



2019 CIGRE Canada Conference

Le Westin Montréal

Montréal, QC, Canada • September 16-19, 2019

www.cigre.ca

Program

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WELCOME MESSAGE FROM GENERAL CHAIR

On behalf of the members of the CIGRE Canada committee and Hydro-Québec, I would like to officially welcome you to the 14th Annual CIGRE Canada Conference on Power Systems. Hydro-Québec is proud to host this important event, which will bring together many major players in the energy sector. From September 16 to 19, business leaders, manufacturers, engineers, regulators and academics will come to Montréal to discuss the latest technical and technological breakthroughs as well as major trends in the power industry.

In recent years, Montréal has garnered a reputation for being a high-tech centre of excellence and an innovation hub, becoming in the process a global leader in artificial intelligence. The theme of this year's conference could therefore not be more appropriate: **Innovation at the heart of power grid transformation**.

Innovation must be a top priority given that all aspects of tomorrow's power grid will incorporate digital technologies, enabling interactive features that promote customer participation. Regardless of your role in the industry, I am sure you share my conviction that the effects of this changing reality are already being felt. This shift pushes us to question our methods, review our current paradigms and rethink our strategies. However, in spite of the very real business challenges resulting from the transformation of our industry, I personally see a remarkable opportunity to draw on our expertise and demonstrate creativity through innovation.

Therefore, in the era of transportation electrification, digital transformation and home automation, it is the ideal time to meet and share our knowledge, know-how and innovative practices in order to ensure that the power grid evolves and adapts to the reality of tomorrow. The 2019 CIGRE Canada Conference will provide a unique forum for enriching discussions and new ideas, where you will have the opportunity to learn from your peers on topics of interest including efficient electrification, customer empowerment, asset management and the smart power grid.

I also sincerely hope that you will be able to discover all that Montréal has to offer or perhaps get reacquainted with our cosmopolitan city whose European charm and North American enthusiasm have made it world renowned. When you're not at the conference, I encourage you to discover our local culture by visiting the city's various neighbourhoods and their many shops, art galleries, museums and restaurants.

I'm looking forward to seeing you there!

Yours truly,



Marc Boucher
President, Hydro-Québec TransÉnergie

A DYNAMIC CONFERENCE PROGRAM

The 2019 edition of the CIGRE Canada conference is innovating to reach out and connect the various players in the industry and electric utilities in the context of the remarkable global evolution of power grids in recent years, which will continue in coming years with the gradual liberalization of electricity markets and the penetration of renewable energies into the electricity grid.

The conference will begin with our keynote speaker, Éric Martel, President and CEO of Hydro Quebec, and will follow with a technical panel composed of industry leaders, accompanied by Denis Tremblay, President and CEO of AIEQ, as moderator. AIEQ has joined CIGRE Canada for this year's conference.

Thanks to the volunteer efforts of a very dynamic core (Kasun Samarasakera, Aleks Modelewska and Farhad Yahyaei), we will be inaugurating a networking activity for the new generation of Cigreans (35 and under). Scientific papers by the Next Generation Network (NGN) and students will be evaluated and prizes will be awarded for both groups at the conference banquet.

During Tuesday's lunch break, Robyn Koropatnick will facilitate a Women in Engineering activity, bringing quality guests to the forefront and providing opportunities for women to share and learn from these inspiring leadership journeys. Women are often underrepresented in our sector of activity and this forum aims to recognize the excellence of their contributions and their know-how so as to promote the advancement of women in the electricity sector.

Five technical seminars will take place on Monday prior to the day's conference, along with three workshops on Thursday following the day's conference, all in addition to the various papers to be presented over the span of the conference. These activities are golden opportunities to gain further knowledge and insight in your areas of interest.

Two visits to the Varennes site of the Hydro-Québec research institute (IREQ) are also on the agenda. Hydro-Québec is the only utility in North America to have a research center as large as IREQ, spending an average of \$100 million a year on its innovation projects. The work at IREQ makes it possible to:

- Extend the useful life of equipment
- Increase equipment performance
- Optimize maintenance
- Support energy efficiency programs and improve customer service

We invite you to participate in this unique forum in large numbers and are eager to see you at the CIGRE Canada 2019 conference.



Pierre Van Dyke
 Canadian Representative
 SC B2
 Program Chair
 Research Scientist
 Institut de recherche
 d'Hydro-Québec



Stéphane Talbot
 CIGRE Canada Executive
 Committee Member
 Director Planning
 Hydro-Québec
 TransÉnergie



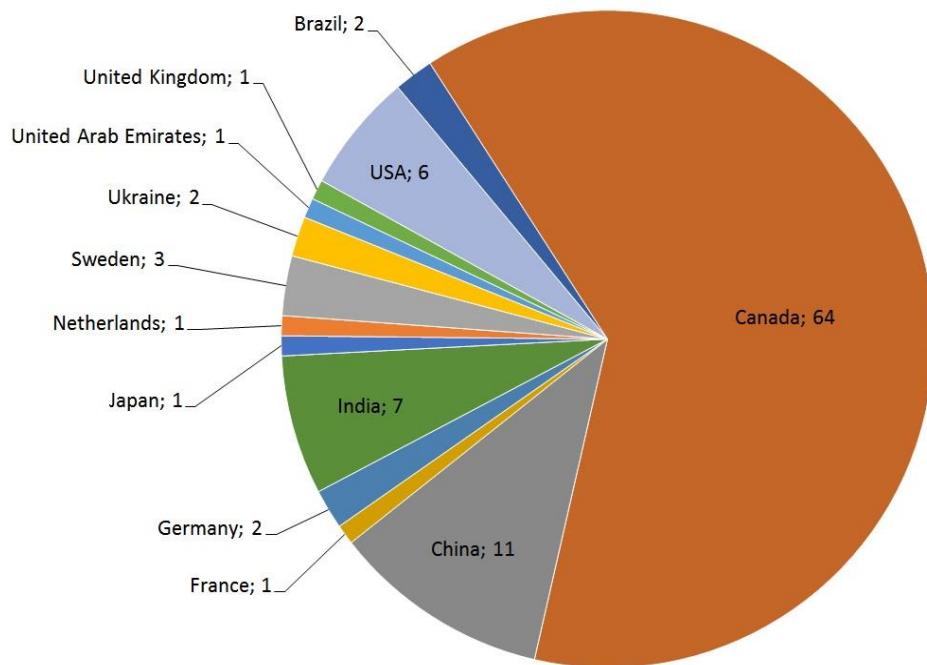
Jean-Pierre Tardif
 Local Arrangement Chair
 Communication Advisor
 Institut de recherche
 d'Hydro-Québec



Jean-François Allan
 Technical Committee
 Chair
 Research Scientist
 Institut de recherche
 d'Hydro-Québec

MESSAGE FROM TECHNICAL COMMITTEE CHAIR

On behalf of the Technical and Organizing Committees, I am pleased to welcome you in Montréal to the 14th Annual CIGRE Canada Conference on Power Systems. At the first stage of the selection process, 146 abstracts were received. Then, 102 papers from 13 countries made it to the conference final program inside 22 technical sessions. In the figure below is presented the distribution of the 102 papers by country, based on the country of the principal author of a paper.



I would like to express my sincere appreciation to the 38 technical committee members for the exposure given to the Call for Papers through the industry, research centres and universities. I am grateful for their time, efforts and expertise provided during the contribution evaluation process. Also, special thanks to the authors for their significant contributions that make the technical program highly relevant to participants.



Jean-François Allan
 Technical Committee Chair
 Research Scientist, Institut de recherche d'Hydro-Québec

COMMITTEES

Organizing Committee

- Marc Boucher**
 President of Hydro-Québec TransÉnergie
 General Chair
- Pierre Van Dyke**, Hydro-Québec (IREQ)
 Canadian Representative SC B2
 Program Chair
- Jean-François Allan**, Hydro-Québec (IREQ)
 Technical Committee Chair
- Jean-Pierre Tardif**, Hydro-Québec (IREQ)
 Local Arrangement Chair
- Stéphane Talbot**, Hydro-Québec TransÉnergie
 CIGRE Canada Executive Committee Member
- Suzanne Lafrenière**, CIGRE Canada
 CIGRE Canada Coordinator
- Steven Desrochers**, Jaguar Expo, Inc.
 Event Manager

Technical Committee

- Alberto Oscar**, Tesmec S.p.A, Italy
Annissa Heniche, Hydro-Québec (IREQ), Canada
Basile Agba, Hydro-Québec (IREQ), Canada
Behzad Kordi, University of Manitoba, Canada
Brent Maksymiw, SaskPower, Canada
Claude Rajotte, Hydro-Québec, Canada
Colin Clark, AltaLink, Canada
Daniel Wong, AltaLink, Canada
David Jacobson, Manitoba Hydro, Canada
David Olan, BC Hydro, Canada
Debashish Datta Ray, Bhabha Atomic Research Centre, India
Derek Oliver, University of Manitoba, Canada
Dipendra Rai, BC Hydro, Canada
Duc-Hai Nguyen, Hydro-Québec (IREQ), Canada
Francisc Zavoda, Hydro-Québec (IREQ), Canada
Jean-Bernard Dastous, Hydro-Québec (IREQ), Canada
Jean-François Allan, Hydro-Québec (IREQ), Canada
John Martin, Alberta Electric System Operator, Canada
Jorge Hollman, Powertech Labs, Canada
Julien Beaudry, Hydro-Québec (IREQ), Canada
Kankar Bhattacharya, University of Waterloo, Canada
Manuela Dobrescu, Hydro-Québec TransÉnergie, Canada
Mark Stemmle, Nexans High Voltage USA Inc., USA
Nicolas Pouliot, Hydro-Québec (IREQ), Canada
Normann Fischer, Schweitzer Engineering Laboratories, USA
Patrick Picher, Hydro-Québec (IREQ), Canada
Pierre Couture, Hydro-Québec (IREQ), Canada
Pierre Van Dyke, Hydro-Québec (IREQ), Canada
Rémi Tremblay, Hydro-Québec, Canada
Rick Spyker, AltaLink, Canada
Sébastien Poirier, Hydro-Québec (IREQ), Canada
Serge Montambault, Hydro-Québec (IREQ), Canada
Simon Prud'homme, Hydro-Québec, Canada
Steven Pai, BC Hydro, Canada
Sudhakar Cherukupalli, BC Hydro, Canada
Tarlochan Sidhu, University of Ontario Institute of Technology, Canada
Tatiana Guerrero, WSP, Canada
Xicai Zhao, NR Electric, China
Zibby Kieloch, Manitoba Hydro, Canada

WEEK-AT-A-GLANCE

Monday September 16, 2019	
7:00-17:30 Registration	
Technical visits to IREQ  	CIGRE Workshops
8:00 Departure 1 st technical visit	8:30-9:30 <i>B2.48 Experience with the mechanical performance of non-conventional conductors</i> , P. Van Dyke
9:00-12:00 First technical visit (capacity 48 people)	9:45-10:45 <i>B2.44 Coatings for protecting overhead power network equipment in Winter conditions</i> , M. Farzaneh et H. Gauthier
13:00 Departure 2 nd technical visit	11:00-12:00 <i>Asset management and its importance for electric power utilities</i> , D. Komljenovic
14:00-17:00 Second technical visit (capacity 48 people)	13:30-14:30 <i>C6 Impact of Distributed Energy Resources (DER) on transmission grid operations and control</i> , M. de Montigny 14:45-15:45 <i>C5 Regulation and market design barriers preventing to capture all the value from fast and high-locations-freedom energy storage</i> Kankar Bhattacharya (CA), Jarrad Wright (ZA) and Arnaud Banner (FR), supported by Anant Venkateswaran (US)
18:00-20:00 Welcome Reception	

Exhibitor Trade Show Opening Hours

Monday	18:00-20:00
Tuesday	9:00-20:00
Wednesday	9:00-16:30

Time		Tuesday September 17, 2019		
06:30	19:00	Registration		
06:45	08:00	Breakfast		
07:00	16:00	Speaker ready room		
08:00	08:10	Word of welcome		
08:10	08:30	Keynote speech – Innovation at the heart of power grid transformation Éric Martel, President and CEO of Hydro-Québec		
08:30	10:00	Business panel – Power grid transformation Marc Boucher, President of Hydro-Québec TransÉnergie Gaétan Thomas, President and CEO NB Power Mark Lauby, Senior vice president and chief reliability officer NERC Moderator: Denis Tremblay, President and CEO AIEQ		
10:00	10:30	Networking Break		
10:30	12:00	Session 1 (A2)	Session 2 (B4)	Session 3 (C6)
12:00	13:15	Lunch	Women in engineering	
13:15	14:30	Session 4 (B2)	Session 5 (B5)	Session 6 (C5)
14:30	15:00	Networking Break		
15:00	16:15	Session 7 (A3)	Session 8 (B4)	Session 9 (B5)
16:15	16:45	Networking Break		
16:45	17:45	Session 10 (B3)	Session 11 (A2)	Session 12 (C2)
17:45	19:00	Cocktail Reception		
19:00	22:00	Conference Banquet and presentation of the finalists Best Student Papers - Best NGN Papers		

Time		Wednesday September 18, 2019				
06:30	13:00	Registration				
06:45	08:00	Breakfast				
07:00	13:00	Speaker ready room				
08:00	08:15	AIEQ – Future direction Denis Tremblay, President and CEO AIEQ				
08:15	09:15	Sponsor Panel – Towards the energy system of the future				
09:15	09:45	Networking Break				
09:45	10:45	Session 13 (A2)	Session 14 (C2)	Session 15 (B4)		
10:45	11:15	Networking Break				
11:15	12:15	Session 16 (B4)	Session 17 (C2)	Session 18 (B3)		
12:15	13:45	Lunch	Next Generation Network luncheon			
13:45	15:00	Session 19 (C1)	Session 20 (B2)			
15:00	15:30	Networking Break				
15:30	16:30	Session 21 (B5)	Session 22 (A2)			
16:30	16:45	Networking Break				
16:45	17:15	Award Presentation of the Best Papers and Closing Session Award of the Best Student Paper – Award of the Best NGN Paper – Prize draws				
19:00	21:30	Next Generation Network (NGN) dinner				

Time		Thursday September 19, 2019		
08:00	12:00	Tutorial ABB	Tutorial Siemens	Tutorial GE

DETAILED AGENDA

Social Events

Welcome Reception

Monday September 16, 2019 | 18:00 – 20:00

Le Westin Montréal, Casual dress

Get the conference off to a great start by networking with your colleagues over a glass of wine and collecting your registration materials.

Cocktail Reception

Tuesday September 17, 2019 | 17:45 – 19:00

Le Westin Montréal, Business casual

Enjoy a beverage while networking with the exhibitors and your colleagues before the banquet.

Banquet

Tuesday September 17, 2019 | 19:00 – 22:00

Le Westin Montréal, Business casual

The conference banquet is an evening of fine dining and stimulating conversation, providing an opportunity to salute the work accomplished during the conference. Network with participants and enjoy the entertainment.

The finalists for the Best Student Paper Award and the Best NGN Paper Award will be presented during the banquet.

This recognition consists of a personalized certificate for each finalist.

Awards Presentation

Tuesday September 17, 2019 | 16:45 – 17:15

Le Westin Montréal, Business casual

In recognition of their outstanding contributions for the 2019 CIGRE Canada Conference, a Best Student Paper Award and a Best NGN Paper Award will be presented to the author(s) of a student and an NGN paper, based on the quality of the full paper and the presentation.

2019 CIGRE Canada Conference Best Student Paper Award

This award consists of a personalized certificate and a cash award in the amount of \$1,000.

2019 CIGRE Canada Conference Best NGN Paper Award

This award consists of a personalized certificate and a cash award in the amount of \$1,000.

Sponsored by CIGRE Canada



WIE Luncheon

Tuesday September 17, 2019 | 12:00 – 13:15

CIGRE Canada Women in Engineering is pleased to host a panel discussion during the WIE Luncheon:

Over the past 30 years there have been numerous initiatives attempting to increase the participation of women in engineering.

The concepts of inclusion and diversity, in addition to recognition of how engineering solutions can be improved when the design team better reflects society, are being discussed now more than ever by engineering students, professors, professionals, and the general public.

This session will consider where our influential panelists started their careers, where they are in their careers at present and what initiatives are being considered and, what their hopes are for the future including concepts that can be implemented to achieve gender parity within the engineering profession.

12:00	12:30	Lunch served to all in attendance at approximately 12:05	
12:30	12:38	Welcome from the moderator and introduction of panelists	Robyn Koropatnick, Vice President, Business Development, Teshmont Consultants LP
12:38	13:13	WIE Panel 'Past, Present and Future' Roundtable theme	Kathy Baig, President, Ordre des ingénieurs du Québec (OIQ) Nathalie Pilon, ABB Canada President Arielle Kadoch, Stantec Principal Sector Leader, Power T&D Canada East Moderator: Robyn Koropatnick, Vice President, Business Development, Teshmont Consultants LP
13:13	13:15	Closing remarks	Robyn Koropatnick, Vice President, Business Development, Teshmont Consultants LP

CIGRE Canada NGN

CIGRE Canada Luncheon

Wednesday September 18, 2019 | 12:00 – 13:15

12:00	12:10	Welcome	Aleks Modelewska, Business Development, Digital Engineering
12:10	12:20	Note from CIGRE Canada President	Mike Bartel, Vice President, Asset Management, Altalink
12:20	12:30	Note from CIGRE President	Rob Stephen, GM Master Specialist Technology Group, ESKOM <i>(Via Letter read by Aleks Modelewska, Digital Engineering)</i>
12:30	12:40	Ice breaker intro	Farhad Yahyaie, Senior Engineer, Power System Studies, Powertech Labs Ani Chopra, Lifecycle Maintenance EIT, Altalink Brendan Kelly, Smartwires Kurtis Martin Sturmey, Utility Project Lead, METSCO
12:40	13:15		Ice breakers

CIGRE Canada NGN Social

Wednesday September 18, 2019 | 18:00 – 20:00

18:00	18:10	Welcome	Aleks Modelewska, Business Development, Digital Engineering Farhad Yahyaie, Senior Engineer, Power System Studies, Powertech Labs Ani Chopra, Lifecycle Maintenance EIT, Altalink Brendan Kelly, Smartwires Kurtis Martin Sturmey, Utility Project Lead, METSCO
18:10	20:00	Mingling	

Technical Tour

Hydro-Québec's Research Institute - IREQ

Monday September 16, 2019

First visit : 8:00 – 12:00

Second visit : 13:00 – 17:00

Hydro-Québec's research institute, IREQ, is one of the largest integrated electrical research and testing centres in North America. Created in 1970, IREQ has developed large-scale expertise in electrical apparatus, network analysis and control, automation and measurement, materials, chemical and mechanical engineering, and applications of electricity. It has impressive facilities at its disposal: distribution tests lines, high-voltage laboratory, a power system study and simulation centre and an electrotechnology laboratory, as well as numerous specialized laboratories, notably in robotics, battery materials and mechanical engineering. It has also an extensive three-span mechanical test line to study vibration phenomena. Before you begin the tour of our facilities, a short presentation will give you an overview of Hydro-Québec's grid.

IREQ has facilities in Varennes, some 45 minutes from downtown Montréal.

Don't miss this great opportunity!



*For summary verification purposes, all visitors must provide at the moment of the registration to the visit the following information; those who fail to provide it will unfortunately not be able to attend the visit.

* Complete Name, Date of birth, Passport number, Country emitting the passport

CIGRE Workshops

B2.48 Experience with the mechanical performance of non-conventional conductors

Monday September 16, 2019 | 8:30 – 9:30

Presenter: Pierre Van Dyke, Hydro-Québec Research Institute (IREQ)

Bottlenecks in transmission and distribution grids are causing more and more precarious situations. Non-conventional conductor change may become an attractive option to increase the capacity. This can offer higher capacity without weight penalty and higher ampacity limits with limited or no structure changes. The use of high temperature conductors with high ampacity rating, small diameter (to stay below existing wind load limits), light weight and reduced sag characteristics can be attractive.

B2.44 Coatings for protecting overhead power network equipment in Winter Conditions

Monday September 16, 2019 | 9:45 – 10:45

Presenter: M. Farzaneh, Consultant , H. Gauthier, Hydro-Québec Research Institute (IREQ)

The application of superhydrophobic and glaciophobic coatings could offer a number of opportunities to improve the performance of power network equipment subjected to icing. This tutorial is based on the work of CIGRE Working Group B2.44 as reported in CIGRE Technical Brochure 631 entitled Coatings for Protecting Overhead Power Network Equipment in winter conditions. The presentation deals with state-of-the-art activities related to techniques for protecting power network equipment including insulators, ground wires and conductors under icing conditions.

Asset management and its importance for electric power utilities

Monday September 16, 2019 | 11:00 – 12:00

Presenter: D. Komljenovic, Hydro-Québec Research Institute (IREQ)

The tutorial presents the basic concept and overview of asset management and asset management system such as defined in ISO 5500x. Asset management is described and discussed in a proper context of operational and business complexity including associated challenges to this context. The presentation highlights the difference between notions of “Asset management” and “Managing assets”. Current developments and trends in this field are presented in both electrical power industry and elsewhere including potential benefits from implementing a structured asset management system. Some practical experience from industry is also described. Factors of success and potential traps are stressed.

C6 Impact of Distributed Energy Resources (DER) on transmission grid operations and control

Monday September 16, 2019 | 13:30 – 14:30

Presenter: M. de Montigny, Hydro-Québec Research Institute (IREQ)

In the context of the energy transition, Hydro-Québec must carry out impact studies of distributed energy resources (DER) on grid operations and control. Those studies require a tool capable of representing the behaviour of the operators and grid control systems in the context of network planning. The work done in the SIRE project for the integration of wind power is presented and serves as a basis for the development for a new DER impact assessment tool on Hydro-Québec transmission network.

C5 Regulation and market design barriers preventing to capture all the value from fast and high locations freedom energy storage

Monday September 16, 2019 | 14:45 – 15:45

Presenter: Kankar Bhattacharya (CA), Jarrad Wright (ZA) and Arnaud Banner (FR), supported by Anant Venkateswaran (US)

Tutorials

Thursday September 19, 2019 | 08:00 – 12:00

ABB Technical Tutorial

Innovations and best practices for implementing your digital transformation strategy

Summary:

ABB's latest technologies provide innovative solutions across the power value chain and help utilities to accelerate the digital transformation of power grids.

Traditional substations have always relied on copper cables to connect primary equipment like circuit breakers, conventional current and voltage transformers, and protection relays to control the electricity.

Now, digital technologies with modern sensors, communications and standards are driving the evolution of something new—digital substations.

Digital substations are a key element of next-generation grids and recent innovations provide a vast list of benefits, including digital communications through fiber-optic cables replacing copper, which can maximize efficiency, reliability and safety, while reducing cost, risk and environmental impact.

Primary equipment's as integrated digital solution such as a digitally enabled power transformers, enable remote monitoring and data analytics of its vital parameters in real time. Connected via the digital substation back to the enterprise level with an enterprise asset management and performance software opens the door for seamless end to end integration and gives the operational and planning folks a crystal clear view allowing them to drive operation and planning more efficient as decision making can be linked to broad and real-time data.

The global experience in going the digital path from different utilities is shared as well the motivation and experience of implementing a digital substation in Canada will be presented.

Attend this session to learn how utilities are leveraging digital substations to improve safety and reliability while providing a functional consolidation to lower costs and optimize resources.

Additionally get an overview and better understanding of today's technology and innovations supporting the digital transformation.

Agenda for Technical Workshop:

- Introduction - Current challenges and how digital transformation helps (benefits)
30 min - Kal Allam / Peter Rietmann
 - Example of utilities challenges
 - Examples of applying digitalization
 - Brownfield vs Greenfield
 - The digital building blocks (overview of current and future products)
90 min
 - Primary equipment / Digital Transformer
LucTousignant
 - Protection and automation
Peter Rietmann
 - Enterprise asset management solutions
Jay Jayaraman
 - Cyber security
Peter Rietmann
- Coffee break 30 min
- Digital Substation Experience - Implementation of Blackie Substation
30 min - Varun Chhibbar
 - Panel discussion / ask the experts
60 min - Robert Isbister, Peter Rietmann, Jay Jayarama

TECHNICAL SESSIONS

Tuesday September 17, 2019

Session 1 Room A	Transformers (A2)
(10:30 – 10:45)	CIGRE-106  Generator Failure Forensic Simulations Study, Lessons Learned Hesamaldin (Sam) Maleki, Dan Kell, Iftikhar Khan, Myles Godfrey Hatch Ltd. (Canada)
(10:45 – 11:00)	CIGRE-133  [FR] Évaluation d'état diélectrique et Analyse des causes profondes des défaillances des transformateurs de courant HT et THT  [EN] HV and EHV Current Transformer dielectric condition assessment and root cause analysis Diego M. Robalino ¹ , Ismail Güner ² ¹ Megger (USA), ² Hydro-Québec
(11:00 – 11:15)	CIGRE-117  Analysis of Short Circuit Withstand Capability of Power Transformers I. LAZARIEV JSC Ukrainian research, design and technological transformer institute (JSC "VIT") (Ukraine)
(11:15 – 11:30)	CIGRE-198  [FR] Étude de cas d'analyse de la réponse en fréquence (FRA) pour l'évaluation de l'intégrité d'un transformateur usagé suite à une réparation  [EN] Case study for assessing the integrity of a service-aged transformer repair using Frequency Response Analysis (FRA) R. S. A. FERREIRA ¹ , H. SIMARD ² , P. PICHER ³ , V. BEHJAT ¹ , I. FOFANA ¹ , H. EZZAIDI ¹ ¹ Research Chair on Aging Power Network Infrastructure (ViAHT), Université du Québec à Chicoutimi (UQAC) (Canada), ² Énergie Électrique Rio Tinto, Saguenay-Lac-Saint-Jean, ³ Institut de recherche d'Hydro-Québec (IREQ)
(11:30 – 11:45)	CIGRE-209  Web Applications for Transmission System Asset Health Monitoring Sunil Agarwal, P.K Srivastava, Sunil Kumar, Manoj Kumar, Abhishek Bhardwaj, Vikas Bishnoi Power Grid Corporation of India Limited (India)
(11:45 – 12:00)	CIGRE-160  [FR] Surveillance de l'état du système de refroidissement des transformateurs par l'utilisation de réseaux de neurones  [EN] Transformer cooling system monitoring using neural networks A. ZINFLOU, P. PICHER, L. VOULIGNY, A. MARCHAND Hydro-Québec (Canada)
Session 2 Room B	HVDC and Power Electronics (B4)
(10:30 – 10:45)	CIGRE-180  Increasing Transient Stability Limit by Nonlinear Damping Design Jinpeng Guo, Haihao Jiang, Xiaozhe Wang, Boon-teck Ooi McGill University (Canada)
(10:45 – 11:00)	CIGRE-183  The Research on the Key Equipment for 750kV Fixed Series Compensation in 3000m a.s.l. CHEN Yuanjun, ZHOU Qiwen, WANG Dechang, Gao Jian, Chen Wei, Zhang Daoxiong NR Electric Co., Ltd. (China)

Tuesday September 17, 2019

(11:00 – 11:15)	CIGRE-208  Voltage Source Converter (VSC) Operation at DC Lines close to AC Lines M. Weiland, E. Starschich, G. Ebner, R. Teixeira Pinto, M. Schmidt Siemens AG (Germany)
(11:15 – 11:30)	CIGRE-261  Influence of extreme low humidity on the dielectric strength of air insulation under critical design voltages L. Arevalo ¹ , D. Wu ¹ , O. Diaz ¹ , M. Larsson ² , C. Tornkvist ² ¹ ABB Power Grids – HVDC (Sweden), ² ABB Corporate Research
(11:30 – 11:45)	CIGRE-142  Sizing Study for a Hybrid Power Flow Controller – Comparison with the Nanjing UPFC J. Z. Bebic ¹ , Y. Dong ² , L. Pan ² , B. Wang ³ ¹ Hybrid Power Flow Controller Ltd. (Canada), ² Research Institute of NR Electric Co., Ltd., ³ NR Electric USA LLC
(11:45 – 12:00)	CIGRE-144  MULTI -FPGA SOLUTION FOR LARGE POWER SYSTEMS AND MICROGRIDS REAL TIME SIMULATION TEJKIRAN RANGINEEDI, SYED QASEEM Ali, AMINE YAMANE, LUC-ANDRE GREGOIRE, JEAN-NICOLAS PAQUIN, JEAN BELANGER OPAL-RT Technologies (Canada)

Session 3 Room C	Distribution Systems and Dispersed Generation (C6)
(10:30 – 10:45)	CIGRE-195  A DER Management System for Distributing Power among Discretely and Continuously Controlled Devices within DER group Chu Sun ¹ , Syed Qaseem Ali ² , Geza Joos ¹ , Francois Bouffard ¹ ¹ McGill University (Canada), ² OPAL-RT Technologies
(10:45 – 11:00)	CIGRE-202  The Energy Twin – A Solution for Techno-Economic Business Case Analysis of Microgrids & Distributed Energy Systems (DES) Bharatkumar Solanki, Alif Gilani Siemens Canada Limited (Canada)
(11:00 – 11:15)	CIGRE-228  Synchronous Generator Load Sharing Models for Diesel-Based Remote Systems JASON A. ZRUM, MICHAEL ROSS Yukon Research Centre – Yukon College (Canada)
(11:15 – 11:30)	CIGRE-230  MiGen Project – Empowering the transformation at the grid edge R. Abdullah ¹ , M. Lacroix ² ¹ Hydro Ottawa (Canada), ² eMcREY Solutions
(11:30 – 11:45)	CIGRE-239  Impact of Load Modelling Parameters on Motor Start simulation in The Alberta Electric System Ping-Kwan Keung ¹ , Sabbir Ahmed ¹ , Hamid Zareipour ² , Ali Reza Seifi ² , Edmond Chih ² , Amir Saman Hoshayrzaadeh ² ¹ Alberta Electric System Operator (AESO) (Canada), ² University of Calgary
(11:45 – 12:00)	CIGRE-161  Determination of Hot Spots in Gas Generators Using Brillouin Based Fiber Optic Distributed Sensor L. ZOU ¹ , O. SEZERMAN ¹ , C. SPENCER ² , G. DAILEY ³ ¹ OZ Optics Limited (Canada), ² Calpine Corporation, ³ QPS Photonics Inc

Tuesday September 17, 2019

Session 4
Room A
Overhead Lines (B2)

(13:15 – 13:30)

CIGRE-187

☐ Design optimization of a 138 kV transmission line with optical phase conductors

 RICHARD MARANDA, GUILLAUME VACHON, BASSEM KAABIA
 BBA Inc. (Canada)

(13:30 – 13:45)

CIGRE-194

☐ [FR] Amélioration de la durée de vie en fatigue du conducteur en utilisant une pince de suspension avec des élastomères coniques

☐ [EN] Improved conductor endurance limit by using a suspension clamp with conical elastomers

 J. PARADIS, P. VAN DYKE
 Institut de Recherche d'Hydro-Québec (Canada)

(13:45 – 14:00)

CIGRE-114

☐ Management Insulator contamination problems, mitigation methods and innovative predictive maintenance of overhead lines.

 JM GEORGE
 Sediver (France)

(14:00 – 14:15)

CIGRE-199

☐ Transmission Line Route Refinement with Simultaneous Geomorphological Assessment

 Sébastien Paradis, Line Bariteau, Claude Roy
 BBA Inc. (Canada)

(14:15 – 14:30)

CIGRE-232

☐ [FR] Validation d'un conducteur AACSR avec fils trapézoïdaux pour une traversée de rivière

☐ [EN] Validation of an AACSR conductor with trapezoidal wires for a river crossing

 P. VAN DYKE¹, S. PRUD'HOMME², J. PARADIS¹
¹Institut de Recherche d'Hydro-Québec (Canada), ²Hydro-Québec

Session 5
Room B
Protection and Automation (B5)

(13:15 – 13:30)

CIGRE-193

☐ New Methodologies for Accurate Modelling and Simulation of Advanced Telecommunication-Based Protection Schemes in a Software Environment

 Hadi Khani, Daniyal Qureshi, Saman Alaeedini, Ishwarjot Anand
 Quanta Technology (Canada)

(13:30 – 13:45)

CIGRE-105

☐ A Station Domain Islanding Detection Method Based on Topology Analysis

 Hua Xiujuan, Jiang Miao, Xu Guangfu
 NR Electric Co., Ltd. (China)

(13:45 – 14:00)

CIGRE-104

☐ AI-Based Islanding Detection for Utilities and Industrials

 K. BAVISETTI¹, D. CRUDELE², J. FRANKLIN³, S. GILL¹, M. JENSEN⁴, K. VU¹
¹ABB (USA), ²NYSERDA, ³National Grid, ⁴PG&E

(14:00 – 14:15)

CIGRE-108

☐ The Identification of Transmission Line Overload and Fault Based on Ucosφ

 Wang xingguo¹, Zhou Zexin¹, Liu Huanzhang², Du dingxiang¹
¹China Electric Power Research Institute (China), ²Central China Grid Company Limited

(14:15 – 14:30)

CIGRE-244

☐ The AURORA vulnerability: The sword of Damocles over the heads of rotating machines

Marc Potvin

BBA Inc. (Canada)

Tuesday September 17, 2019

Session 6
Room C

(13:15 – 13:30)

CIGRE-135

The fundamental evaluation of the methodology of constrained connection for Distributed Generation for procuring flexibility in European countries –lessons for Japan-

K. Furusawa
 Central Research Institute of Electric Power Industry (Japan)

(13:30 – 13:45)

CIGRE-140

Generation Connection Process - North American vs Australian Experience

M. HEIDARI, J. JIANG, J. TAILOR, T. ABDEL-GALIL
 SNC Lavalin Inc (Canada)

(13:45 – 14:00)

CIGRE-186

Challenges Faced and Measures Adopted for RE Integration in Indian Power system

P.K. Agarwal, S.K. Jain
 Power System Operation Corporation Ltd. (India)

(14:00 – 14:15)

CIGRE-217

Energy Storage and Ancillary Services Markets in North America

Hisham Alharbi, Kankar Bhattacharya
 University of Waterloo (Canada)

(14:15 – 14:30)

CIGRE-240

Demand Response Services in Electricity Markets of US and Canada

NITIN PADMANABHAN¹, MOHAMED AHMED², KANKAR BHATTACHARYA¹

¹ECE Department, University of Waterloo (Canada), ²Independent Electricity System Operator

Session 7
Room A

(15:00 – 15:15)

CIGRE-112

[FR] Réseau de transport électrique intelligent formé de lignes de transport intelligentes et d'un réseau indépendant et redondant de fibres optiques

[EN] Smart Transmission Grid Based on Smart Power Lines with Independent and Redundant Optical Fiber Network
 Pierre Couture
 Hydro-Québec (Canada)

(15:15 – 15:30)

CIGRE-175

A Station Service Voltage Transformer Designed and Tested to Withstand a Severe Internal Arc Fault

S. Brodeur¹, H. Dinh²

¹ABB Inc., Transformers (Canada), ²ABB Inc., High Voltage Products

(15:30 – 15:45)

CIGRE-201

Mitigation of inrush and outrush currents in capacitor bank switching using dry type air core reactors

M. Goulkhan D. Caverly, M. Sharp
 Trench Ltd (Canada)

(15:45 – 16:00)

CIGRE-231

[FR] Fabrication de revêtements superhydrophobes durables pour les isolateurs en verre

[EN] Fabrication of a durable superhydrophobic coating for high voltage glass insulators

A. Allahdini¹, G. Momen¹, R. Jafari¹, H. Gauthier²

¹Université du Québec à Chicoutimi (Canada), ²Institut de recherche d'Hydro-Québec

Tuesday September 17, 2019

(16:00 – 16:15)

CIGRE-248

- Connecting Controlled Switching Devices in Power Plants to Analytics Tools in Sorgenia's Operations Centre to Increase the Service Life of Apparatuses
 V. BALVET¹, V. CHECOLA²
¹VIZIMAX Inc. (Canada), ²SORGENIA S.p.A.

**Session 8
Room B**

(15:00 – 15:15)

CIGRE-213

- Active Filtering of harmonic voltages or currents utilizing a MMC STATCOM-Design Aspects and Performance Experience
 T. Schlegl, Dr. G. Pilz
 Siemens AG (Germany)

(15:15 – 15:30)

CIGRE-223

- HVDC O&M Strategy
 D. KAVANAGH¹, C. MADSEN², D. KELL³
¹Nalcor Energy (Canada), ²ATCO Electricity Global Business Unit, ³Hatch

(15:30 – 15:45)

CIGRE-225

- Research on Key Technical Parameters of Main Equipments for UHV Converter Station in High Altitude Area
 Zhang He, Wu Fangjie, Shen Xiaolin, Yue Bo, Yang yiming, Wang yaoxuan
 State Grid Economic and Technological Research Institute Co., Ltd. (China)

(15:45 – 16:00)

CIGRE-227

- A COORDINATION CONTROL BETWEEN SVC AND BUS/SHUNT REACTORS
 LOKESH CHUNDAWAT, ALOK SHARMA
 Power Grid Corporation of India Ltd (India)

(16:00 – 16:15)

CIGRE-189

- Method for Suppressing Current Spike in Wide Input Flyback converter
 XIAO Yuwei¹, LIU Xuandong¹, SUN Wei², WU Bin¹
¹School of Electrical Engineering, Xi'an Jiaotong University (China), ²Wuyi University

**Session 9
Room C**
Protection and Automation (B5)

(15:00 – 15:15)

CIGRE-101

- Study of Distributed Grounding Line Selection Application Based on GOOSE
 Jiang Miao, Shi Yong, Dong Kaida, Hou Wei, Li Yuqi
 NR Electric Co., Ltd. (China)

(15:15 – 15:30)

CIGRE-181

- Real-Time Dynamic Protection Zone Determination for Interconnected Power Systems using Network Theory Principles
 A.C. ADEWOLE¹, A.D. RAJAPAKSE¹, D. OUELLETTE², P. FORSYTH²
¹University of Manitoba (Canada), ²RTDS Technologies Inc.

(15:30 – 15:45)

CIGRE-129

- Shunt Reactor with Auxiliary Winding System Inter-turn Protection Based on Zero Sequence Differential Current
 GUO Yarong¹, WANG Xingguo¹, LIU Huanzhang², LIU Dan³
¹State Key Laboratory of Power Grid Safety and Energy Conservation (China Electric Power Research Institute) (China)
²Central China Grid Company, ³China National Electric Power Dispatch and Control Center

(15:45 – 16:00)

CIGRE-197

- Con Edison Transmission System Reliability Model
 R. Hasan¹, M. Viele¹, D. J. Allen²
¹Con Edison (USA), ²The Risk Research Group

Tuesday September 17, 2019

(16:00 – 16:15)

CIGRE-242

Comprehensive Motor Condition Monitoring Integrated in Advanced Protection Relays – A real case study

Umar Khan¹, Mital Kanabar¹, Mathieu Harvey², Carlos Oliveira³

¹GE Renewable Energy (Canada), ²Arcelor Mittal Mines, ³Trelec Inc.

**Session 10
Room A**

(16:45 – 17:00)

CIGRE-138

[FR] Prise de décisions en gestion des actifs des utilités électriques en tenant compte des risques

[EN] Risk-Informed Decision-Making in Asset Management of Electrical Utilities

Dragan Komljenovic¹, Darragi Messaoudi², Pierre Larivière², Steve Caron², Ramzi Chahine²

¹IREQ (Canada), ²Hydro-Québec TransÉnergie

(17:00 – 17:15)

CIGRE-185

Recognition of the benefits by the use of Transformers and Reactors immersed in insulating fluid with high fire point (K Class): the case of Fire Department of Sao Paulo state in Brazil

ROBERTO IGNACIO DA SILVA, ALEXANDRE COELHO

Cargill (Brazil)

(17:15 – 17:30)

CIGRE-190

[FR] Évolution numérique des systèmes de commande et de protection d'un poste électrique conformément à la norme 61850 ; Retour d'expérience d'un projet pilote ayant été pré-validé sur réplique avant un son installation

[EN] DIGITAL TRANSFORMATION OF SUBSTATION THROUGH IEC61850 STANDARD: EXPERIENCE DEPLOYING DIGITAL SUBSTATION PILOT THROUGH DIGITAL SUBSTATION REPLICA

Saurabh Talwar¹, Eric Loiselle², David Lambert², William Boutin², Michel Lavallee², Felipe Sarubbi¹

¹Siemens Canada Limited (Canada), ²Hydro-Québec

(17:30 – 17:45)

CIGRE-158

Early Fault Detection on Energized Substation Equipment

C. JEAN, R. WEISER

Positron Inc. (Canada)

**Session 11
Room B**

(16:45 – 17:00)

CIGRE-157

Bypassing GSU transformers in case of emergencies or maintenance

E. GOMEZ HENNIG¹, K. KAINEDER², R. MAYER², E. SCHWEIGER³

¹Siemens Canada Ltd. (Canada), ²Siemens AG (Austria), ³Siemens AG (Germany)

(17:00 – 17:15)

CIGRE-219

Use of GIS Tools and Space Technologies for Optimal Transmission Line Routing and Asset Mapping

B. N. De. Bhowmick, V. K. Bhaskar, S. B. R. Rao, Pradeep Patil, Pradeep Singh Chauhan, Shalini Raj

Power Grid Corporation of India Limited (India)

(17:15 – 17:30)

CIGRE-166

Improved Jiles-Atherton Hysteresis Model for Converter Transformer Controlled Switching Assessment in Nelson River Bipole III HVDC System

C. Fang¹, A. D. Rajapakse², R. Jayasinghe³

¹Manitoba Hydro (Canada), ²University of Manitoba, ³Manitoba Hydro International

(17:30 – 17:45)

CIGRE-167

Development of transmission voltage class, reconnectable 230 x 115 kV mobile transformers for improved reliability of power delivery

T. KALICKI¹, W. ZIOMEK², K. VIJAYAN²

¹Hydro One Inc. (Canada), ²PTI Transformers LP

Tuesday September 17, 2019

Session 12
Room C

(16:45 – 17:00)

System Operation and Control (C2)**CIGRE-111** **Power System Stabilizer Tuning with Presence of Torsional Oscillations**A. MOSHREF¹, H. TAGOURTI¹, N. WOOSTER¹, R. HARRISON², T. RICIOOPPO²¹BBA Engineering Ltd. (Canada), ²ATCO

(17:00 – 17:15)

CIGRE-118 **Simulation and Analysis of Resilient Power Systems in PJM**

N. TACKA, A. GIACOMONI, S. BENNER, R. HILDERBRAND

PJM Interconnection (USA)

(17:15 – 17:30)

CIGRE-146 **Normalised Voltage Instability Sensitivity Index: A New Concept for Monitoring Voltage Stability in the Control Centre**V.N. SEWDIEN¹, R. PREECE², J.L. RUEDA TORRES³¹TenneT TSO B.V. (Netherlands), ²The University of Manchester, ³TU Delft

(17:30 – 17:45)

CIGRE-249 **PV Solar Farm Control as STATCOM (PV-STATCOM) for Alleviating Subsynchronous Oscillations**

R. Salehi, R. K. Varma

The University of Western Ontario (Canada)

Wednesday September 18, 2019

Session 13
Room A
Transformers (A2)

(9:45 – 10:00)

CIGRE-148
 **The Value of Performing Power Factor Sweep Measurements on Bushings**

 BRANDON DUPUIS, LOGAN MERRILL
 OMICRON electronics Corp. (USA)

(10:00 – 10:15)

CIGRE-120
 **Torsion of Transformer Windings Under Short Circuit**

 I. LAZARIEV
 JSC Ukrainian research, design and technological transformer institute (JSC "VIT") (Ukraine)

(10:15 – 10:30)

CIGRE-134
 **[FR] Méthodologie d'évaluation d'état des transformateurs de puissance**
 **[EN] Condition Assessment Methodology for Power Transformers**

 Brian Sparling¹, Ismail Güner²
¹Dynamic Ratings (Canada), ²Hydro-Québec

(10:30 – 10:45)

CIGRE-229
 **[FR] Étude préliminaire de fluide à base d'ester pour application dans des transformateurs exploités en région climatique froide**
 **[EN] Preliminary Study of Ester-based Fluid for Application in Transformers Serving in Cold Climatic Regions**

 U. Mohan Rao¹, I. Fofana¹, T. Jaya¹, E. M. Rodriguez Celis², J. Jalbert², B. Noirhomme², P. Picher²
¹Research Chair on the Aging of Power Network Infrastructure (ViAHT), Université du Québec à Chicoutimi (Canada)

²Institut de recherche d'Hydro-Québec (IREQ)

Session 14
Room B
System Operation and Control (C2)

(9:45 – 10:00)

CIGRE-192
 **Investigating the Choice of Load Model and its Parameters for Different Voltage Response Scenarios in Large Power Systems**

 A. S. Hoshyarzadeh¹, H. Zareipour¹, P. Keung², S. A. Ahmed²
¹University of Calgary (Canada), ²Alberta Electric System Operator

(10:00 – 10:15)

CIGRE-200
 **Active Power Priority Vs. Reactive Power Priority Operating Modes in Solar Plants**

 M. DARYABAK, M. RAHMATIAN, K. KABIRI, K. CHILUKURI
 PSC Consulting (Canada)

(10:15 – 10:30)

CIGRE-246
 **Dynamic Interactions between a large PV plant and a STATCOM**

 Sibin Mohan, Rajiv K. Varma
 The University of Western Ontario (Canada)

(10:30 – 10:45)

CIGRE-188
 **Challenges Faced and Lessons Learnt in Development of Indian Electricity Markets and Regulations**

S.K. Jain, P.K. Agarwal

Power System Operation Corporation Ltd. (India)

Wednesday September 18, 2019

Session 15
Room C

(9:45 – 10:00)

CIGRE-163
Operational Experience of Essex STATCOM after Refurbishment

 J. BURROUGHS¹, J. Hu², B. Bisewski², Chris Root¹
¹Vermont Electric Power Co. Inc (USA), ²RBJ Engineering

(10:00 – 10:15)

CIGRE-165
Design Validation and Field-Testing Experience of Linear Shore Line Grounding Electrodes for Reliable Operation of HVDC Links

A. DARIANI

SNC LAVALIN (Canada)

(10:15 – 10:30)

CIGRE-179
A Complete Average Value Model of Modular Multilevel Converter

 Jinling Qi¹, Haihao Jiang², Weixing Li¹, Boon-Teck Ooi²
¹Harbin Institute of Technology (China), ²McGill University

(10:30 – 10:45)

CIGRE-260
Lifecycle Management for HVDC Systems

ERIK JANSSON, URBAN ELGQVIST

ABB (Sweden)

Session 16
Room A

(11:15 – 11:30)

CIGRE-102
System-Based Technique to Evaluate the Risk of Self-Excitation of Synchronous Machines

Sameh K. Kodsi, Thiromi Rajapakse, Jun Tan

Teshmont Consultants LP (Canada)

(11:30 – 11:45)

CIGRE-116
The Design of Control and Protection System of 150 MVar SVC in Nuevo Vallarta Substation in Mexico

Xin Huang, DaoXiong Zhang, Chihhan Chen, Haiying Li, Qiwen Zhou, Gang Du

NR Electric Co., Ltd. (China)

(11:45 – 12:00)

CIGRE-137
[FR] Améliorations aux protections des filtres c.a. des convertisseurs CCHT en utilisant un calcul d'impédance
[EN] Upgrade to HVDC AC Filters Protections – Using Impedance Calculation

P.-A. Chiasson, S. Tremblay

Hydro-Québec (Canada)

(12:00 – 12:15)

CIGRE-122
[FR] A Simplified Practical Relation of Tap-Changer Control Mode Upon HVDC Valve Power Loss and its Engineering Application

Zhongyuan Zhao, Bin Wang

NR Electric Company Ltd. (China)

Wednesday September 18, 2019

Session 17
Room B

(11:15 – 11:30)

CIGRE-207
Paradigm Shift in Operational Philosophy of POWERGRID

 SUNIL AGRAWAL, P.K. SRIVASTAVA, SUNIL KUMAR, MANOJ KUMAR, VIKAS BISHNOI, ABHISHEK BHARDWAJ
 Power Grid Corporation of India Limited (India)

(11:30 – 11:45)

CIGRE-218
Reduction of CLPU Overload through Active Load Management

 S. DZELETOVIC, F. BOUFFARD, G. JOOS
 McGill University (Canada)

(11:45 – 12:00)

CIGRE-233
Application of Small Signal Analyses in Model Validation Studies

 F. YAHYAIE, P. ZADKHAST
 Powertech Labs Inc. (Canada)

(12:00 – 12:15)

CIGRE-247
A Novel Combined Reactive Power-based Frequency and Power Oscillation Damping Control by PV-STATCOMs

 M. Akbari, R. K. Varma
 The University of Western Ontario (Canada)

Session 18
Room C

(11:15 – 11:30)

CIGRE-196
Multi-Feeder Protection Methodology and New Product Design for Distribution Substations

 Kamyar Moghadam¹, Joshua Kuchison², Rainer Goblirsch³
¹Siemens Canada Limited (Canada), ²EPCOR Transmission, ³Siemens AG

(11:30 – 11:45)

CIGRE-152
Reliability and Cost-Effectiveness Analysis of Various HV Substation Configurations

 A Boričić, D Bhatt, P Westerlund
 KTH Royal Institute of Technology (Sweden)

(11:45 – 12:00)

CIGRE-153
Harmonic Resonance phenomena in lightly loaded MV network

 Mohammed Bin Jarsh¹, Surendra S. Chhajta², Jayraj Peter Prasad²
¹Department of Energy (United Arab Emirates), ²Abu Dhabi Transmission and Despatch Company (TRANSCO)

(12:00 – 12:15)

CIGRE-226
Substation Anomaly Detection System – A Substation & Distribution Network Cybersecurity Early Warning System

 Eric Hawthorne¹, Moein Manbachi¹, Alif Gilani²
¹British Columbia Institute of Technology (BCIT) (Canada), ²Siemens Canada Limited

Wednesday September 18, 2019

Session 19
Room A

(13:45 – 14:00)

System Development and Economics (C1)
CIGRE-151
Reactive Power Planning Strategy for the BC Hydro Transmission System

 YANSONG LENG, PAUL HORAN, MING ZOU, WAH SHUM
 BC Hydro (Canada)

(14:00 – 14:15)

CIGRE-176
[FR] Élaboration d'un système d'aide à la décision pour la gestion des actifs à TransÉnergie
[EN] Development of a decision support system for asset management at TransÉnergie
 A. Côté, D. Messaoudi, D. Komljenovic, S. Alarie, O. Blancke, J.-F. Boudreau, M. Gaha, E. Truchon, S. Pelletier
 Hydro-Québec (Canada)

(14:15 – 14:30)

CIGRE-238
Effects of Future Uncertainty on Present-day Asset Management

 K. MARTIN-STURMEY, A. ALFALAHI, A. BAKULEV
 METSCO Energy Solutions (Canada)

(14:30 – 14:45)

CIGRE-168
Implementation Experience of URTDSM Project in Indian Power System

 P.K. Agarwal, Rajkumar Anumasula, Chandan Kumar
 Power System Operation Corporation Limited (India)

(14:45 – 15:00)

CIGRE-236
Optimal Energy Management and Storage Sizing for Electric Vehicles

 A. DESHPANDE, J. TAYLOR
 University of Toronto (Canada)

Session 20
Room B

(13:45 – 14:00)

CIGRE-220
Transformation of a Large Diameter Monopole to a Pinned Support Guyed Tower

 Pierre-Luc Massé, Richard Maranda, Alireza Aboutalebi
 BBA Inc. (Canada)

(14:00 – 14:15)

CIGRE-113
Condition Assessment and Reliability Analysis of Porcelain and Toughened Glass Cap and Pin Insulators

 C. BONILLA, H. LI
 Powertech Labs. Inc. (Canada)

(14:15 – 14:30)

CIGRE-214
Steel foundations design optimization of a 138 kV transmission line

 MAXIME SANSFAÇON¹, RICHARD MARANDA², GUILLAUME VACHON²
¹EMS Ingénierie (Canada), ²BBA Inc.

(14:30 – 14:45)

CIGRE-235
Line Rating Optimisation with Numerical Weather Models: the ALiRA Project

 R. SUNDERLAND, G. LILJEBAKK, J. PARR, D.J. CANNON, F.G. BRAGLIA
 Digital Engineering Ltd (United Kingdom)

(14:45 – 15:00)

CIGRE-203
Field Validation of Various Line Rating Methods on a 138 kV Transmission Line in British Columbia

 M. L. Lu, C. Singh, R. Barone, K. Zhang, M. Guite, D. Chakrabarti
 BC Hydro Power & Authority (Canada)

Wednesday September 18, 2019

Session 21
Room A

(15:30 – 15:45)

CIGRE-139

[FR] Unité Mobile : une nouvelle approche de remplacement d'un système de commande et protection dans une installation existante
 [EN] Mobile unit: A new approach to modernize the protection and control systems in an existing substation
 J-S LABBÉE
 Hydro-Québec (Canada)

(15:45 – 16:00)

CIGRE-159

Implementation and Testing of a Flicker Meter Using IEC 61850-9-2 Sampled Values
 J. WIJEKOON¹, A.D. RAJAPAKSE¹, N. PERERA², C. ADEWOLE¹
¹University of Manitoba (Canada), ²ERLPhase Power Technologies Ltd

(16:00 – 16:15)

CIGRE-178

Secured Substation Protection & Automation IED Firmware Management
 ANCA CIORACA, MITAL KANABAR
 GE Grid Solutions (Canada)

(16:15 – 16:30)

CIGRE-128

Research and Application of Protection Principle of 300Mvar Class New Synchronous Condenser
 Yaoyao Ji, Huimin Wang, Guang Wang, Zigang Guo, Kai Wang, Jun Chen
 NR Electric Co., Ltd. (China)

Session 22
Room B

(15:30 – 15:45)

CIGRE-177

Assessing Water Content and Vibration from Dynamic Measurement in Transformer
 S. Akré¹, V. Behjat¹, P. Kung², I. Fofana¹
¹Research Chair on the Aging of Power Network Infrastructure (ViAHT), UQAC (Canada), ²QPS Photonics

(15:45 – 16:00)

CIGRE-184

Ten Years of Experience with Natural Ester Dielectric Fluid in 245 kV: Shunt Reactor of Vilhena Substation - Eletronortheast
 ROBERTO IGNACIO DA SILVA¹, IRAN PRADO ARANTES², ITO CAPINOS³, LUCAS DE OLIVEIRA¹, MAURÍCIO A. DE LIMA², GERALDO L. NICOLA⁴
¹Cargill (Brazil), ²Eletronortheast, ³GE, ⁴Consultant

(16:00 – 16:15)

CIGRE-191

Converter Transformer Cold Starts: Specification Nuances and Operational Impacts
 C. MADSEN¹, B. KORBUTIAK¹, L. BENOIT¹, L. NEUMANN¹, M. MIELKE¹, T. THOMPSON², K. WALKER³
¹ATCO Electricity Global Business Unit (Canada), ²Nalcor Energy, ³Hatch

(16:15 – 16:30)

CIGRE-221

Magnetic and Thermal Impact of GIC on Power Transformers: A Case Study
 TR. Girgis¹, M. Saad², E. teNyenhuis², C. Clark³
¹ABB Inc. (USA), ²ABB Inc. (Canada), ³Altalink (Canada)

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■ Study of Distributed Grounding Line Selection Application Based on GOOSE

Jiang Miao, Shi Yong, Dong Kaida, Hou Wei, Li Yuqi
 NR Electric Co., Ltd. (China)

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■ System-Based Technique to Evaluate the Risk of Self-Excitation of Synchronous Machines

Sameh K. Kodsi, Thiromi Rajapakse, Jun Tan
 Teshmont Consultants LP (Canada)

CIGRE-104
■ AI-Based Islanding Detection for Utilities and Industrials

K. BAVISETTI¹, D. CRUDELE², J. FRANKLIN³, S. GILL¹,
 M. JENSEN⁴, K. VU¹

¹ABB (USA)

²NYSERDA

³National Grid

⁴PG&E

CIGRE-105
■ A Station Domain Islanding Detection Method Based on Topology Analysis

Hua Xiujuan, Jiang Miao, Xu Guangfu
 NR Electric Co., Ltd. (China)

CIGRE-106
■ Generator Failure Forensic Simulations Study, Lessons Learned

Hesamaldin (Sam) Maleki, Dan Kell, Iftikhar Khan, Myles Godfrey
 Hatch Ltd. (Canada)

CIGRE-108
■ The Identification of Transmission Line Overload and Fault Based on Ucosφ

Wang xingguo¹, Zhou Zexin¹, Liu Huanzhang², Du dingxiang¹

¹China Electric Power Research Institute (China)

²Central China Grid Company Limited

CIGRE-111
■ Power System Stabilizer Tuning with Presence of Torsional Oscillations

A. MOSHREF¹, H. TAGOURTI¹, N. WOOSTER¹, R. HARRISON²,
 T. RICCIOPPO²

¹BBA Engineering Ltd. (Canada)

²ATCO

CIGRE-112
■ [FR] Réseau de transport électrique intelligent formé de lignes de transport intelligentes et d'un réseau indépendant et redondant de fibres optiques
■ [EN] Smart Transmission Grid Based on Smart Power Lines with Independent and Redundant Optical Fiber Network

Pierre Couture

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■ Condition Assessment and Reliability Analysis of Porcelain and Toughened Glass Cap and Pin Insulators

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■ Management Insulator contamination problems, mitigation methods and innovative predictive maintenance of overhead lines.

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■ The Design of Control and Protection System of 150 MVAr SVC in Nuevo Vallarta Substation in Mexico

Xin Huang, DaoXiong Zhang, Chihhan Chen, Haiying Li, Qiwen Zhou, Gang Du
 NR Electric Co., Ltd. (China)

CIGRE-117
■ Analysis of Short Circuit Withstand Capability of Power Transformers

I. LAZARIEV
 JSC Ukrainian research, design and technological transformer institute (JSC "VIT") (Ukraine)

CIGRE-118
■ Simulation and Analysis of Resilient Power Systems in PJM

N. TACKA, A. GIACOMONI, S. BENNER, R. HILDERBRAND
 PJM Interconnection (USA)

CIGRE-120
■ Torsion of Transformer Windings Under Short Circuit

I. LAZARIEV
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■ A Simplified Practical Relation of Tap-Changer Control Mode Upon HVDC Valve Power Loss and its Engineering Application

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CIGRE-129

■ Shunt Reactor with Auxiliary Winding System Inter-turn Protection Based on Zero Sequence Differential Current

GUO Yarong¹, WANG Xingguo¹, LIU Huanzhang², LIU Dan³

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■ [FR] Évaluation d'état diélectrique et Analyse des causes profondes des défaillances des transformateurs de courant HT et THT

■ [EN] HV and EHV Current Transformer dielectric condition assessment and root cause analysis

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■ [FR] Méthodologie d'évaluation d'état des transformateurs de puissance

■ [EN] Condition Assessment Methodology for Power Transformers

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■ The fundamental evaluation of the methodology of constrained connection for Distributed Generation for procuring flexibility in European countries –lessons for Japan-

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■ [FR] Améliorations aux protections des filtres c.a. des convertisseurs CCHT en utilisant un calcul d'impédance

■ [EN] Upgrade to HVDC AC Filters Protections – Using Impedance Calculation

P.-A. Chiasson, S. Tremblay

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■ [FR] Prise de décisions en gestion des actifs des utilités électriques en tenant compte des risques

■ [EN] Risk-Informed Decision-Making in Asset Management of Electrical Utilities

Dragan Komljenovic¹, Darragi Messaoudi², Pierre Larivière², Steve Caron², Ramzi Chahine²

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²Hydro-Québec TransÉnergie

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■ [FR] Unité Mobile : une nouvelle approche de remplacement d'un système de commande et protection dans une installation existante

■ [EN] Mobile unit: A new approach to modernize the protection and control systems in an existing substation

J-S LABBÉE

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■ Generation Connection Process - North American vs Australian Experience

M. HEIDARI, J. JIANG, J. TAILOR, T. ABDEL-GALIL
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■ Sizing Study for a Hybrid Power Flow Controller – Comparison with the Nanjing UPFC

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■ MULTI -FPGA SOLUTION FOR LARGE POWER SYSTEMS AND MICROGRIDS REAL TIME SIMULATION

TEKIRAN RANGINEEDI, SYED QASEEM Ali, AMINE YAMANE, LUC-ANDRE GREGOIRE, JEAN-NICOLAS PAQUIN, JEAN BELANGER

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■ Normalised Voltage Instability Sensitivity Index: A New Concept for Monitoring Voltage Stability in the Control Centre

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■ The Value of Performing Power Factor Sweep Measurements on Bushings

BRANDON DUPUIS, LOGAN MERRILL

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■ Reactive Power Planning Strategy for the BC Hydro Transmission System

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■ Reliability and Cost-Effectiveness Analysis of Various HV Substation Configurations

A Boričić, D Bhatt, P Westerlund

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■ Harmonic Resonance phenomena in lightly loaded MV network

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■ Bypassing GSU transformers in case of emergencies or maintenance

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³Siemens AG (Germany)

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■ Early Fault Detection on Energized Substation Equipment

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■ Implementation and Testing of a Flicker Meter Using IEC 61850-9-2 Sampled Values

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■ [FR] Surveillance de l'état du système de refroidissement des transformateurs par l'utilisation de réseaux de neurones

■ [EN] Transformer cooling system monitoring using neural networks

A. ZINFLOU, P. PICHER, L. VOULIGNY, A. MARCHAND

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■ Determination of Hot Spots in Gas Generators Using Brillouin Based Fiber Optic Distributed Sensor

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²Calpine Corporation

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■ Operational Experience of Essex STATCOM after Refurbishment

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²RBJ Engineering

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■ Design Validation and Field-Testing Experience of Linear Shore Line Grounding Electrodes for Reliable Operation of HVDC Links

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SNC LAVALIN (Canada)

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■ Improved Jiles-Atherton Hysteresis Model for Converter Transformer Controlled Switching Assessment in Nelson River Bipole III HVDC System

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²University of Manitoba

³Manitoba Hydro International

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■ Development of transmission voltage class, reconnectable 230 x 115 kV mobile transformers for improved reliability of power delivery

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²PTI Transformers LP

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■ Implementation Experience of URTDSM Project in Indian Power System

P.K. Agarwal, Rajkumar Anumasula, Chandan Kumar
Power System Operation Corporation Limited (India)

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■ A Station Service Voltage Transformer Designed and Tested to Withstand a Severe Internal Arc Fault

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¹ABB Inc., Transformers (Canada)

²ABB Inc., High Voltage Products

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■ [FR] Élaboration d'un système d'aide à la décision pour la gestion des actifs à TransÉnergie

■ [EN] Development of a decision support system for asset management at TransÉnergie

A. Côté, D. Messaoudi, D. Komljenovic, S. Alarie, O. Blancke,
 J.-F. Boudreau, M. Gaha, E. Truchon, S. Pelletier
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■ Assessing Water Content and Vibration from Dynamic Measurement in Transformer

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■ Secured Substation Protection & Automation IED Firmware Management

ANCA CIORACA, MITAL KANABAR

GE Grid Solutions (Canada)

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■ A Complete Average Value Model of Modular Multilevel Converter

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²McGill University

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■ Increasing Transient Stability Limit by Nonlinear Damping Design

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■ Real-Time Dynamic Protection Zone Determination for Interconnected Power Systems using Network Theory Principles

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CHEN Yuanjun, ZHOU Qiwen, WANG Dechang, Gao Jian,
Chen Wei, Zhang Daoxiong
NR Electric Co., Ltd. (China)

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■ Ten Years of Experience with Natural Ester Dielectric Fluid in 245 kV: Shunt Reactor of Vilhena Substation - Eletronorte

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ITO CAPINOS³, LUCAS DE OLIVEIRA¹, MAURÍCIO A. DE LIMA²,
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³GE
⁴Consultant

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ROBERTO IGNACIO DA SILVA, ALEXANDRE COELHO
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Power System Operation Corporation Ltd. (India)

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■ Design optimization of a 138 kV transmission line with optical phase conductors

RICHARD MARANDA, GUILLAUME VACHON, BASSEM KAABIA
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■ Challenges Faced and Lessons Learnt in Development of Indian Electricity Markets and Regulations

S.K. Jain, P.K. Agarwal
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■ Method for Suppressing Current Spike in Wide Input Flyback converter

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²Wuyi University

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■ [FR] Évolution numérique des systèmes de commande et de protection d'un poste électrique conformément à la norme 61850 ; Retour d'expérience d'un projet pilote ayant été pré-validé sur réplique avant un son installation

■ [EN] DIGITAL TRANSFORMATION OF SUBSTATION THROUGH IEC61850 STANDARD: EXPERIENCE DEPLOYING DIGITAL SUBSTATION PILOT THROUGH DIGITAL SUBSTATION REPLICA

Saurabh Talwar¹, Eric Loiselle², David Lambert²,
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■ Converter Transformer Cold Starts: Specification Nuances and Operational Impacts

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■ New Methodologies for Accurate Modelling and Simulation of Advanced Telecommunication-Based Protection Schemes in a Software Environment

Hadi Khani, Daniyal Qureshi, Saman Alaeddini,
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■ [FR] Amélioration de la durée de vie en fatigue du conducteur en utilisant une pince de suspension avec des élastomères coniques

■ [EN] Improved conductor endurance limit by using a suspension clamp with conical elastomers

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■ A DER Management System for Distributing Power among Discretely and Continuously Controlled Devices within DER group

Chu Sun¹, Syed Qaseem Ali², Geza Joos¹, Francois Bouffard¹

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■ Multi-Feeder Protection Methodology and New Product Design for Distribution Substations

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²The Risk Research Group

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[FR] Étude de cas d'analyse de la réponse en fréquence (FRA) pour l'évaluation de l'intégrité d'un transformateur usagé suite à une réparation
[EN] Case study for assessing the integrity of a service-aged transformer repair using Frequency Response Analysis (FRA)

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 Sébastien Paradis, Line Bariteau, Claude Roy
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[FR] Active Power Priority Vs. Reactive Power Priority Operating Modes in Solar Plants

 M. DARYABAK, M. RAHMATIAN, K. KABIRI, K. CHILUKURI
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[FR] Mitigation of inrush and outrush currents in capacitor bank switching using dry type air core reactors

 M. Goulkhan D. Caverly, M. Sharp
 Trench Ltd (Canada)

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[FR] The Energy Twin – A Solution for Techno-Economic Business Case Analysis of Microgrids & Distributed Energy Systems (DES)

 Bharatkumar Solanki, Alif Gilani
 Siemens Canada Limited (Canada)

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[FR] Field Validation of Various Line Rating Methods on a 138
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 M. L. Lu, C. Singh, R. Barone, K. Zhang, M. Guite,
 D. Chakrabarti
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[FR] Paradigm Shift in Operational Philosophy of POWERGRID

 SUNIL AGRAWAL, P.K. SRIVASTAVA, SUNIL KUMAR,
 MANOJ KUMAR, VIKAS BISHNOI, ABHISHEK BHARDWAJ
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[FR] Voltage Source Converter (VSC) Operation at DC Lines close to AC Lines

 M. Weiland, E. Starschich, G. Ebner, R. Teixeira Pinto,
 M. Schmidt
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[FR] Web Applications for Transmission System Asset Health Monitoring

 Sunil Agarwal, P.K Srivastava, Sunil Kumar, Manoj Kumar,
 Abhishek Bhardwaj, Vikas Bishnoi
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[FR] Active Filtering of harmonic voltages or currents utilizing a MMC STATCOM-Design Aspects and Performance Experience

 T. Schlegl, Dr. G. Pilz
 Siemens AG (Germany)

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[FR] Steel foundations design optimization of a 138 kV transmission line

 MAXIME SANSAFON¹, RICHARD MARANDA²,
 GUILLAUME VACHON²
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[FR] Energy Storage and Ancillary Services Markets in North America

 Hisham Alharbi, Kankar Bhattacharya
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[FR] Reduction of CLPU Overload through Active Load Management

 S. DZELETOVIC, F. BOUFFARD, G. JOOS
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[FR] Use of GIS Tools and Space Technologies for Optimal Transmission Line Routing and Asset Mapping

 B. N. De. Bhowmick, V. K. Bhaskar, S. B. R. Rao, Pradeep Patil,
 Pradeep Singh Chauhan, Shalini Raj
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[FR] Transformation of a Large Diameter Monopole to a Pinned Support Guyed Tower

 Pierre-Luc Massé, Richard Maranda, Alireza Aboutalebi
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[FR] Magnetic and Thermal Impact of GIC on Power Transformers: A Case Study

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[FR] HVDC O&M Strategy

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■ A COORDINATION CONTROL BETWEEN SVC AND BUS/SHUNT REACTORS

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■ [FR] Étude préliminaire de fluide à base d'ester pour application dans des transformateurs exploités en région climatique froide

■ [EN] Preliminary Study of Ester-based Fluid for Application in Transformers Serving in Cold Climatic Regions

U. Mohan Rao¹, I. Fofana¹, T. Jaya¹, E. M. Rodriguez Celis², J. Jalbert², B. Noirhomme², P. Picher²

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■ MiGen Project – Empowering the transformation at the grid edge

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■ [FR] Fabrication de revêtements superhydrophobes durables pour les isolateurs en verre

■ [EN] Fabrication of a durable superhydrophobic coating for high voltage glass insulators

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■ [FR] Validation d'un conducteur AACSR avec fils trapézoïdaux pour une traversée de rivière

■ [EN] Validation of an AACSR conductor with trapezoidal wires for a river crossing

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■ Line Rating Optimisation with Numerical Weather Models: the ALIRA Project

R. SUNDERLAND, G. LILJEBAKK, J. PARR, D.J. CANNON, F.G. BRAGLIA
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■ Optimal Energy Management and Storage Sizing for Electric Vehicles

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■ Effects of Future Uncertainty on Present-day Asset Management

K. MARTIN-STURMEY, A. ALFALAHI, A. BAKULEV
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■ Impact of Load Modelling Parameters on Motor Start simulation in The Alberta Electric System

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Marc Potvin

BBA Inc. (Canada)

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■ **Dynamic Interactions between a large PV plant and a STATCOM**

Sibin Mohan, Rajiv K. Varma
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■ **A Novel Combined Reactive Power-based Frequency and Power Oscillation Damping Control by PV-STATCOMs**

M. Akbari, R. K. Varma
The University of Western Ontario (Canada)

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¹VIZIMAX Inc. (Canada)
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R. Salehi, R. K. Varma
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■ **Lifecycle Management for HVDC Systems**

ERIK JANSSON, URBAN ELGQVIST
ABB (Sweden)

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■ **Influence of extreme low humidity on the dielectric strength of air insulation under critical design voltages**

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