[1]SINTEF Energi As Norway; [2]Heimdall Power Norway; [3]Kongsberg Digital Norway; [4]Ashild.Vatne@elvia.no; [5]Fagne Norway; [6]BKK Norway; [7]Agder Energi Norway

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Flexibility for increased electrification and utilisation of the distribution grid

Gerd KJØLLE[1], Oddbjørn GJERDE[1], Merkebu Z. DEGEFA[1], Stig SIMONSEN[2], Sigurd KVISTAD[3]
[1]SINTEF Energy Research Norway; [2]Lede Norway; [3]Elvia Norway

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Topics: C6 PS1 - Flexibility Management in Distribution Networks
Keywords: Battery energy storage systems, Electric vehicles, Fast charging stations, GAP analysis

Evaluation of battery energy storage systems (BESS) in the Norwegian power grid to cope with increased vehicle electrification

Heidi S. NYGÅRD[1], Ruth OLERUD[2], Petter LUNDE[3]
[1]Norwegian University of Life Sciences (NMBU) Norway; [2]Norwegian University of Life Sciences (NMBU) Norway; [3]Tronrud Engineering Norway

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Nation-wide Benefit Estimation of Non-Wire Alternative with Storage using Two-dimensional Distribution Network Expansion Model

Ji Woo LEE[1], Seung Wan KIM[2]
[1]NEXT Group, Korea, Republic of (South Korea); [2]Chungnam National University, Korea, Republic of (South Korea)

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Keywords: electricity fast-charging infrastructure, direct current recharging stations, DC stations, decarbonising transport, e-mobility, electric vehicles, electricity grid connexion, Alternative Fuel supply infrastructure, TEN-T road network

A Methodology for Determining optimal DC Charging-station Locations and Operation for Electric-vehicles based on typical technical and commercial Requirements in Europe

Ursula KRISPER
Elektro Ljubljana, d.d.

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Keywords: Load forecasting, machine learning, microgrids

Optimal Design of a Microgrid Considering Load Forecasting

Esra AYDIN, Belgin TURKAY, Cenk ANDIC
Istanbul Technical University Türkiye

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System Resilience with Electricity System Restoration and Related Services

Douglas WILSON[1], Marta LATERZA[1], Marcos SANTOS[1], Richard DAVEY[1], Ian MACPHERSON[2], Mark MORRISON[2], James YU[2]
[1]GE Vernova UK; [2]SP Energy Networks UK

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Two-stage stochastic programming for optimal BESS & DER Total Cost of Ownership and sizing considering grid services in data centre applications

Marco GIUNTOLI[1], Dario CICIO[2], Fabrizio LANDINI[3]
[1]Hitachi Energy Research, Germany; [2]Hitachi Energy, Switzerland; [3]Hitachi Energy, Italy

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Local Active Network Management (LANM) and the role of Smart Substations in Minimising Curtailment of Flexible DER Connections

Peter WALL[1], Douglas WILSON[1], Lihong HAO[1], Andreas GLATZ[1], Yusen FEI[1], Ivan MARTIN[1], Richard DAVEY[1], Boris YAZADZHIYAN[2], James MILLS[2], Mayamiko HARA[2], Tam SOKARI-BRIGGS[2], Tim MANANDHAR[2]
[1]GE Vernova UK; [2]UK Power Networks UK

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DER integration and optimisation to enable Australia's first fully electric public road transport system

Stephen SPROUL[1], John GLASSMIRE[2], Francesco BACCINO[3], Pablo ALMALECK[3]
[1]Hitachi Energy, Australia; [2]Hitachi Energy, USA; [3]Hitachi Energy, Italy

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Keywords: Distributed energy resource, Electric vehicle, Photovoltaic, System analysis

Eliminating overload in distribution systems by utilizing DER

Yoshifumi IKEMOTO[1], Masahiro MINAMI[1], Noriaki KANO[1], Shinya YOSHIZAWA[2], Yohei YAMAGUCHI[2], Yutaka OTA[2]
[1]Kansai Transmission and Distribution, Inc., Japan; [2]Osaka University, Japan

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Keywords: Distribution system, Dynamic pricing, Electric vehicle, Evaluation of voltage variation

Evaluation of the effect of dynamic pricing on EV charging to voltage variation in distribution lines

Toko MANNARI, Hiroyuki HATTA, Masahito TAHASHI
Central Research Institute of Electric Power Industry (CRIEPI), Japan

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Distributed Energy Management System (DERMS) for Solar and Storage to Demonstrate Grid Flexibility and Reliability

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Progressive Grid Solutions Pvt Ltd, India

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Keywords: Battery Energy Storage System, Green Energy, Solar PV, Residential Complex

Creating Self-Sustaining Green Community in Urban Areas through Collaborative Approach: A Case Study

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Distribution Sector Reform in Odisha (India) – A Challenge and Sincere Effort to Turn Around the Distribution Sector into An Operationally & Financially Viable Sector

Sushanta Kumar Ray MOHAPATRA
Odisha Electricity Regulatory Commission, India

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Flexible Marketplace for Green Energy Trading Amongst Local Energy Communities

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Hybrid non-linear and convex optimisation for efficient combined analysis of the engineering and market layers of distribution network flexibility

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TNEI Services Ltd UK

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Low voltage measurement system to support distribution system state estimation

István TÁCZI[1], Kristóf Péter JUHÁSZ[2], István VOKONY[2], Bálint HARTMANN[2]
[1]E.ON DSO; [2]Budapest University of Technology and Economics

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Kopernikus projects - Field applications and OT-IT-integration to enable the full potential of future power systems

Peter NOGLIK[1], Maximilian DAUER[2], Michael GRATZA[3], Andreas SCHLERETH[4], Mario GIUNTOLI[5], Robert SCHMIDT[6], Stephan RUPP[7], Sebastian BRUSKE[7], Maximilian ROSE[8], Katarina KNEZOVIC[9], Antony HILLIARD[10]
[1]Hitachi Energy AG, Germany; [2]Siemens AG, Germany; [3]TenneT TSO GmbH, Germany; [4]Fraunhofer IPA, Germany; [5]Hitachi Energy Research RWTH Aachen, Germany; [6]RWTH Aachen, Germany; [7]Maschinenfabrik Reinhausen GmbH, Germany; [8]Schleswig-Holstein Netz AG, Germany; [9]Hitachi Energy Research, Switzerland; [10]Hitachi Energy Research, Canada

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Keywords: Wide area protection, Active distribution network, synchrophasor measurements, phasor measurement unit

A New Wide Area Protection Scheme for Active Distribution Network

Khaled AL-MAITAH[1], Abdullah AL-ODIENAT[2]
[1]EDCO; [2]Mutah Univiesity

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Topics: C6 PS1 - Flexibility Management in Distribution Networks
Keywords: Data analytics, planning of distribution networks, PV hosting capacity, smart meters

Revisiting PV Regulatory Connection Rules in LV Jordanian Distribution Feeders through Leveraging Smart Metering Data

Sereen ALTHAHER[1], Alia WEDIAN[2], Sahban ALNASER[1]
[1]Univirsity of Jordan; [2]IDECO

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Smart Meters: A Key to Sustainable Energy With Applied Study Cases in Palestine

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Efficient Identification of Customer Types in Energy Consumption Data: Leveraging Dimensionality Reduction and K-Means Clustering Method

Leonie RIEDL[1], Martin BRAUN[1], Philip HEHLERT[2]
[1]Fraunhofer Institut für Energiewirtschaft und Energiesystemtechnik IEE & Universität Kassel, Germany; [2]Georg-August-Universität Göttingen, Germany

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Evaluating Distribution Transformer Utilisation for Flexibility and Enhanced Observability using Multiple Sources of Data

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SP Energy Networks UK

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Energy Storage System Design Considering Multiple Revenue Streams for Large Scale Solar in Malaysia

Junainah SARDI[1], Wan Syakirah WAN ABDULLAH[2], Hazriq Hakimi YAACOB[2], Ahmad Amirul Hakim MOHD HAMID[2]
[1]Universiti Teknikal Malaysia Melaka; [2]Tenaga Nasional Berhad

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Investigating the Capabilities of Weight-Based Gravity Storage for Delivering Ancillary Services

Alexander SIEMSEN[1], Rasmus VIG JENSEN[1], Lisa CALEARO[1], Jill MACPHERSON[2]
[1]Rambøll Danmark A/S; [2]Gravitricity

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The challenge of smooth cooperation of hydroelectric Turbines with thermal Units to provide FCR and aFRR in a Non-Interconnected Island

Anastasis TSOUMANIS[1], Stefanos KOKKINELIS[2], Konstantinos NATSIS[1], Stavros PAPATHANASSIOU[3], Despoina KOUKOULA[2], Charalampos PAPPAS[2], Eleni LAMPRINIDI[2], Theodora PATSAKA[2]
[1]PPC Renewables S.M.S.A., Greece; [2]Hellenic Electricity Distribution Network Operator S.A., Greece; [3]National Technical University of Athens, Greece

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Keywords: Distributed generation, distribution equipment, hosting capacity, short-circuit withstand

Upgrading the short-circuit withstand capability of distribution Network Equipment to increase DG hosting capacity

Aristotelis TSIMTSIOS[1], Nikolaos SARIDAKIS[1], Vassilis BAKOLAS[1], George KARVELIS[1], Emmanouil VOUMVOULAKIS[2], Konstantinos FOUNTAS[2], Eirini LEONIDAKI[2], Panagiotis LIONTOS[2]
[1]PROTASIS SA, Greece; [2]HEDNO SA, Greece

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Topics: C6 PS1 - Flexibility Management in Distribution Networks
Keywords: Distribution Network, Design Fault Level, Renewable Energy Sources, Hosting Capacity

Fault Level Constraints to the DER Hosting Capacity of the Greek MV Distribution Network

Olga SCHINA[1], Evangelia NIKITOPOULOU[1], Stavros PAPATHANASIOU[1], Athanasios DRATSAS[2]
[1]NTUA, Greece; [2]TEDRA PC, Greece

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Topics: C6 PS2 - Power Electronic based Solutions for Smart Distribution Systems
Keywords: Wireless power transfer Inductive power transfer (IPT), capacitive power transfer (CPT), and radio waves wireless power transfer (RW-WPT).

Classification of Highly Resonant Wireless Charging Techniques for Light EVs and Similar Low Applications

Eman GOMAA[1], Ahmed SHAWKY[2], Mohammed SAAD[2], Mohammed ORABI[2]
[1]Upper Egypt Electricity Distribution Company; [2]Aswan University

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A Hybrid Networking Scheme With Grid-forming and Grid-following Converters for Resilient Active Distribution System

Zhuhu HUA, Lei SHANG, Xuzhu DONG
Wuhan University, China

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Black Start Operation of Grid-Forming Converters Based on Generalized Three-Phase Droop Control Under Unbalanced Conditions

Zexian ZENG[1], Prajwal BHAGWAT[2], Maryam SAEEDIFARD[1], Dominic GROSS[2]
[1]Georgia Institute of Technology, United States of America; [2]University of Wisconsin-Madison, United States of America

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Soft Open Point at Bermeo substation to improve distribution system reliability and hosting capacity

Markel ZUBIAGA[1], David SANTOS DE DIOS[1], Eneko OLEA[1], Javier CHIVITE[1], R. PEÑA[2]
[1]Ingeteam, Spain; [2]Iberdrola, Spain

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Semiconductor circuit-breaker based on RB-IGCT to protect LVDC microgrids

Marcel STOECKLI[1], Antonello ANTONIAZZI*[2], Thomas MASPER[2], Thorsten STRASSEL[3], Christian WINTER[4], Tobias KELLER[4]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]ABB, Italy; [3]ABB, Switzerland; [4]Hitachi Energy, Switzerland

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Synthesis of Adaptive Control System of Converter-Interfaced Generation Based on a Virtual Synchronous Generator

Alisher ASKAROV[1], Aleksey SUVOROV[1], Pavel ILYUSHIN[2]
[1]National Research Tomsk Polytechnic University, Russian Federation; [2]Energy Research Institute of the Russian Academy of Sciences, Russian Federation

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Topics: C6 PS2 - Power Electronic based Solutions for Smart Distribution Systems
Keywords: Distribution power systems, IBR, Virtual inertia function

The Development of GFM inverters for penetration of variable renewable energy

Yusuke NISHIDA, Teru MIYAZAKI
Tokyo Electric Power Company Holdings, Inc., Japan

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Topics: C6 PS2 - Power Electronic based Solutions for Smart Distribution Systems
Keywords: Active distribution networks, Conventional inverters, CYMDIST, Distribution systems, IDECO, Renewable Energy Resources, Smart Inverters, Voltage Regulation, Volt-VAR Control

Volt-Var Technique Utilization for Voltage Control in Distribution Networks with Smart Inverters – A Case Study of Jordan

Walaa THIABAT, Mu'men BODOOR, Mahdi ALSHATNAWI, Abdalrheem JAWARNEH, Mohammad NASER
IDECO

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Active distribution systems and distributed energy resources

Jin-Su KIM, Ji-Song HONG, Young-Bin CHO, Seok-Chan LEE
LS ELECTRIC Co., Ltd., Korea, Republic of (South Korea)

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Topics: C6 PS2 - Power Electronic based Solutions for Smart Distribution Systems
Keywords: Solar photovoltaic-based microgrid, Distribution systems, Voltage rise suppression, PV curtailment, Financial loss

Voltage Rise Suppression Strategies for Utility-Scale Solar Photovoltaic-based Microgrids

Krit KONGURAI
Electricity Generating Authority of Thailand (EGAT), Thailand

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Topics: C6 PS2 - Power Electronic based Solutions for Smart Distribution Systems
Keywords: LVAC pillars, LVDC, LVAC/LVDC overheating and arc faults.

Low Voltage Arcing and Fire Testing: Experiments to Compare Arc Flash and Fire Hazard Between LVAC and LVDC Enclosures Faults

Michael GIBSON[1], Andre CUPPEN[1,2], Nirmal NAIR[1]
[1]University of Auckland, New Zealand; [2]PowerCo Limited, New Zealand

PS3 - RURAL, ISLANDED AND INDUSTRIAL ELECTRIFICATION STANDARDS, PRACTICES AND TECHNOLOGY OPTIONS

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Topics: C6 PS3 - Rural, Islanded and Industrial Electrification Standards, Practices and Technology Options

Design and Implementation of Dominion's Microgrid Using Hardware-in-the-Loop Testing

Genesis B. ALVAREZ[1], Robert L. ALLISON[1], Katelynn A. VANCE[1], Lou COLANGELO[2], Hermann KOCH[3], Adam ADDESSO[2]
[1]Dominion Energy, United States of America; [2]RCM Technologies, Inc., United States of America; [3]drkochconsulting, Germany

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Keywords: protection, direct current, symmetrical monopole, pole to ground fault

Protection scheme for single pole to ground faults in multi-terminal MMC-MVDC grid utilizing sequential tripping

Gvan Chun CHO[1,2], Seul-Ki KIM[1], Gyeong-Hun KIM[1], Jihui HWANG[1]
[1]Korea Electrotechnology Research Institute, Korea, Republic of (South Korea); [2]National Research University 'Moscow Power Engineering Institute', Russia

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Korea Electrotechnology Research Institute

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Keywords: DERs, fault detection, open conductor fault

Detection of Open Conductor Fault using Multiple Measurement Factors of RTUs in Active Distribution Networks with DERs

JiSong HONG
LS ELECTRIC, Korea, Republic of (South Korea)

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Challenge to establish decarbonized, resilient, and semi-independent microgrid in islands

Hideo ISHII[1], Naoto HIGA[2], Tomohiro SHIOHAMA[3], Satoru NAKAMURA[3], Kiyomasa KOHATSU[3]
[1]Waseda University, Japan; [2]NEXTEMS, Japan; [3]Okinawa Electric Power Company, Japan

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Validation of off-grid system in real cases

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Suad S. ALMATTAR
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Oleg BAGLEYBTER[1], Guillaume FOGGIA[2], Yi HUA[2]
[1]GE Vernova UK; [2]GE Vernova France

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Keywords: Optimal Restoration, Grid-forming, HILs

Optimal Service Restoration Using Distributed Generations After Blackout in Distribution Networks

Saehwan LIM, Jin-Oh LEE, Hyeong-Jun YOO, Gyeong-Hun KIM
Korea Electrotechnology Research Institute, Korea, Republic of (South Korea)

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A Combined Prepaid and Post-Paid Scheme for Non-Connected Zones and Migration from a Conventional Energy-Based Tariff to an Availability Solution in Terms of Time

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Validation of the Engineering for a Protection System in a Microgrid at the Universidad del Valle Campus in Colombia

Andres DÍAZ, Edison FRANCO, Eduardo GOMEZ
Universidad del Valle

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Impacts and Challenges of the Integration of Connected to the Grid-Microgrids: Colombian Case

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Universidad del Valle

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PS1 - TESTING, MONITORING AND DIAGNOSTICS

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Topics: D1 PS1 - Testing, Monitoring and Diagnostics

A High Performance Differential Acoustic Emission Sensor for Partial Discharge Detection

Yongling LU[1], Zhen WANG[1], Chengtao LUO[2], Yang SONG[2]
[1]State Grid Jiangsu Electric Power Company Ltd. Research Institute,China; [2]Shanghai Jiao Tong University,China

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Differential Pressure Method for Measuring Gas Leakage of Dynamic Sealing Units in GIS

Zhiqiang TAO[1], Liang SONG[2], Lu LIU[1], Manuel NAEF[2], Luopeng LIU[2], Yang WANG[1]
[1]Hitachi Energy Research; [2]Hitachi Energy High Voltage Technology Center

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS1 - Testing, Monitoring and Diagnostics
Keywords: UHF monitoring, narrow band system, Power Transformers, noisy environment, SF6-alternatives

Use of narrow band UHF monitoring system for Power Transformer and GIS including SF6-free solution in laboratory and site environments

Raphael LEBRETON, Sebastien LOUISE
GE Vernova, France

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS1 - Testing, Monitoring and Diagnostics
Keywords: High voltage direct current (HVDC), High Voltage DC Cable, Insulation, Space charge, Thermal Step Method (TSM)

Thermal stimuli-based test tools for cables

Petru NOTINGHER[1,2], Mourad JEBLI[1,2], Abdellah DARKAWI[1,2], Thierry MARTIRE[1,2], Jean-Charles LAURENTIE[1,2], Jérôme CASTELLON[1,2], Ludovic BOYER[3]
[1]University of Montpellier, France; [2]CNRS, France; [3]SuperGrid Institute, France

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Marco RIVA
ELDS Technology Centre – ABB spa Italy

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Use of state observer and load cell sensors for monitoring overhead line ice sleeve overload and conductor temperature

Lorenzo PAPI
TERNA, Italy

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Compensating Losses in Online HFCT Partial Discharge Measurements under High Load Current Conditions

Kai Xian LAI, Javan Chun Fong LEE, Bing Hong LECK, Ranjan THIRUCHELVAM, Vincent Kum Kong WONG
SP Group Singapore

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Keywords: Dielectric Frequency Response (DFR), Chromatography, High Molecular Weight Acids, Low Molecular Weight Acids

Determination of Low and High Molecular Weight Carboxylic Acids by Chromatography and Possible Implications for Dielectric Frequency Response Measurements

Lance LEWAND, Ronald HERNANDEZ, Zach HOLLAND
Doble Engineering Company, United States of America

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Application of Performing DFR on Bushings: Utility Perspective

Poorvi PATEL[1], Peter ZHAO[2], Varun GOYAL[2], Timothy RAYMOND[1]
[1]Electric Power Research Institute (EPRI), United States of America; [2]Hydro One, Canada

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A Review of Factors Affecting the Dielectric Assessment of Coupling Capacitive Voltage Transformers in the Field

Diego ROBALINO[1], Zoltan ROMAN[2]
[1]Megger Group, United States of America; [2]GE Vernova, United States of America

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Synthetic Data Generation and Its Applications: Training a Machine Learning Dissolved Gas Analysis Time Series Predictor

Mauricio SOTO
Hitachi Energy, United States of America

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Challenges on atmospheric Corrections for external Insulation Design and Testing - Revisited

Liliana AREVALO
Hitachi Energy Sweden, Sweden

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Diagnostic of On-Load Tap-Changer based on vibroacoustic Measurements

Joachim SCHIESSLING
Hitachi Energy Sweden AB, Sweden

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Topics: D1 PS1 - Testing, Monitoring and Diagnostics
Keywords: Power Transformers; Dissolved Gas Analysis; Stray Gassing

Stray Gassing of Insulating oils - Transformer condition assessment tool

Anabela PEIXOTO, Cláudia FARINHA, João VALENTIM, Rui MARTINS
EDP Labelec, Portugal

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Topics: D1 PS1 - Testing, Monitoring and Diagnostics
Keywords: Aging, Breakdown Voltage, Cable Insulation (XLPE), Supra Harmonics

Supraharmonic resilience of power cable insulation materials

Mischa E. VERMEER[1], Mohamad GHAFFARIAN NIASAR[2], Peter VAN DER WIELEN[1], Peter VAESSEN[2]
[1]Technical University Eindhoven; [2]Technical University Delft

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Keywords: Early Failure, Condition Assessment, Data Analytics, Forecasting

Condition Assessment after Early Failures in Power Equipment despite successfully passed Factory Acceptance and Commissioning Tests

Robert ROSS[1], Gerben KOOPMANS[2], Peter YPMA[2], Maria ROSS[2]
[1]TU Delft; [2]IWO

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Keywords: Condition Monitoring, Magneto resistive, Partial Discharge, PHM

A magnetic PD sensor for Prognostics and Health Management of Electric Power Equipment and Power Electronic Devices

Robert ROSS[2], Johan SMIT[2], M.G. NIASAR[1], Cees MEIJER[3], Aart-Jan DE GRAAF[3], Yun CHEN[1], Luis C.C. HEREDIA[1]
[1]TU Delft; [2]TU Delft / IWO; [3]IWO

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Experience in transmission networks using automatic partial discharge diagnostic platform

Ricardo GÓMEZ[1], Ricardo REINOSO[1], Javier ORTEGO[2], Elvis JORGE[2], Gonzalo DONOSO[1], Elena NOGUEROLES[1], Javier MARTÍN HERRERA[3], Oscar GARCÍA GARCÍA[3]
[1]Red Eléctrica, Spain; [2]Ampacimon, Spain; [3]Elewit, Spain

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Pseudo passive sensoring of partial discharges of electrical assets in multiple and remote locations

Daniel BLANCO[1], Fco. Javier DE PAZ[2], Rafael FUERTES[2], Ricardo GÓMEZ[1], Ricardo REINOSO[1], Gonzalo DONOSO[1], Elena NOGUEROLES[1]
[1]Red Eléctrica, Spain; [2]DXIoT Systems, Spain

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS1 - Testing, Monitoring and Diagnostics
Keywords: T&D equipment, disconnectors, TSO, cyclic corrosion, type test, life expectancy, maintenance

Cyclic Corrosion Testing Under Load for HV Disconnectors

Catherine LE POSTEC, Hélène GAUTHIER
Hydro-Québec, Canada

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Lifetime analysis and extended impulse and superimposed impulse voltage tests on a GIS voltage divider for HVDC applications

Marcel STOECKLI[1], Uwe RIECHERT*[2], Erik SPERLING[3], Andreas DOWBYSCH[4]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy, Switzerland; [3]Omicron electronics, Switzerland; [4]Technische Universität Dresden, Germany

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Dissolved Gas On-line Monitor Based on Tunable Diode Laser Absorption Spectroscopy and Enhanced by Vacuum Extraction

Dmitriy VODENNIKOV[1], Alexander GUK[1], Artem KLIMCHUK[2], Mikhail BALANOV[2], Leonid POSPEEV[2]
[1]PJSC ROSSETI, Russian Federation; [2]Individual expert, Russian Federation

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS1 - Testing, Monitoring and Diagnostics
Keywords: chemical markers, methanol, power transformer, insulation ageing, normalization, seasonal changes

Monitoring of Seasonal Changes in the Concentrations of Chemical Markers Dissolved in Power Transformer Oil

Leonid DARIAN[1], Sergey ASOSKOV[2], Vladimir POLISHCHUK[3], Roman OBRAZTSOV[1], Alexey MAKSIMCHENKO[1]
[1]JSC «Technical Inspection UES», Russian Federation; [2]LLC Gazprom Energo, Russian Federation; [3]Joint Institute for High Temperatures of the RAS, Russian Federation

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Topics: D1 PS1 - Testing, Monitoring and Diagnostics
Keywords: X-ray, mobile system, high-voltage equipment, diagnostics, radiation safety

Mobile Diagnostic X-ray System for Inspection of High-voltage Equipment in Operation

Leonid DARIAN[1], Roman OBRAZTSOV[1], Oleg OZEROV[2]
[1]JSC «Technical Inspection UES», Russian Federation; [2]Dukhov Research Institute of Automatics

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Topics: D1 PS1 - Testing, Monitoring and Diagnostics
Keywords: Dissolved Gas Analysis, HV Equipment, Partial Discharges, Ostwald coefficients

Generation of Gases Related to Partial Discharges in High Voltage Equipment: a theoretical-practical approach

Adriana DE CASTRO PASSOS MARTINS[1], Sheila SOUTHGATE DE OLIVEIRA[2], Alain François SANSON LEVY[3], Arthur DE CASTRO RIBEIRO[4]
[1]Brazilian NC of CIGRE, Brazil; CEMIG; [2]Consultant; [3]Consultant; [4]Eletrobras CEPEL

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Alternative methods for the simultaneous determination of diagnostic parameters

Carolin SCHUETT, Zhe SHAN, Ivanka HOEHLEIN
Siemens Energy, Germany

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On Cold Climate Lab Test of Alternative Liquids: Synthetic Ester

Ahmed GAMIL[1], Pawel KLYS[2], Robert DASZKIEWICZ[2], Rafal ZIEMSKY[2], Krysztof KASZA[2], Alan SBRAVATI[3]
[1]Hitachi Energy, Germany; [2]Hitachi Energy, Poland; [3]Hitachi Energy, USA

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS1 - Testing, Monitoring and Diagnostics
Keywords: Space charge, XLPE cables, Pulsed-electro-acoustic(PEA) method, Load cycles

State of the Art in Space Charge Measurements on Cables in Japan

Shosuke MORITA[1], Norikazu FUSE[1], Takayuki MATSUBATA[2], Yoshinao MURATA[2], Yoshinobu MURAKAMI[3], Naohiro HOZUMI[3]
[1]Central Research Institute of Electric Power Industry, Japan; [2]Sumitomo Electric Industries Ltd., Japan; [3]Toyohashi University of Technology, Japan

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AI-based DGA Interpretation Method for On-Load Tap-Changers

Rainer FROTSCHER[1], Eva KELEMEN[2], Alexander ALBER[1], Jim RIPPON[2]
[1]Maschinenfabrik Reinhausen GmbH, Germany; [2]ALTALINK, L. P., Canada

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Development and verification of an online method for determining the oil condition of on-load tap-changers and transformers

Andreas KURZ[1], Roland GÖTZ[1], Julia MASSMANN[2], Johannes VEIT[2]
[1]Maschinenfabrik Reinhausen, Germany; [2]Amprion GmbH, Germany

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Optical PD Measurements on GIS and Power Transformers

Claus NEUMANN[1], Maximilian VOGL[2], Borja MANCHON[2]
[1]Technical University of Darmstadt, Germany; [2]Vogl electronic, Germany

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Determination of uncertainty contributions of voltage non-linearity of lightning impulse voltage measurement systems

Wei YAN, Yi LI
National Measurement Institute, Australia

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Effects of Glass Transition Temperature (Tg) of Composite Core Rod on Performance of Polymer Insulators

Nitin SHINGNE*, Uday PUNTAMBEKAR, Satish CHETWANI
Electrical Research and Development Association (ERDA), India

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Topics: D1 PS1 - Testing, Monitoring and Diagnostics
Keywords: transformer health, DGA, sampling, extraction, measurement

Imperative Technicalities for Managing Reliable Dissolved Gas Analysis and Adequate Diagnosis of Contemporary Oil-Filled Power Transformers

Marius GRISARU
Transformer oil tests independent consultant and educationalist at Transformer Academy, Israel

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Topics: D1 PS1 - Testing, Monitoring and Diagnostics

Partial discharge behaviour in GIS with C4-FN mixtures:Comparison of conventional and UHF measurement techniques

Johanna LINKE[1], Uwe RIECHERT[2], Stephan SCHLEGEL[1]
[1]Technische Universität Dresden, Germany; [2]Hitachi Energy, Switzerland

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Evaluation of the Dielectric Strength of Silicone Elastomers at DC Stress

Stefan KUEHNEL[1], Stefan KORNHUBER[1], Jens LAMBRECHT[2], Jens SEIFERT[3]
[1]Hochschule Zittau/Görlitz, Germany; [2]Wacker Chemie AG, Germany; [3]Maschinenfabrik Reinhausen, Germany

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Tests experiences of Temporary Over-Voltage for HVDC cable system

Dae-Jin PARK, Tae-Ho LEE, Sang-Taek PARK, Jin-Ho NAM, Sung-Yun KIM, Jung-Nyun KIM
LS Cable & System

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
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Model To Estimate Solid Insulation Ageing in Power Transformers via Alcohol Based Chemical Indicators

Abhay CHAUDHARY, Dr Subir SEN, B.B MUKHERJEE, V K BHASKAR, Abhishek ABHISHEK, N K BHASKAR, Dr Satish KUMAR, Dr Arun Prakash UPADHYAY*
Power Grid Corporation of India Ltd, India

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New Approach in Condition Monitoring of Power Transformers Oil Pumps

Sebastián LAURIA, Franco LEIVA
Laboratorio Dr. Lantos

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS1 - Testing, Monitoring and Diagnostics
Keywords: DISSIPATION FACTOR, INSULATION POWER FACTOR, POWER TRANSFORMER

High Insulation Power Factor in Power Transformer!!! Deep Diagnostic Approaches for Root Cause Analysis

Pongpon SINGKHAWAT, Anchalee TONG-IN
Electricity Generating Authority of Thailand (EGAT), Thailand

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS1 - Testing, Monitoring and Diagnostics
Keywords: CORROSIVE SULFUR, IMAGE PROCESSING, POWER TRANSFORMER, TRANSFORMER OIL

How Can Image Processing Empower Decision-Making in Corrosive Sulfur Analysis of Transformer Oil?

Wutthipan PARIYOTHAI, Sirapa THONGDEE
Electricity Generating Authority of Thailand (EGAT), Thailand

PS2 - MATERIALS FOR ELECTROTECHNICAL TECHNICAL PURPOSES AND MODELLING

ID: 10130
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling
Keywords: SF6, equation, data, electrical transmission, distibution equipment

Several equations of state for SF6: how to avoid errors?

Nathalie BARNEL, Alain JEANMAIRE
EDF R&D, France

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling
Keywords: Fluoronitrile mixtures, SF6, Gas Insulated Substations (GIS), liquefaction properties, thermodynamidc experimental approach

Characterization of the liquefaction properties of fluoronitrile mixtures by a thermodynamic experimental approach

Caterina TOIGO[1], Antoine PEREZ[1], Frank JACQUIER[1], Alain GIRODET[1], Michael INVERSIN[2], Didier LASSERRE[2]
[1]SuperGrid Institute, France; [2]RTE, France

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Effect of temperature on the development and partial discharge characteristics of electrical trees under combined AC/DC voltage in epoxy resin

Yingman SUN[1], Xuandong LIU[1], Gaoyi SHANG[1], Hao SUN[1], Hao TANG[2], Xining LI[2]
[1]Xi'an Jiaotong University, China; [2]China electric power research institute, China

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Modelling and decoupling of the dielectric response of silicone rubber composites used for outer insulation

Qian WANG, Chao WU, Xidong LIANG
Tsinghua University, China

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling

Research progress in environmentally friendly epoxy resins

Qiang FU[1], Lei PENG[1], Li ZHANG[1], Chengxi FU[2], Musong LIN[1], Zhi LI[1]
[1]Guangdong Key Laboratory of Electric Power Equipment Reliability, Electric Power Research Institute of Guangdong Power Grid Co., Ltd. , China; [2]School of Energy and Environment, City University of Hong Kong, China

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Study on Epoxy Resin Insulation Characteristics of Valve-Side Bushing in Converter Transformer Under Composite Voltage and Thermal Field

Hao SUN[1], Xuandong LIU[1], Wanhao SHI[1], Yingman SUN[1], Hao TANG[2], Xining LI[2]
[1]Xi'an Jiaotong University, China; [2]China electric power research institute, China

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Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling

Study on water ingress characteristics of HTV silicone rubber

Ying ZHOU[1], Xidong LIANG[1], Zhou ZUO[1], Chao WU[1], Qian WANG[1], Shuming LIU[1], Shuqi LIU[1], Yanfeng GAO[2]
[1]Tsinghua University, China; [2]State Grid Jibei Electric Power Co. Ltd. Research Institute, China

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling
Keywords: Resin Impregnated Paper (RIP), HVDC, reliability, DC voltage, breakdown value

Ageing behaviour of RIP material under several DC voltages and temperature

Matthieu DALSTEIN[1], Laura DE FINA[2], Thanh VU-CONG[1], Franck JACQUIER[1], Armando PASTORE[2]
[1]SuperGrid Institute, France; [2]GE RPV, Italy

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling
Keywords: mineral oil, ester oil, biodegradable hydrocarbons, thermal ageing, ageing markers

Alternative liquids for instrument transformers: thermal ageing comparison and ageing markers correlation

Anthony JEANNETON[1], Christophe PERRIER[1], Abderrahmane BEROUAL[2]
[1]GE Grid Solutions, France; [2]Ecole Centrale de Lyon, France

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling
Keywords: Dielectric properties, liquid nitrogen, resistive superconductive, pre-conditioning, DC applications

Dielectric properties of liquid nitrogen for the design of Resistive Superconductive Fault Current Limiters

Diego BRASILIANO, Christophe CREUSOT, Nicolas DEVEAUX, Alain GIRODET, Laurent MATHRAY
SuperGrid Institute, France

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Evaluating the Interfacial Compatibility of Dielectric Materials for Cable Joints

Paul MWASAME[1], Xiaoshuang WEI[1], Timothy PERSON[1], Saurav SENGUPTA[1], Michael CHERRY[1], Wenbo XU[1], Yuanqiao RAO[1], Robert DRAKE[2]
[1]Dow Chemical, United States of America; [2]Dow Chemical, United Kingdom

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Relevance of Mechanical Properties of Transformer Insulation in Power Transformer Analysis

Marta MUÑOZ[1], Orlando GIRLANDA[2], Joakim X. JOHANSSON[2], Julia FORSLIN[2], Miguel AGUIRRE[1]
[1]Hitachi Energy, Spain; [2]Hitachi Energy, Sweden

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling
Keywords: accelerated testing, thermal aging, ethylene vinyl acetate

Investigation of Aging of the Polymer Cable Composition Based on Ethylene Vinyl Acetate

Darya BOLOTINA[1], Alexander KONONENKO[1], Alexey POMERANTSEV[2], Alexander TSIKANIN[1]
[1]RISI JSC, Russian Federation; [2]RISI JSC, FRCCP RAS, Russian Federation

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling
Keywords: cellulose, insulation, degree of polymerization, supramolecular structure, grinding

The influence of Preparation Method of Cellulose Insulation Samples on Determining the Degree of Polymerization

Leonid DARIAN[1], Victor GAVRILYUK[2]
[1]JSC «Technical Inspection UES», Russian Federation; [2]MIREA — Russian Technological University, Russian Federation

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling
Keywords: mineral oil, sediment, metals, colloids, paper isolation, spectral methods, organometallic compounds, salts of organic acids

On the Control and Mechanism of Formation of Organometallic Compounds in Service Oil

Marina LYUTIKOVA[1], Sergey NEKHOROSHEV[2], Alexander KONOVALOV[1]
[1]PJSC ROSSETI, Russian Federation; [2]Khanty-Mansiysk State Medical Academy, Russian Federation

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling
Keywords: Contamination, Finite element method, Insulating paper, Partial discharges

Use of Finite Element Model for Simulation of Partial Discharge Detection Circuit in Contaminated Paper-Oil Insulation Systems

Carlos Kleber DA COSTA ARRUDA[1], Adriana DE CASTRO PASSOS MARTINS[2], Alain François SANSON LEVY[3], Orsino BORGES DE OLIVEIRA FILHO[1]
[1]Brazilian NC of CIGRE, Brazil; Eletrobras CEPEL; [2]CEMIG; [3]Consultant

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling
Keywords: Mineral insulating oil, natural ester, thermally upgraded kraft paper, thermal class

Thermal class of thermally upgraded paper in natural ester and in mineral insulating oils according to IEEE C57.100-2011

Helena Maria WILHELM[1], Paulo FERNANDES[1], Richard MAREK[2]
[1]Brazilian NC of CIGRE, Brazil; Vegoor; [2]Consultant

ID: 10857
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling
Keywords: Aramid/cellulose, hybrid paper, natural ester, paper degradation, thermal ageing

Thermal stresses of hybrid paper (aramid/cellulose) in natural ester and in mineral insulating oils

Helena Maria WILHELM[1], Paulo FERNANDES[1], Richard MAREK[2], Marco MARIN[3], Germano F. MORAES[3], Nelson VELOSO[3], Tiago MARCHESAN[4], Vitor BENDER[4]
[1]Brazilian NC of CIGRE, Brazil; Vegoor; [2]Consultant; [3]COPEL; [4]UFSM University

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling
Keywords: DBDS, elemental sulphur, mineral oil, mitigation, OLTC, oil treatment, silver corrosion, synthetic ester

Silver Corrosion Testing and Mitigation

Jelena LUKIĆ[1], Jelena JANKOVIĆ[1], Draginja MIHAJOVIĆ[1], Sandra GLIŠIĆ[2], Aleksandar ORLOVIĆ[2]
[1]Electrical Engineering Institute Nikola Tesla, Serbia; [2]Faculty of Technology and Metallurgy of the University of Belgrade, Serbia

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling

Assessing dissolved Gas Analysis on inhibited and uninhibited Mineral Oils and natural Esters under simulated Thermal Fault

Pär WEDIN
Nynas AB, Sweden

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling

On Lab Aging Test of Alternative Liquids:Natural Ester

Ahmed GAMIL[1], Dejan VUKOVIC[1], Jelena LUKIC[2], Valentina VASOVIC[2], Draginja MIHAJLOVIC[2]
[1]Hitachi Energy, Germany; [2]Electrical Engineering Institute Nikola Tesla, Serbia

ID: 11054
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling
Keywords: Dry Air, ε-Functionally Graded Materials (ε-FGM), Insulating Spacer, Nano-Micro Composite (NMC) materials

Enhancement of the Electrical Insulation Performance of Cone-Type Insulating Spacers using Functionally Graded Materials in Natural Gas GIS

Kenji OKAMOTO[1], Naoki HAYAKAWA[2], Katsumi KATO[3], Naoki OSAWA[4], Masahiro KOZAKO[5], Hitoshi OKUBO[6]
[1]Fuji Electric Co., Ltd., Japan; [2]Nagoya University, Japan; [3]N. I. T., Niihama College, Japan; [4]Kanazawa Institute of Technology, Japan; [5]Kyushu Institute of Technology, Japan; [6]Aichi Institute of Technology, Japan

ID: 11055
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling
Keywords: Direct current integrated charge (Q(t)) method, dielectric properties, HVDC technology

Direct Current Integrated Charge Method as a Useful Tool for Dielectric Measurements

Yoitsu SEKIGUCHI[1], Hiroaki MIYAKE[2], Takashi KURIHARA[3], Tatsuo TAKADA[2]
[1]Sumitomo Electric Industries, Japan; [2]Tokyo City University, Japan; [3]CRIEPI, Japan

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling

Comparison of PRPD Pattern of Electrical and UHF PD Measurements at Cable Terminations

Rouven BERKEMEIER[1], Robert BACH[1], Niklas PECK[1], Stefan TENBOHLEN[2]
[1]South Westphalia University of Applied Sciences Soest, Germany; [2]Universität Stuttgart, Germany

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling
Keywords: Polymeric insulators, Self-cleaning, Superhydrophobic, Tracking

Development of Superhydrophobic Coating for Outdoor Polymeric Insulators

M-Ramez HALLOUM, Subba REDDY B*
Indian Institute of Science, India

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Degassing Simulator For XLPE Cables

Taeuk KIM, Jonghae KIM, Youngjae CHOI, Youngseng KIM
LS Cable & System, Korea, Republic of (South Korea)

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
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On the development of multiscale conductivity models for extruded HVDC Cable Insulation

Mikael UNGE
NKT AB, Sweden

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS2 - Materials for Electrotechnical Technical Purposes and Modelling

Investigation on Aging of Transformer Solid Insulation Impregnated with Natural Ester Liquid

Ahmed GAMIL
Hitachi Energy, Germany

PS3 - MATERIALS TO ENABLE THE ENERGY TRANSITION

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS3 - Materials to enable the Energy Transition

Analysis of the application of flexible graphene grounding material in photovoltaic power plants under harsh geological conditions

Xiaobing YU[1], Chengfang ZHOU[1], Yue HUANG[1], Xingguo LIU[1], Hui XU[1], Tao DING[1], Yaoliang ZENG[1], Huifeng CHEN[1], Xiao HAN[1], Zhengwei FENG[1], Jian GUO[2], Yang DONG[2]
[1]Huaneng Hubei New Energy Co., Ltd, China; [2]Hubei Leibodun Technology Co., Ltd, China

ID: 10305
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS3 - Materials to enable the Energy Transition
Keywords: SF6, C4-FN-based solutions, GIS, GIL

C4-FN mixtures – Return of experience from Substations

Samuel FIFI[1], Hugo DOLIGEZ[1], Elodie GALINIER[1], Fabrice MORAND[1], Maxime PERRET[2], Thomas BERTELOOT[1]
[1]GE Grid Solutions, France; [2]GE Grid Solutions, Switzerland

ID: 10585
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS3 - Materials to enable the Energy Transition
Keywords: Transformer, recycled oil, life-cycle assessment

Innovative use case of recycled oil in a 57 MVA transformer at EDF SEI-Corse

Christophe ELLEAU
EDF

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS3 - Materials to enable the Energy Transition

Chemistry of C4-FN gas mixtures and application in high-voltage equipment

Marcel STOECKLI[1], Lise DONZEL*[2], Saskia BUFFONI[2], Pawel KRAWCZYK[2], Michael GATZSCHE[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy, Switzerland

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS3 - Materials to enable the Energy Transition

Evaluating life cycle environmental impacts of power transformers with different dielectric liquids

Marcel STOECKLI[1], Shelly ARREGUIN*[2], Dejan VUKOVIC[3], Ghazi KABLOUTI[2], Namita ASNANI[4]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy, Switzerland; [3]Hitachi Energy, Germany; [4]Hitachi Energy, India

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS3 - Materials to enable the Energy Transition

Environmentally friendly and highly efficient novel corrosion protection coatings for electrical equipment under harsh environmental conditions

Jürgen BÜTTNER[1], Valentin KOPP[1], Christian SCHRAMM[1], Ivanka HOEHLEIN[2]
[1]Chemische Industrie Erlangen, Germany; [2]Siemens Energy, Germany

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS3 - Materials to enable the Energy Transition

Recent development of nanomaterials for batteries and dielectric capacitors for energy storage in Japan

Yasunori TANAKA[1], Makoto KAMBARA[2], Minoru OSADA[3], Shigemitsu OKABE[4], Akiko KUMADA[5]
[1]Kanazawa University, Japan; [2]Osaka University, Japan; [3]Nagoya University, Japan; [4]Japan Science & Technology Agency, Japan; [5]The University of Tokyo, Japan

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS3 - Materials to enable the Energy Transition
Keywords: Electrical insulating gas, SF6, Global warming potential, Machine learning

Data-driven exploration for replacement of SF6 gas with quantum mechanics-assisted machine learning

Masahiro SATO, Hajime SHIMAKAWA, Akiko KUMADA
The University of Tokyo, Japan

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: D1 PS3 - Materials to enable the Energy Transition

New C4-FN and C4-FN mixture gas models as a common reference for users and equipment manufacturers

Christian IHMELS[1], Max CLAESSENS[2]
[1]LTP GmbH, Germany; [2]Hitachi Energy, Switzerland

D2 - INFORMATION SYSTEMS, TELECOMUNICATIONS AND CYBERSECURITY

PS1 - IT/OT SOLUTIONS TO IMPROVE THE EFFICIENCY AND RESILIENCE OF ELECTRIC POWER SYSTEMS

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Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems

Exploration and Practice of Cloud Orchestration in New Power System Distribution Scenarios

Fuyou SUN[1], Xiaolong REN[2], Yunzhan LI[1]
[1]Huawei Technologies Co., Ltd., China; [2]State Grid Corporation of China, China

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D2 INFORMATION SYSTEMS, TELECOMUNICATIONS AND CYBERSECURITY - Full Papers
Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems
Keywords: DoA estimation, Substation asset management, Switched beam antenna array, WSN

Design of smart planar antenna array with optimal directivity in eight directions detecting ISM band wireless sensors for IT/OT solutions and substation asset condition monitoring & deep learning applications

Reham Elsamnty EL SAMNTY
Egyptian Electricity Transmission Company (EETC) Egypt

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D2 INFORMATION SYSTEMS, TELECOMUNICATIONS AND CYBERSECURITY - Full Papers
Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems
Keywords: Open-source, standardization, grid-related data models, IEC CIM semantic standards, IOT

A possible win-win cohabitation of open-source and standardization

Laurent GUISE[1], Gilles NATIVEL[2], Benoît JEANSON[3], Philippe TAILHADES[4], Boris DOLLEY[3], Eric LAMBERT[5], Camille BLOCH[6]
[1]Ernergysemantic.com, France; [2]ENEDIS, France; [3]RTE, France; [4]GIMELEC, France; [5]EDF, France; [6]Schneider Electric. France

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D2 INFORMATION SYSTEMS, TELECOMUNICATIONS AND CYBERSECURITY - Full Papers
Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems
Keywords: energy data, electirc power system, AI solutions, common semantic data model, IEC standards

OMEGA-X: Energy Data Space for improving efficiency of electric power systems leveraging semantic interoperability and AI

Eric LAMBERT[1], Erik MAQUEDA[2], Javier VALIÑO[3], Olivier GENEST[4], Valentina JANEV[5], Bruno TRAVERSON[1], Maxime LEFRANÇOIS[6], Lina NACHABE[6], Amélie GYRARD[4], Antonio KUNG[4]
[1]EDF R&D, France; [2]Tecnalia, Spain; [3]ATOS, Spain; [4]Trialog, France; [5]Pupin Institute , Serbia; [6]Mines St Etienne, France

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The journey of digitalization: how Smart Digital Substations can drive the Industrial Internet of Things revolution

Alessandro PEDRETTI
Hitachi Energy, Italy

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Digital twin for asset management of electric power systems based on IEC CIM and BIM integration

Enea BIONDA
RSE, Italy

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Market driven architecture for remote monitoring of HV assets

Sebastiano SCARPACI
HITACHY ENERGY, Italy

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Orchestrated ICT architecture for grid monitoring of distribution power grid

Roberta TERRUGGIA
RSE, Italy

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Development of Common distribution power system model (CDPSM) based profiles and the proposed validation process

Harish KRISHNAPPA, Stephan LUPP, Bas KRUIMER, Lino PRKA
DNV

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Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems

Integrating Artificial Intelligence Models and Synthetic Image Data for Enhanced Asset Inspection and Defect Identification

Po-Chen CHEN[1], Reddy MANDATI[1], Vladyslav ANDERSON[1], Ankush AGARWAL[1], David BARNARD[2], Michael FINN[2], Jesse CROMER[2], Tatjana DOKIC[3], Andrew MCCAULEY[2], Clay TUTAJ[2], Neha DAVE[2], Bobby BESHARATI[3], Jamie BARNETT[2]
[1]Exelon Corp, United States of America; [2]BGE, Exelon, United States of America; [3]Exelon Corp, United States of America

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DERConnect: A State-of-the-Art DER Test Facility for Advanced Distribution System Management and Distributed Controls

Kohei MURAKAMI[1], Adil KHURRAM[1], Keaton CHIA[1], Jesse WOLF[1], Sayed A. SADAT[1], Scott BROWN[1], Aditya MISHRA[1], Ben HWANG[1], Jan KLEISSL[1], Jorge CORTES[1], Raymond DE CALLAFON[1], Sonia MARTINEZ[1], Hamed V. HAGHI[2], Rajesh GUPTA[1], David VICTOR[1]
[1]UC San Diego, United States of America; [2]Southern California Edison, United States of America

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A.I. Searchable Synchrophasor Database for Power System Protection

Alberto RAMIREZ ORQUIN, Vanessa RAMIREZ
Resilient Grids LLC, United States of America

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Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems
Keywords: AI, Asset Management, Cloud Platform, Digital Transformation

AI and Cloud-based Digital Transformation of Utility Asset Management and Inspections

Junhui ZHAO, Jing YANG, Umair ZIA, Asim FAZLAGIC
Eversource Energy, United States of America

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Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems

Digitalization of distribution assets using API-REST

Markel SANZ HERAS[1], David SANTACRUZ PELAEZ[1], Fernando IBAÑEZ ALAMEDA[2], Jonathan GONZÁLEZ RÍOS[3]
[1]I-DE, Spain; [2]Tecnalia, Spain; [3]Merytronic, Spain

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Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems
Keywords: distribution-phasor measurement unit, D-PMU, distribution automation, synchrophasors, time synchronisation

Validation of a Distribution-PMU system in a real-scale medium-voltage testbed: Test results and next steps

Marcel STOECKLI[1], Mayank NAGENDRAN*[2], Paolo ROMANO[2], Alessandro CIROCCO[3], Andrea RUFFINI[3], Andrea PEGOIANI[3], Samuele FORCINITI[3]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Zaphiro Technologies, Switzerland; [3]Unareti, Italy

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AI and Grid Planning with Advanced Data Science

Ted ZALUCKI
Engineered Intelligence Inc., Canada

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Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems
Keywords: AI, Reinforcement Learning, ESS, Optimal Operation, HILS test

Development and HILS Test of an AI Model for Optimal Operation of ESS in Renewable Energy Integrated EV Charging Station

Yundong SEO[1], Seungho HWANG[1], Gilsung BYEON[2], Dongjun WON[3]
[1]SK Telecom Co., Ltd.; [2]Korea Electrotechnology Research Institute, Korea, Republic of (South Korea); [3]Inha University, Korea, Republic of (South Korea)

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Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems
Keywords: common information model (CIM), data verification, grid model verification, network model management

Data Verification in Power System Modelling

Nikolay BELYAEV, Roman BOGOMOLOV
JSC SO UPS, Russian Federation

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D2 INFORMATION SYSTEMS, TELECOMUNICATIONS AND CYBERSECURITY - Full Papers
Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems
Keywords: big data, machine learning, RES, forecasting

Improving the Accuracy of RES Generation Forecast to Ensure Their Reliable Operation in the Power System

Irina BOBRITSKAYA, Aleksandr KRYMOV, Alexey ARKHIPOV
JCS SO UPS, Russian Federation

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D2 INFORMATION SYSTEMS, TELECOMUNICATIONS AND CYBERSECURITY - Full Papers
Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems

Big Data Processing and Representation in the Low-frequency Oscillations Analysis

Andrey RODIONOV[1], Kirill BUTIN[2], Aleksandr POPOV[1], Dmitry DUBININ[3], Olga ZHURAVLEVA[3]
[1]Energoservice, Russian Federation; [2]NARFU, Russian Federation; [3]JSC SO UPS, Russian Federation

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Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems
Keywords: AI, ADMS, Big Data, decision support system, distribution networks, neural networks, state estimation, power flow forecasting

Symbiosis of Artificial Intelligences in Automated Systems of Supervisory Control of the Electrical Grid of a Distribution Grid Company

Sergey RYKOVANOV, Mikhail KHOZYAINOV
SYSTEL LLC, Russian Federation

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D2 INFORMATION SYSTEMS, TELECOMUNICATIONS AND CYBERSECURITY - Full Papers
Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems
Keywords: Virtual Reality; gamification; training operation teams

Virtual Reality and gamification as tools for training operation teams, maintenance of substations and energy transmission lines

Leandro Henrique DA SILVA[1], Juliano CORTES DE SOUZA[2], Josias MATOS DE ARAUJO[3]
[1]Brazilian NC of CIGRE, Brazil;Virtual Engenharia; [2]Comando Engenharia; [3]Eng Smart Lead

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D2 INFORMATION SYSTEMS, TELECOMUNICATIONS AND CYBERSECURITY - Full Papers
Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems
Keywords: Digital transformation; Intelligent electronic devices; communication services

A holistic approach for advanced management of grid substation: Intelligent electronic devices and communication services in the Electrical Power Utility

Marcelo ZAPELLA, Ramesh POTLAPULA, Adriano PIRES
Brazilian NC of CIGRE, Brazil; GE Grid Solutions

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D2 INFORMATION SYSTEMS, TELECOMUNICATIONS AND CYBERSECURITY - Full Papers
Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems
Keywords: IEC 61850; 5G; WAMPAC Systems; Digital Transformation Era

Enhancing WAMPAC Systems in the Digital Transformation Era: Applied Research on IEC 61850 over 5G

Yona LOPES[1], Nicolas FULLI[2], Mayara Helena SANTOS[2], Ana Carolina PEDREIRA CAPELLA[3], Joyce MEIRELLES[4]
[1]Brazilian NC of CIGRE, Brazil; UFF Universidade Federal Fluminense; YSMART ECT; [2]KYA Engenharia; [3]TIM Brasil; [4]Operador Nacional do Sistema Elétrico (ONS)

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D2 INFORMATION SYSTEMS, TELECOMUNICATIONS AND CYBERSECURITY - Full Papers
Topics: D2 PS1 - IT/OT Solutions to improve the Efficiency and Resilience of Electric Power Systems
Keywords: Secure Timing, Central atomic clocks, Time transfer, Timing over optical fiber, Timing from GNSS

Secure time and time transfer

Oddleiv TUNGLAND[1], Geir KARLSEN[1], Kjell Olav NESTEGARD[1], Harald HAUGLIN[2]
[1]Statnett SF Norway; [2]Justervesenet Norway

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[1]Hitachi Energy Research, Germany; [2]Hitachi Energy Research, USA; [3]Hitachi Energy Research Switzerland; [4]Hitachi Energy South Africa

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Green Power Denmark

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Keywords: Big data, Data Lake, data acquisition, lightning induced faults, transmission network, transient analysis

Analyses of Lightning Induced Faults Recorded by Diverse Monitoring Systems in the Transmission Network Based on a New Concept of Data Lake Design

Bozidar FILIPOVIC-GRCIC[1], Bojan FRANC[1], Bruno JURISIC[2], Tihomir JAKOVIC[2], Tomislav ZUPAN[2], Antonija IVISIC[3], Ivan STURLIC[4], Alan ZUPAN[4]
[1]University of Zagreb Faculty of Electrical Engineering and Computing, Zagreb, Croatia; [2]Končar – Electrical Engineering Institute Ltd., Croatia; [3]Business Analytics and BI, Comping d.o.o., Croatia; [4]Croatian Transmission System Operator Plc., Croatia

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Praditthon PATCHARAUBONGASEAM, Supatchaya LEELUDEJ
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[1]SUBNET Solutions Inc., Canada; [2]Elektrilevi OÜ, Estonia; [3]Enefit Connect OÜ, Estonia; [4]Eesti Energia AS, Estonia

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Keywords: EV risks, risk, cybersecurity, threats, attacks, risk mitigation, security controls

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[1]UMS Group; [2]ISA Intercolombia

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A Strategy for Cyber Risk Mitigation in Smart Grids Through Traffic Management

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[1]Universidad Nacional; [2]Enel Colombia

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[1]Universidad Nacional; [2]Universidad de Antioquia

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Topics: D2 PS2 - Cybersecurity in Emerging Application Domains and Technologies for Securing Energy Organisations
Keywords: Cybersecurity, protection device management, cloud

Implementing a Protection Management System in AWS Cloud: Strict Cyber Security Standards & Rules and experience of system in Production

Santitos GARCIA ZAMORA[1], Pavel IPENZA[2], Ameen HAMDON[3]
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[1]XM; [2]Colombia Inteligente

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[1]CrossDMZ; [2]Independiente; [3]Colombia Inteligente; [4]Universidad del Valle; [5]Escuela Superior de Guerra; [6]Termocandelaria; [7]Kontinua Group

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[1]Universidad del Valle; [2]CrossDMZ

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Keywords: 5G, 5G standalone, protection, fault, fault indication, edge computing

Virtual Fault Passage Indication in commercial 5G standalone Network

Petra RAUSSI[1], Heli KOKKONIEMI-TARKKANEN[1], Anna KULMALA[2], Petri HOVILA[2]
[1]VTT Technical Research Centre of Finland; [2]ABB Oy

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Keywords: 5G, protection, fault, line differential, edge computing

Applicability of 5G Communication to Line Differential Protection for Distribution Networks

Juha YLINEN, Petri HOVILA, Petri SYVÄLUOMA, Anna KULMALA, Rajasekara DEVADASS, Petteri VAARA
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Keywords: MPLS-TP, teleprotection, PTP, inter substation communications

Migration from TDM Networks to MPLS-TP, Field Experiences

Kimmo KARKULEHTO[1], Antti VIRO[2]
[1]Fingrid Oyj; [2]DNWP

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Keywords: WAN, Time division Multiplexing, protection signaling, optical transport networks, digital hierachy

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[1]GE, France; [2]UTE, Uruguay

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[1]GE Grid Solutions Venezuela; [2]Nakama Soluciones Peru

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Keywords: Passive Optical Network (PON), Gigabyte Passive Optical Network (GPON), EDRP (Expedited, Deterministic, Redundant, PON), Leaf-spine Architecture

Redundant Passive Optical Network (PON) Transport for Grid Intelligence

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Exelon, United States of America

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Keywords: Evolved Packet Core (EPC), Private Long-Term Evolution (PLTE), Radio Access Network (RAN), User Equipment (UE)

PLTE Testing of Utility Use Cases in Support of Grid Modernization

Jayson SHIAU[1], Arien MAJETTE[2], James CONWAY[1], Michael MORGAN[2]
[1]Commonwealth Edison (ComEd), United States of America; [2]Exelon, United States of America

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Mapping Multiprotocol Services into a MPLS Critical Infrastructure Network

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Red Eléctrica, Spain

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Keywords: QKD, MPLS-TP, critical infrastructure protection, encryption

Quantum Key Distribution for MPLS-TP Traffic Encryption

Marcel STOECKLI[1], Ramon BAECHLI*[2], Rouven FLOETER[2], Vivek PALANGADAN[2], Mohammad-Amin SHOAIE[2]
[1]ELECTROSUISSE, Switzerland - CIGRE NC Secretariat; [2]Hitachi Energy, Switzerland

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Keywords: design concept IP MPLS network, high availability, flexibility, and scalability

Electric Power Industry of Serbia IP MPLS network application for communications of technical information systems

Danilo LALOVIĆ[1], Vesna VUKIĆEVIĆ[1], Ivan VUKADINOVIĆ[1], Vigor STANIŠIĆ[1], Zlatko MITROVIĆ[1], Miodrag JEVTIĆ[2], Dalibor MITIĆ[2]
[1]EPS JSC, Serbia; [2]SAGA, Serbia

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Implementation of "Software-Defined Networking" as an Alternative for Efficient Traffic Management in Digital Substations

Octavio DIAZ[1], Germán RUEDA[1], Johan CASTRO[1], Oscar TOBAR[1], Germán ZAPATA[1], Rodolfo GARCIA[2]
[1]Universidad Nacional; [2]Enel Colombia

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Keywords: redundant system, resilience measures, triplex redundancy, virtual switch

IP Network Availability Improvement Initiatives

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TEPCO Power Grid. Inc., Japan

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Keywords: IP Network, Microwave, MPLS Traffic Engineering, Resilient Networks

Techniques and methods in building resilient networks that support critical applications for Electricity Power Utilities

Ryuichi MURAKAMI[1], Makoto KUBO[1], Hiroyuki NAKAGAWA[2]
[1]Tohoku Electric Power Network Co., Inc., Japan; [2]Nakagawa Juniper Networks, Inc., Japan

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Keywords: MPLS-TP, Microwave wireless network, Packet-switched network, Resiliency

Requirements for resilient packet-switched network using MPLS-TP and microwave wireless technologies

Toshiki KINOSHITA[1], Davy HAEGDORENS[2]
[1]Chugoku Electric Power Transmission & Distribution Co., Inc., Japan; [2]OTN Systems, Belgium

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Keywords: IEC 61850, Process bus, Availability, PRP, HSR

A Fast and Accurate Calculation Method of Availability for Protection Relays Applying the IEC 61850 Process Bus

Akihiro TANAKA, Eiji OHBA
Central Research Institute of Electric Power Industry, Japan

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Keywords: Internet Protocol Security, Optical Fiber Ground Wire, Time Division Multiplexing

Implementing Telecommunications Network For Remote Operation Of Substations From National Transmission Asset Management Centre (NTAMC) By POWERGRID – A Novel Experience

Manoj KUMAR, Anoop Kumar SINGH, Vimlesh KUMAR
POWERGRID, India

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Implementation of HVDC-Emergency Power Control at HVDC Raigarh by Integrating Two Different Geographical Locations Through IEC 61850 Platform Over SDH Network

TVS Praveen KUMAR, N.B ADARI, Sunil KUMAR, Yogesh MISAL
POWEGRID, India

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Overview of State-of-the-Art Unified Network Management System for Managing Multivendor and Multi-Technology Power System Communication Network and attaining more Reliable, Scalable & Efficient Communication Network

Dr. Sunita CHOHAN*, Shyama KUMARI, Gaurav AWAL, Sangita Sarkar SARKAR, Nutan Mishra MISHRA, VS Bhal BHAL
POWERGRID, India

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Shyam AGARWAL, Amit JAIN*
Central Power Research Institute, India

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Keywords: IoT, Private 5G, Smartification of electrical safety, Wireless communication networks

Development of Wireless Communication Environments for the Smartification of Electrical Safety in Power Plants

Kazunari KUWAHARA, Ryota HIGASHI, Tetsuya KOTOOKA, Mitsuaki OSAKO, Koushiro NAKAGAWA
Kyushu Electric Power Co., Inc., Japan

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Strengthen cybersecurity and device management of cellular communication systems

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Topics: D2 PS3 - Meeting the Challenges of Energy Transition with Reliable, Scalable, and Efficient Telecommunications Networks
Keywords: ANDE, BGP, Fast ReRoute, OSPF, PDC, PMU, Pseudowire, MPLS-TP, SDN, SDH, WAMPAC.

MPLS-TP as a communication protocol for Critical Infrastructure transport networks: Challenges in the implementation of the protocol in WAMPAC systems of ANDE - Paraguay

Chrystian RUIZ DIAZ[1], Enrique DAVALOS[2], Cecilia VEGA[1]
[1]ANDE; [2]Facultad Politécnica – UNA

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D2 INFORMATION SYSTEMS, TELECOMUNICATIONS AND CYBERSECURITY - Full Papers
Topics: D2 PS3 - Meeting the Challenges of Energy Transition with Reliable, Scalable, and Efficient Telecommunications Networks
Keywords: failure detection, network management, network monitoring, Operational Technology, OT, SCADA

Implementation and Impact of Network Management and Monitoring Systems on ANDE's Operational Technology (OT) Network

Ricardo LOREIRO, Chrystian RUIZ DIAZ
ANDE

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