



2021 CIGRE CANADA CONFERENCE & EXPO

October 25-28, 2021 Hilton Toronto Ontario, Canada cigreconference.ca

*Decentralization, Decarbonization
& Climate Change Adaptation*



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WELCOME MESSAGE FROM GENERAL CHAIR

On behalf of the members of the CIGRE Canada committee and Hydro One, I hope you'll join us in Toronto for the 16th Annual CIGRE Canada Conference, from October 25 to 28. Over these four days, Business Leaders, Manufacturers, Engineers, Regulators and Academia will collaborate and discuss the latest industry and technological trends and developments within the sector.

The conference theme, "Decentralization, Decarbonization & Climate Change Adaptation," reflects the rapidly evolving energy sector, including the introduction of new flexible and digital technologies, greater penetration of distributed energy resources, and a heightened focus on resiliency and sustainability. In the face of change, utilities and businesses must continue to focus on their core businesses of enabling, producing and delivering clean, safe and reliable electricity, while improving the customer experience. Personally, I believe there are great opportunities for the future of our industry.

The CIGRE Canada Conference will provide a forum to meet and share our knowledge, experience, ideas and perspectives on how we can collectively shape the "Utility of the Future" as we prepare ourselves for sector transformation.

I look forward to seeing you in Toronto in October 2021.

Yours truly,

Mark Poweska
President and CEO, Hydro One





Building a better and brighter future.

We're committed to operating safely in an environmentally and socially responsible manner, partnering with our customers and community partners to build a brighter future for all.

Learn more about how we're investing in Ontario by visiting [HydroOne.com](https://www.hydroone.com)

COMMITTEES

Organizing Committee

Mark Poweska

President & CEO of Hydro One
General Chair

Bruno Jesus, Hydro One

Executive Committee Chair

Xiaoping (Mary) Shen, Hydro One

Program Chair

Jigar Patel, Hydro One

Technical Chair

Rabiz Foda, Hydro One

Workshops Chair

Steven Desrochers, Jaguar Expo, Inc.

Event Manager

John Kamel, Hydro One

Local Organizing Team

Shahed Mirmohammadi, Hydro One

Local Organizing Team

Lauren Mulroney, Hydro One

Local Organizing Team

Chrisopher Evershed, Hydro One

Local Organizing Team

Navjot Kehal, Hydro One

Local Organizing Team

Technical Committee

Aslam Khan, Hydro One Networks Inc., Canada

Hemant Kumar Barot, Hydro One Networks Inc., Canada

Lianxiang Tang, Hydro One Networks Inc., Canada

Dipendra Rai, BC Hydro, Canada

Jerry Wen, BC Hydro, Canada

Steven Pai, BC Hydro, Canada

Sudhakar Cherukupalli, BC Hydro, Canada

Francisc Zavoda, Hydro-Québec (IREQ), Canada

Jean-François Allan, Hydro-Québec (IREQ), Canada

Nicolas Pouliot, Hydro-Québec (IREQ), Canada

Patrick Picher, Hydro-Québec (IREQ), Canada

Pierre Van Dyke, Hydro-Québec (IREQ), Canada

Claude Rajotte, Hydro-Québec, Canada

David Jacobson, Manitoba Hydro, Canada

Derek Oliver, University of Manitoba, Canada

Tarlochan Sidhu, University of Western Ontario, Canada

Tom Sgouros, Brown University, United States

Bogdan Kasztenny, Schweitzer Engineering Laboratories, United States

Greg Smelich, Schweitzer Engineering Laboratories, United States

Normann Fischer, Schweitzer Engineering Laboratories, United States

Brent Maksymiw, Sask Power, Canada

Farnoosh Rahmatian, Nugrid Power, Canada

Fred Ritter, Alberta Electric System Operator (retired), Canada

Hany Soloumah, Siemens, Canada

Janos Toth, Enginomix Consulting, Canada

John McNichol, Manitoba Hydro (retired), Canada

Alberto Oscar, Tesmec S.p.A, Italy

Debashish Datta Ray, Bhabha Atomic Research Centre, India

SCHEDULE-AT-A-GLANCE

Exhibitor Trade Show Opening Hours

Conference Level, Grande Place

Monday
18:00 - 20:00

Tuesday
09:00 - 20:00

Wednesday
09:00 - 16:00

Monday, October 25, 2021

08:00-17:30 Registration — Lobby Level

CIGRE Workshops — Governor General Main Floor

08:30 – 09:30

Workshop 1 A3 B3

Arc-Resistant Enclosed Shunt Capacitor Banks, Self-Contained for Medium Voltage up to 38kV

V. Coman (Hydro One), S. Ashmore (Qvarx)

09:45 – 10:45

Workshop 2 C2 C3 C4 C6

Transient Stability Analysis of Microgrids

Dr. C. Tang (McMaster U), Dr. M. Soliman (McMaster U), N. Kazemeini (S&C Electric)

11:00 – 12:00

Workshop 3 A3 B3 B5 C2 C3 C5 C6 D1 D2

Driving Decarbonization in a Multi-Stakeholder Energy Environment

K. Sridharan (Schneider Electric), M. Bureau (Schneider Electric), J. Trevan (AECOM)

12:00 - 13:30 — Lunch

13:30 – 14:30

Workshop 4 A3

Current State of Asset Management for T&D Utilities

Y. Tsimberg, (Kinectrics)

14:45 – 15:45

Workshop 5 D2

Innovative Business Practices for Decentralization, Decarbonization and Climate Change Adaptation

N. Grotra (Kinectrics), Dr. S H. Mehdi (Kinectrics)

Technical visits to Hydro One's CMS
Departures and arrivals at the main entrance of the hotel Hilton



Departure: 08:50
Return: 13:30

18:00- 20:00 Welcome Reception — Convention Level Foyer

CIGRE STUDY COMMITTEE THEMES:

- | | | | |
|--|--------------------------------------|---|---|
| A1 Rotating Electrical Machines | B2 Overhead Lines | C1 System Development and Economics | C6 Distribution Systems and Dispersed Generation |
| A2 Transformers | B3 Substations | C2 System Operation and Control | D1 Materials and Emerging Test Techniques |
| A3 High Voltage Equipment | B4 HVDC and Power Electronics | C3 System Environmental Performance | D2 Information System and Telecommunications |
| B1 Insulated Cables | B5 Protection and Automation | C5 Electricity Markets and Regulations | |

Time		Tuesday, October 26, 2021						
06:30	19:00	Registration — Lobby Level						
06:45	08:00	Breakfast — Toronto 1+2 Ballroom						
07:00	16:00	Speaker ready at registration desk — Lobby Level						
08:00	08:10	Word of Welcome — Toronto 1+2 Ballroom Phil Zinck, President CIGRE Canada						
08:10	08:30	Keynote: The Role of Electricity in Meeting the Global Challenge of Climate Change — Toronto 1+2 Ballroom Mark Poweska, President and CEO of Hydro One						
08:30	10:00	Business Panel: Evolving Canada’s Transmission & Distribution System — Toronto 1+2 Ballroom Bill Strohecker, Country Manager, Hitachi Energy; Marco Barbosa, VP of Transmission, Siemens Energy; Ezio Del Bello, General Manager, SEDIVER Canada; Shah Nawaz, Vice President, Digital Grid, Siemens Canada; Moderator: Ahsan Upal, Business Development, Burns & McDonnell						
10:00	10:30	Networking Break — Convention Level Foyer						
10:30	12:00	Session 1 — Toronto 1+2 Ballroom		Session 2 — Carmichael/Jackson		Session 3 — Tom Thompson		
		433	A1 Rotating electrical machines	434	A3 High Voltage Equipment	415	B2 Overhead Lines	
		455		435				
		405	A2 Transformers	461		418		
12:00	13:15	Women in Energy Luncheon: Embracing Change — Toronto 1+2 Ballroom Donna Jablonsky, Director, Transmission Asset Management, Hydro One; Neetika Sathe, VP, Green Energy and Technology (GRE&T) Centre, Alectra; Arielle Kadoch, Sector Leader, Transmission & Distribution, Power Delivery Canada and North America Export, Stantec Moderator: Robyn Koropatnick, Global RSL HVDC, Stantec						
13:15	14:30	Session 4 — Toronto 1+2 Ballroom		Session 5 — Carmichael/Jackson		Session 6 — Tom Thompson		
		407	A2 Transformers	463	A3 High Voltage Equipment	431	B2 Overhead Lines	
		408		475		436		
		414		413		446		
14:30	15:00	Networking Break — Convention Level Foyer						
15:00	16:15	Session 7 — Toronto 1+2 Ballroom		Session 8 — Carmichael/Jackson		Session 9 — Tom Thompson		
		430	A2 Transformers	384	B3 Substations	452	B2 Overhead Lines	
		437		409				
		441		421		467		
16:15	16:45	Networking Break — Convention Level Foyer						
16:45	17:45	Session 10 — Toronto 1+2 Ballroom		Session 11 — Carmichael/Jackson		Session 12 — Tom Thompson		
		454	A2 Transformers	443	B3 Substations	432	B5 Protection and Automation	
		466		444				
		456	B1 Insulated Cables	445		449		
17:45	19:00	Cocktail Reception — Convention Level Foyer						
19:00	22:00	Conference Banquet and presentation of the finalists — Toronto 1+2 Ballroom Best Student Papers - Best NGN Papers						

Time		Wednesday, October 27, 2021								
06:30	13:00	Registration — Lobby Level								
06:45	08:00	Breakfast — Toronto 1+2 Ballroom								
07:00	13:00	Speaker ready at registration desk — Lobby Level								
08:00	08:15	Keynote: The Regulator’s Place in Energy Transition, Climate Change and Innovation — Toronto 1+2 Ballroom Keynote Speaker: Harneet Panesar , Chief Operating Officer, Ontario Energy Board								
08:15	09:15	CEO Panel: How Indigenous Partnerships and Economic Reconciliation Can Meet the Challenges of Decentralization, Decarbonization and Climate Change Adaptation — Toronto 1+2 Ballroom Annette Verschuren , President & CEO, NRStor, Mark Poweska , President & CEO, Hydro One; Arne Wohlschlegel , Managing Director, Siemens Energy Canada; Moderator: Faisal Kazi , President & CEO, Siemens Canada								
09:15	09:45	Networking Break — Convention Level Foyer								
9:45	10:45	Session 13 — Toronto 1+2 Ballroom			Session 14 — Carmichael/Jackson			Session 15 — Tom Thompson		
		402	B5 Protection and Automation	472	C1 System Development and Economics	424	C6 Distribution Systems and Dispersed Generation			
		423		400		427				
						397	D1 Mateirals and Emerging Test Techniques			
10:45	11:15	Networking Break — Convention Level Foyer								
11:15	12:15	Session 16 — Toronto 1+2 Ballroom			Session 17 — Carmichael/Jackson			Session 18 — Tom Thompson		
		451	B5 Protection and Automation	401	C1 System Development and Economics	422	C5 Electricity Markets and Regulations			
		453		471		386	C6 Distribution Systems and Dispersed Generation			
			438	C3 System Environmental Performance	392					
12:15	13:45	Next Generation Network Luncheon: Professional Development & Networking Talk — Toronto 1+2 Ballroom Malsha Annakkage , Power Systems Engineer, TransGrid Solutions; Michael Ross , PhD, P.Eng, PMP, Industrial Research Chair in Northern Energy Innovation, Yukon Research Centre; Pranav Pattabi P.Eng, M.Eng, MIEEE, Associate, METSCO Energy								
13:45	14:45	Session 19 — Toronto 1+2 Ballroom				Session 20 — Carmichael/Jackson				
		382	B5 Protection and Automation		425	D2 Information System and Telecommunications				
		473			391	C2 System Operation and Control				
			399							
14:45	15:15	Networking Break — Convention Level Foyer								
15:15	16:30	Session 21 — Toronto 1+2 Ballroom				Session 22 — Carmichael/Jackson				
		442	B4 HVDC and Power Electronics		390	C6 Distribution Systems and Dispersed Generation				
		448			411					
					447					
		465	B3 Substations			460				
16:30	16:45	Networking Break — Convention Level Foyer								
16:45	17:15	Award Presentation of the Best Papers and Closing Session — Toronto 1+2 Ballroom Award of the Best Student Paper – Award of the Best NGN Paper – Prize draws								
18:00	20:30	Next Generation Network (NGN) Reception — Lower Tundra Restaurant								

Time		Thursday, October 28, 2021					
08:00	12:00	Tutorial 1 — Carmichael/Jackson			Tutorial 2 — Toronto 1 Ballroom		
		Siemens Energy – SF6 free, F-gas free, Greenhouse Gas free - High Voltage Switchgear: Technology, Products & Regulations.			Siemens Canada's <i>SIPROTEC Digital Twin - Cloud Based Testing of Numerical Protection Relays</i>		

WORKSHOP 1 A3 B3

08:30 – 09:30 Monday, October 25, 2021

Governor General

Arc-Resistant Enclosed Shunt Capacitor Banks, Self-Contained for Medium Voltage up to 38kV

The workshop presents a solution for MV Arc-Resistant Enclosed Capacitor Banks (Completely Self-Contained), for 14.4kV and 28.8kV substations.

The role of the shunt capacitor banks and benefits of using enclosed capacitor bank concept are outlined.

Design & Selection of Components, Core functions and Installation are presented.

The type and rating of switching device used is outlined as it relates to the system transients and voltage power quality.

The selection of inductors to limit inrush and outrush transient currents is presented.

Potential situations of resonance between the capacitor bank and the utility system are outlined, where tuning inductors can be used for preventive control of resonance.

PRESENTERS: **Voichita (Vicky) Coman**, Sr. Material Management Engineer, Equipment, Standards & New Technologies, Hydro One Networks Inc

Steve Ashmore, Technical Director, Qvarx

WORKSHOP 2 C2 C3 C4 C6

09:45 – 10:45 Monday, October 25, 2021

Governor General

Transient Stability Analysis of Microgrids

Traditionally electricity is generated at central power plants and delivered to end users over transmission and distribution networks. When major disturbances occur due to extreme weather or other causes, power systems may encounter system-wide blackouts resulting in massive load interruptions. Transient stability analysis of is one of the major studies routinely performed by independent system operators to ensure established planning and operating criteria are met.

To combat climate change, the power industry moves towards decarbonization thus relying less on fossil fuels in power generation. One way to achieve decarbonization is through the increased use of renewable energy resources such as wind and solar. Moreover, energy storage devices such as grid-size storage batteries also find their ways to power grids to fully utilize intermittent wind and solar resources.

Another major trend in the power industry is decentralization through the incorporation of distributed energy resources (DERs). More and more DERs are being integrated into existing utility distribution networks as well as large customer sites, thus transforming them into microgrids with improved power grid resilience to extreme weather. When properly designed, microgrids can also reduce the energy costs of customers.

This workshop on transient stability analysis of microgrids will focus on the dynamic stability assessment of microgrids. It will cover topics on major trends on microgrids, commercially available simulation tools, dynamic modelling of DERs such as gas/diesel generators, wind turbine generators, solar photovoltaic and battery energy storage systems. Sample transient stability simulations results will also be presented.

PRESENTERS: **Dr. Chi Tang**, Assistant Professor – Power and Energy Engineering Technology Program, SEPT, Faculty of Engineering, McMaster University; **Dr. Mostafa Soliman**, Assistant Professor – Automation, Engineering Technology Program, SEPT, Faculty of Engineering, McMaster University; **Navid Kazemeini**, District Manager – Southwest Ontario, S&C Electric Canada Ltd.

WORKSHOP 3 A3 B3 B5 C2 C3 C5 C6 D1 D2

11:00 – 12:00 Monday, October 25, 2021

Governor General

Driving Decarbonization in a Multi-Stakeholder Energy Environment

Canada ranks top 3 in terms of energy production per capita in the world and it is the second highest consumer of energy per capita globally.

Energy is key in driving operations, growth and business profitability and long-term sustainability. In complying with the Paris accord, UN SDG initiatives, climate change advisory programs, the focus is on addressing decarbonization in industry, communities and other sectors collaborating with multiple stakeholders contributing and shaping sustainability of our environment.

In this session, we focus on consumers - commercial and electro-intensive industrial customers.

Workshop will discuss:

- Challenges related to driving decarbonization in the Commercial & Industrial & transportation businesses.
- Key considerations of decarbonization program development.
- Pathways for Decarbonization - development & implementation
- Role of data management in decarbonization
- Brief review selected customer references

PRESENTERS:

Kaliyur Sridharan

Senior Director – Growth Programs
Schneider Electric

Justin Trevan

Vice President
AECOM

Matthieu Bureau

Vice President
Schneider Electric

CIGRE STUDY COMMITTEE THEMES:

A1 Rotating Electrical Machines	B2 Overhead Lines	C1 System Development and Economics	C6 Distribution Systems and Dispersed Generation
A2 Transformers	B3 Substations	C2 System Operation and Control	D1 Materials and Emerging Test Techniques
A3 High Voltage Equipment	B4 HVDC and Power Electronics	C3 System Environmental Performance	D2 Information System and Telecommunications
B1 Insulated Cables	B5 Protection and Automation	C5 Electricity Markets and Regulations	

WORKSHOP 4 A3

13:30 – 14:30 Monday, October 25, 2021

Governor General

Current State of Asset Management for T&D Utilities

The presentation will briefly address fundamental aspects associated with equipment focused Asset Management and will focus on recent developments, specifically:

- Component based Health Index
- Use of age limiter in conjunction with the Health Index
- Development of degradation curves
- Criticality as a measure of consequence of failure
- Long-term degradation vs immediate concerns
- End of life considerations
- Asset Performance Management (APM) tools and CIGRE
- Strategic Asset Management Plan and Asset Management Plans

PRESENTER:

Yury Tsimberg, P. Eng.
Director, Asset Management
Kinectrics Inc

Throughout the presentation references will be made linking the material presented with the conference theme of “Decentralization, Decarbonization & Climate Change Adaptation”.

The session presenter will facilitate audience participations, including exchange of ideas, identification of challenges and examples from the past experience.

WORKSHOP 5 D2

14:45 – 15:45 Monday, October 25, 2021

Governor General

Innovative Business Practices for Decentralization, Decarbonization and Climate Change Adaptation

As we coming closer to bid year 2021 good bye and enter into 2022, global reliance on non-renewable sources of energy dominated by coal, oil and natural gas continue to be a trend that is not declining fast enough. Estimates predict that global energy needs will rise over 45% by 2030 and will continue to surge. With global push to decarbonize and growing understanding that to save the planet, we must transition to low carbon emission systems. With the advancements in manufacturing technologies over last decade, the costs of production of infrastructure and equipment for producing solar and wind generated electricity has come down to the extent that it can compete with non-renewables. Also, there is growing adoption of decentralized, distributed peer to peer systems for energy distribution and the technological challenges required to deal with these are on a

path of major innovation. For the energy industry, technology adoption is a key if they want to have effective and efficient way to manage decentralized distribution and push for decarbonization. These technologies include sensors, internet of things, block chain technologies, connected devices, big data, AI and machine learning. Led by Dr. Mehdi Husain and Neeraj Grotra, this workshop we will explore how energy sector can benefit from these emerging technologies and drive Decentralization, Decarbonization & Climate Change Adaptation.

PRESENTERS: **Neeraj Grotra**, Sr. Director IT and Business Improvement, Kinectrics Inc

Dr. S Husain Mehdi, Director of Life Cycle Management and Special Advisor to the President and CEO, Kinectrics Inc.



CMS TECHNICAL TOUR



WHAT TO SEE ON THE CMS TOUR

CMS technical tour offers an opportunity to see up close the major pieces of power equipment that make up our electrical grid.

RECLOSERS

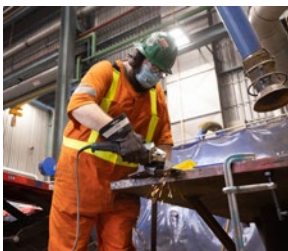


See various reclosers and regulators detanked with demonstrations on they operate

GASKETS

Learn how gaskets materials are selected, cut and used on power equipment

MECHANICAL SHOP



See one of the largest lathes in Canada.

CMS also has one of the largest indoor cranes in Canada too.

OIL FARM AND TANKERS



Walk through a mobile oil degasifier, and observe the various components and processes to handle oil in the field

TRANSFORMERS

See transformers from 750 MVA to 10 MVA. A detanked transformer on display, see the core, coils and a tap changer.

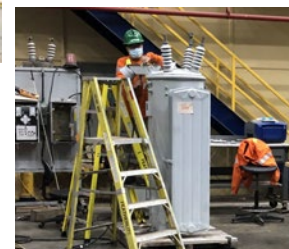


BUSHINGS

Witness an insulation power factor test and see bushings in various states of assembly



REGULATORS


















**CENTRAL MAINTENANCE SERVICES
2021**

TECHNICAL SESSIONS

Tuesday, October 26, 2021			
10:30 – 12:00	Session 1 Session Chair: Emanuel Petrache	Session 2 Session Chair: Hemant Barot	Session 3 Session Chair: Paul Forster
	CIGRE-433 A1 Monitoring & Condition Assessment of Large Rotating Machines Using Latest Partial Discharge Detection and Analysis Techniques A. El-Rasheed, M. Söller, M. Huzmezan, Megger Limited, Canada	CIGRE-434 A3 Development of SF6 free Clean Air Instrument Transformers and Power VTs UDO PRUCKER, Trench Germany; Detlef Fredrich, Siemens Energy China; Johannes Rickmann, Siemens Energy Germany; Mana Yazdani, Trench Limited Canada	CIGRE-415 B2 Design of FRP Pole Structures for Transmission Lines in British Columbia M. L. Lu, D. Chakrabarti and M. Khedr, BC Hydro Power & Authority, Canada
	CIGRE-455 A1 Dynamic System Equivalents using Integrated PSS/E and Python for Transient Stability Studies R. GUO, Hatch Ltd.; U. D. ANNAKAGE, University of Manitoba, Canada	CIGRE-435 A3 Innovative applications of High Voltage Instrument Transformers for monitoring Power Systems Transients and Harmonics Mana Yazdani, Trench Canada Ltd.; Johannes Rickmann & Detlef Fredrich, Siemens Energy	CIGRE-418 B2 Fiber-Optic Distributed Strain and Temperature Sensor for Enhancing Power Grid Reliability and Utilization L. Zou and O. Sezerman, OZ Optics Ltd., Ottawa, Canada
	CIGRE-405 A2 Innovative Resilient Transformers for Maximum Operating Flexibility K. KAINEDER, R. MAYER, E. SCHWEIGER, Siemens Energy, Austria, Germany; A. O'MALLEY, Consolidated Edison Co. of NY, USA; R. SZEWCZYK, J.-C. DUART, DuPont, Poland, Switzerland	CIGRE-461 A3 United Power Flow Controller B. Niemann, Dr. C. Pfeifer, K. Sharma, S. Frederic, SIEMENS ENERGY GLOBAL GMBH & CO KG, GERMANY	
	Session 4 Session Chair: Behdad Biglar	Session 5 Session Chair: Juming Huang	Session 6 Session Chair: Lianxiang Tang
	CIGRE-407 A2 Ferro Resonance Studies for protection Relay Replacement, Lesson learned and straight forward approach for mitigation solutions Sam Maleki, Mike Shen, Mohammad Akbari, Nick Cascioli, Alexandre Gariepy, Tetra Tech	CIGRE-463 A3 CIGRE JWG A3.43 progress report "Tools for lifecycle management of T&D switchgear based on data from condition monitoring systems" P WESTERLUND on behalf of JWG A3.43, KTH Royal Institute of Technology, Sweden	CIGRE-431 B2 EPZ : A giant 315 kV double-circuit interconnection tower Mario Robichaud, CIMA+, Canada
13:15 – 14:30	CIGRE-408 A2 Forecasting Near-Term Failure of Transformers Using Reliability Statistics on Dissolved Gas Analysis Z.H. DRAPER, J.J. DUKARM, Delta-X Research, Inc., Canada	CIGRE-475 A3 Understanding the contribution of the noise to the error in NCITs Aritz Sanchez, Andoni Gallastegi and Idoia Etxeandia, Artech Group, Spain	CIGRE-436 B2 Reporting on the Last 6 years of Field Inspections Using LineCore for the Non-Destructive Evaluation of Overhead Conductors J. BELLEMARE and F. SIROIS, Département de Génie Électrique, Polytechnique Montréal; G. A. ROUSSEAU, D. VALIQUETTE and N. POULIOT, Institut de Recherche d'Hydro-Québec (IREQ), Canada
	CIGRE-414 A2 Transformers Dynamic Overload Guide YMR, YURI MONTEIRO ROSSINI, SIEMENS ENERGY, INC., USA	CIGRE-413 A3 First CO2-neutral 145 kV Dead Tank Circuit-Breaker and 145 kV / 50 kA GIS with Vacuum Switching and Clean Air Insulation Technology L. FARIAS, B. FARMER, Pacific Gas & Electric Co., USA; P. ROSKILLY, N. SIDDIQUI, T. HEINZ, F. EHRlich, D. HELBIG, Siemens Energy, USA & Germany	CIGRE-446 B2 A vibration-sag-tension-based icing monitoring of overhead lines Bertrand Godard, Ampacimon, Belgium; Joey Alexander, Ampacimon, USA

CIGRE STUDY COMMITTEE THEMES:
















- | | | | |
|--|--------------------------------------|---|---|
| A1 Rotating Electrical Machines | B2 Overhead Lines | C1 System Development and Economics | C6 Distribution Systems and Dispersed Generation |
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| A3 High Voltage Equipment | B4 HVDC and Power Electronics | C3 System Environmental Performance | D2 Information System and Telecommunications |
| B1 Insulated Cables | B5 Protection and Automation | C5 Electricity Markets and Regulations | |

15:00 – 16:15	Session 7 Session Chair: Jawed Atcha	Session 8 Session Chair: Paul Ankrett	Session 9 Session Chair: Eduardo Alvarado
	CIGRE-430 A2  Combining Controlled Switching and Flux Conditioning to Eliminate the Voltage Dips When Energizing the Step-Up Transformer of Renewables and Distributed Energy Resources V. BALVET, VIZIMAX Inc., Canada	CIGRE-384 B3  SF6 gas a greenhouse - possible replacements E.B., Elvir Burnazovic, Hydro One Networks Inc., Canada	CIGRE-452 B2  Hydro One Hybrid Thermal Model for Ampacity Calculations of bare Overhead Conductors in steady state John J. Penaranda and Pankaj Sharma, Hydro One Inc., Canada
	CIGRE-437 A2  Power flow control of carbon-neutral energy to industrialized urban areas Dr. T. KALICKI, R. REINMULLER, J. MORNEAU, F. A. QURESHY, L. OPRITA, Hydro One Inc., Canada; M. PARISI, NYPA, USA; M. STOESSL, G. LINORTNER, Siemens Energy Austria, Austria; J. KOLLMANNNSBERGER, Maschinenfabrik Reinhausen, Germany	CIGRE-409 B3  3D Virtual Station Walkthrough Sean Lachhman, Hydro One Networks Inc., Canada	CIGRE-467 B2  Performance validation of a twin spacer damper for AAC 49 mm conductors P. VAN DYKE, Institut de recherche d'Hydro-Québec; D. BÉLANGER, M.H. TREMBLAY, É. DESJARDINS, P. MESSIER, Hydro-Québec, Canada
	CIGRE-441 A2  On-site Partial Discharge Testing of Transformers Charles Nybeck, Ph.D., Megger, USA; Markus Söller, Managing Director of Power Diagnostix Systems	CIGRE-421 B3  Using Waveform Analytics for Asset Management - Operational Case Studies J. A. WISCHKAEMPER, C. L. BENNER, B. D. RUSSELL, K. MANIVANNAN, Texas A&M University, USA	
16:45 – 17:45	Session 10 Session Chair: Dr. Tarek Abdel-Galil	Session 11 Session Chair: John Penaranda	Session 12 Session Chair: Pankaj Sharma
	CIGRE-454 A2  Inrush Current Analysis for Transformers in Isolated Microgrids SG, SIMON GEOFFROY-GAGNON, JZ, JASON A. ZRUM, MR, MICHAEL ROSS, YukonU Research Centre, Northern Energy Innovation – Yukon University, Canada	CIGRE-443 B3  Rapid urbanization is on the rise. How does this impact civil project design in dense urban settings? E. GOMEZ HENNIG, O. CASTANON, Siemens Energy, Canada; E. SCHWEIGER, M. A. STOESSL, Siemens Energy, Austria; G. KULAK, T. THRUM, D. HAMMING, Stantec, Canada	CIGRE-432 B5  Realizing benefits from securing access and remotely managing devices across the Duke Energy enterprise K. ANDRESON, Duke Energy, USA; A. WEST, B.Eng., B.Sc., MIEEE, Regional Technical Director, SUBNET Solutions Inc.
	CIGRE-466 A2  The influence of transient parameters on the ageing of transformer turn-to-turn paper-oil insulation Anurag A. Devadiga, Shesha H. Jayaram, University of Waterloo, Canada	CIGRE-444 B3  Infrared & AI Focused Asset Performance Management (APM) John Nam, Richard Harada, Angelo Rizzo, Systems With Intelligence, Canada	CIGRE-449 B5  Methodologies and Tools for Full-Cycle Automation of Transmission Line Protection Settings Evaluation Daniyal Qureshi, Hadi Khani, Quanta Technology, Canada; James Kelly, Muna Anazodo, Pankaj Sharma & Ryan Parappilly, Hydro One Networks Inc., Canada
	CIGRE-456 B1  Advanced Diagnostic Testing of Medium Voltage Utility Cable Systems Ali Naderian Jahromi, Pranav Ketharam Pattabi, and Shanon Lo, METSCO Energy Solutions Inc., Canada	CIGRE-445 B3  Offshore substation platform expandability index C.A. PLET, M.S. ZADEH (Canada), & N. ROUXEL (United States), DNV Energy Systems	

CIGRE STUDY COMMITTEE THEMES:













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| A1 Rotating Electrical Machines | B2 Overhead Lines | C1 System Development and Economics | G6 Distribution Systems and Dispersed Generation |
| A2 Transformers | B3 Substations | C2 System Operation and Control | D1 Materials and Emerging Test Techniques |
| A3 High Voltage Equipment | B4 HVDC and Power Electronics | C3 System Environmental Performance | D2 Information System and Telecommunications |
| B1 Insulated Cables | B5 Protection and Automation | C5 Electricity Markets and Regulations | |

Wednesday, October 27, 2021

Wednesday, October 27, 2021			
09:45 – 10:45	Session 13 Session Chair: Pankaj Sharma	Session 14 Session Chair: Behdad Biglar	Session 15 Session Chair: Hemant Barot
	CIGRE-402 B5  Fault Analysis of a Conceptual McMaster University Microgrid Design C. Tang, S. Kauser, S.M. Gulamhusein, M. Mungroo, McMaster University, Canada	CIGRE-472 C1  Electricity Grid Resilience Adaptation Framework - Proposed L. LEE, J. PATEL, A. JACKSON, D. WAGNER, P. SHARMA & J. GE, Hydro One Networks Inc., Canada	CIGRE-424 C6  Advanced maintenance through digital twins GIUMENTO A, CIMA+, CANADA; GIRARD J-P, HEXACODE SOLUTIONS, CANADA
	CIGRE-423 B5  End-to-End Testing Methodology for Validation of Line Differential Protection: Test Considerations and Challenges SUGHOSH R KUBER, Megger, USA; ABEL GONZALEZ, Megger, Canada	CIGRE-400 C1  Asset management practices and strategy – A discussion on the new outlook Hemant Barot, Dhaval Patel, Hydro One Networks Inc., Canada	CIGRE-427 C6  Energy autonomy and microgrids in remote communities Veilleux, Jean-Francois, CIMA+, CANADA; Giumento, Angelo, CIMA+, CANADA
			CIGRE-397 D1  Cybersecurity risk reduction leveraging Cyber Range solutions D. Boucher, G. Farthing, vadmUS, Canada; P. Berthier RHEA Group, Canada; G. Hillier, CIMA+, Canada
11:15 – 12:15	Session 16 Session Chair: Emanuel Petrache	Session 17 Session Chair: Eduardo Alvarado	Session 18 Session Chair: Paul Forster
	CIGRE-451 B5  Methodologies and Processes to Enhance the Accuracy, Technical Quality, and Efficacy of Protective Relay Testing using Comtrade Files Hadi Khani, Saman Alaeddini, Juergen Holbach, Ijaz Peerbocus, Quanta Technology, Canada & USA; Rohan Perera, Weimin Wang, Xin Zheng, Hydro One Networks Inc., Canada	CIGRE-401 C1  Distribution Neutral Point Treatment and Grounding System in Distribution Stations Mr. Elvir Burnazovic, MASc, Dipl. Ing., Hydro One Networks Inc., Canada	CIGRE-422 C5  Ontario electricity sector scenario, technological advancements and challenges – A discussion Dhaval Patel, Hemant Barot, Hydro One Networks Inc., Canada
	CIGRE-453 B5  Online Neutral Line Fault Locator (nLFL) for HVDC Applications Dexter M. T. J. Williams, Aniruddha M. Gole, Ben Korbutiak, Humud Said & Adam Chevrefils; University of Manitoba, Manitoba Hydro International Ltd. And Atco Electric, Canada	CIGRE-471 C1  Grid Resilience Strategy – Natural Hazards: High Level Pragmatic Approach L. LEE, J. PATEL, A. JACKSON, D. WAGNER, P. SHARMA, and J. GE, Hydro One Networks Inc., Canada	CIGRE-386 C6  EV Fast Charging Stations and Power Quality FRANCISC ZAVODA, CRHQ/IREQ (Hydro-Quebec), Canada
		CIGRE-438 C3  Experiences with NERC TPL-007 GMD Vulnerability Assessments in Ontario CYNTHIA YIU, Hydro One Networks Inc., Canada; EMILY DROPPA, Independent Electricity System Operator, Canada; DEBBIE ZHOU, Hydro One Networks Inc., Canada	CIGRE-392 C6  Steady State and Dynamic Performance Assessment of a Conceptual McMaster University Campus Microgrid Design B. Ryan, A. Belcamino, O. Mulla, C. Harding, E. Bijsterveld, A. Luu, R. Singh, J. Shah, E. Mann, C. Tang, McMaster University, CANADA

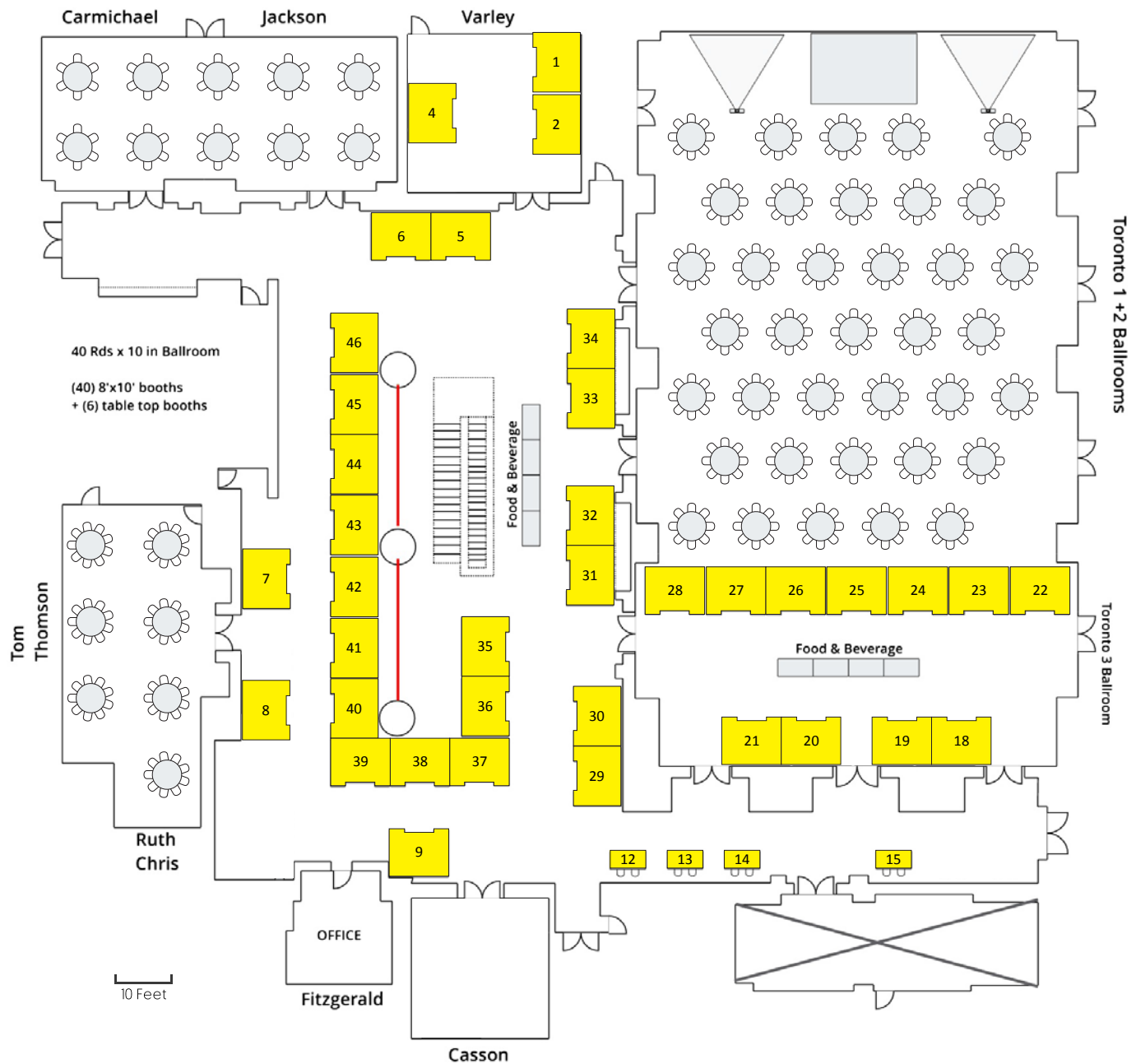
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13:45 – 14:45	Session 19 Session Chair: Paul Ankrett	Session 20 Session Chair: Dr. Tarek Abdel-Galil
	CIGRE-382 B5  A Transformation from Gasoline/Diesel Vehicles to Electrical Vehicles and Trucks- Challenges and Pros/Cons Sridhar Seshadri, Sr. Director, Terawe Corporation	CIGRE-425 D2  Securing a substation LAN with a Software Defined Network and a Functional Security Monitoring Intrusion Detection System Steel McCreery, OMICRON electronics Canada Corp, Canada; Lance Dice, Schweitzer Engineering Laboratories Inc., USA
	CIGRE-473 B5  Modernizing Distribution Grid for DER Integration Using Distributed Edge Intelligence: Wireless Applications & Test Results PALAK PARIKH, CRAIG WESTER, ROBERT MUZIOL, GE Renewable Energy, Canada, US	CIGRE-391 C2  Real-time Implementation and Performance Analysis of a Machine Learning Based Voltage Stability Monitoring System K.D. DHARMAPALA, A.D. RAJAPAKSE, University of Manitoba; K. NARENDRA, Electric Power Group (USA); Y. ZHANG, RTDS Technologies Inc. (Canada)
		CIGRE-399 C2  An Optimization Method on System Model Verification Chris Beaudoin, Lana Zhu, System Performance Department, Manitoba Hydro, Winnipeg, Manitoba, Canada
15:15 – 16:30	Session 21 Session Chair: Jawed Atcha	Session 22 Session Chair: John Penaranda
	CIGRE-442 B4  Our Transportation and Energy Future: Industries Collide MP, Morgan Putnam, NGI Consulting, United States	CIGRE-390 C6  Adaptive Joint Grid Forming Control Strategy for PV and Battery Energy Storage Systems in an Isolated Microgrid M. FARRAJ, R. KALUTHANTHRIGE, A.D. RAJAPAKSE, University of Manitoba, Solar Solution, Canada
	CIGRE-448 B4  Exploration of Modular Power Flow Control Technology on the Manitoba Power System Kurtis Toews, Shirley Mayadewi and Bagen Bagen, Manitoba Hydro; Amir Motamedi, Brendan Kelly, Chris Ariante and Andrew Martin, Smart Wires	CIGRE-411 C6  Chasing the Peak -Potential Reduction in Global Adjustment Charge for McMaster University F.Q. Huang, H. Yim, C. Tang, McMaster University, Canada
	CIGRE-465 B3  3D Laser Scanning and Autodesk Inventor Workflow in Substation Design J.BROOKSBANK & L. KLIMKINA, Hydro One Networks Inc., Canada	CIGRE-447 C6  Analysis of lifetime impact of carbon equivalent of medium voltage primary switchgear considering air insulated system as compared to existing SF6 and SF6 free solution E. Ducharme, Dual ADE, Canada; C. Girardet, vadinUS, Canada; M. Ramesh, nuventura, Germany
		CIGRE-460 C6  Comparative Assessment of Hosting Capacity Analysis Methods: Industry Best Practices and Standardization Framework Shadi Chuangpishit, Malahat Peik Herfeh, Farid Katiraei, Quanta Technology; Ahmed Awad, Brian McMillan, Natural resources Canada

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| 1: Dual-ADE Technologies | 15: Megger | 28: OPAL-RT Technologies | 39: Sentient Energy |
| 2: Ampacimon | 18: GE Grid Solutions | 29: Manitoba Hydro International | 40: K-line Insulators |
| 4: Oz Optics | 19: Reinhausen Canada | 30: RTDS Technologies | 41: K-line Insulators |
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KEYNOTE

08:10 – 08:30 Tuesday, October 26, 2021
Toronto 1+2 Ballroom

The Role of Electricity in Meeting the Global Challenge of Climate Change

Speaker: Mark Poweska, President and CEO of Hydro One

Hydro One's CEO Mark Poweska will discuss the important role that the electricity sector will play in addressing the global challenge of climate change.



BUSINESS PANEL

08:30 – 10:00 Tuesday, October 26, 2021
Toronto 1+2 Ballroom

Evolving Canada's Transmission & Distribution System

Our transmission and distribution grids have evolved very little over many decades. Engineering conservatism and a stable operational factors have kept this infrastructure largely unchanged.

Factors such as Environmental Social Governance (ESG), the general shift from fossil to electric, and the modern expectation that all regions and citizens have a right to affordable reliable power will necessitate its evolution.

MODERATOR:

Ahsan Upal
Business Development
Burns & McDonnell

SPEAKERS:

Bill Strohecker
Country Managing Director,
Hitachi Energy

Marco De Freitas Barbosa
VP of Transmission
Siemens Energy

Ezio Del Bello
General Manager
SEDIVER Canada

Shah Nawaz
Vice President, Digital Grid
Siemens Canada



Bill Strohecker



Marco De Freitas Barbosa



Ezio Del Bello



Shah Nawaz

WOMEN IN ENERGY LUNCHEON

08:30 – 10:00 Tuesday, October 26, 2021

Toronto 1+2 Ballroom

Embracing Change

CIGRE is an organization where success is directly related to technical and professional contribution regardless of age, race, or gender. To promote gender equality, CIGRE initiated a “Women In Energy” forum as part of the Paris 2014 session. And in 2016, CIGRE Canada created a Women in Energy forum to further promote diversity within CIGRE Canada, and within the profession in general.

The theme of this years’ CIGRE Canada Women in Energy panel is Embracing Change. Change is never easy, especially when the change seems out of your control. In this session we will explore hidden opportunities that are present in every situation.

MODERATOR:

Robyn Koropatnick

Global RSL HVDC

Stantec

SPEAKERS:

Donna Jablonsky, Director

Transmission Asset Management

Hydro One

Neetika Sathe, VP

Green Energy and Technology (GRE&T) Centre

Alectra

Arielle Kadoch, Sector Leader, Transmission & Distribution

Power Delivery Canada and North America Export

Stantec



Donna Jablonsky



Neetika Sathe



Arielle Kadoch

KEYNOTE

08:00 – 08:15 Wednesday, October 27, 2021

Toronto 1+2 Ballroom

The Regulator's Place in Energy Transition, Climate Change and Innovation

Speaker: **Harneet Panesar**, Chief Operating Officer, Ontario Energy Board

The Ontario Energy Board is charting a path toward modernization that includes an innovation mandate. While its primary role remains as an economic regulator, the OEB's innovation mandate is unfurling both with the agency and in its interactions with the entities it regulates. Harneet Panesar will provide a glimpse into the evolution of the OEB, and how its policies and plans can enable innovation, address climate change and facilitate the energy transition.



CEO PANEL

08:15 – 09:15 Wednesday, October 27, 2021

Toronto 1+2 Ballroom

How Indigenous Partnerships and Economic Reconciliation Can Meet the Challenges of Decentralization, Decarbonization and Climate Change Adaptation

Decentralization, Decarbonization & Climate Change Adaptation is the overall theme of the conference. The CEO Panel will explore decentralization, decarbonization and climate change adaptation through the lens of the economic opportunity these trends present for Indigenous partnerships and economic reconciliation.

MODERATOR:

Faisal Kazi
President & CEO
Siemens Canada

SPEAKERS:

Annette Verschuren
President & CEO
NRStor

Mark Poweska
President & CEO
Hydro One

Arne Wohlschlegel
Managing Director
Siemens Energy Canada



Annette Verschuren



Mark Poweska



Arne Wohlschlegel

NEXT GENERATION NETWORK LUNCHEON

12:15 – 13:45 Wednesday, October 27, 2021

Toronto 1+2 Ballroom

Professional Development & Networking Talk

The Next Generation Network (NGN) helps bring a new generation of Power System Professionals into the world of CIGRE and help deliver a platform where early-career professionals can feel comfortable sharing their ideas, get an opportunity to interact with industry experts and get involved in CIGRE Working Groups and technical events. Join us for a luncheon of networking and casual discussion with three power systems professionals about their experiences in the industry, specific career choices, and their future goals.

SPEAKERS:

Malsha Annakkage

Power Systems Engineer
TransGrid Solutions

Michael Ross, PhD, P.Eng, PMP

Industrial Research Chair in Northern Energy Innovation
Yukon Research Centre

Pranav Pattabi P.Eng, M.Eng, MIEEE, Associate
METSCO Energy



Malsha Annakkage



Michael Ross



Pranav Pattabi

SOCIAL EVENTS

Welcome Reception

Monday, October 25, 2021 | 18:00 – 20:00

Convention Level Foyer, Hilton Toronto, Casual dress code

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

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Cocktail Reception

Tuesday October 26, 2021 | 17:45 – 19:00

Convention Level Foyer, Hilton Toronto, Business casual dress code

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

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Banquet

Tuesday, October 26, 2021 | 19:00 – 22:00

Toronto 1+2 Ballroom, Hilton Toronto, Business casual dress code

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.



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CIGRE Canada NGN Social Networking & Cocktails – Come out for a great time!

Wednesday, October 27, 2021 | 18:00 – 20:30

Lower Tundra Restaurant, Hilton Toronto

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Award Presentation, Prize Draw & Closing Remarks

Wednesday, October 27, 2021 | 16:45 – 17:15

Toronto 1+2 Ballroom, Hilton Toronto, Business casual dress code

In recognition of their outstanding contributions for the 2021 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.

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2021 CIGRE CANADA CONFERENCE BEST STUDENT PAPER AWARD

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

2021 CIGRE CANADA CONFERENCE BEST NGN PAPER AWARD

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



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