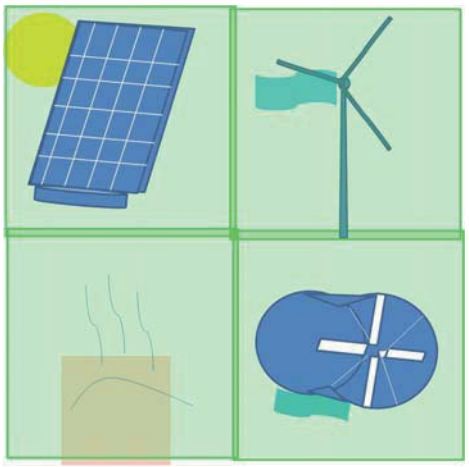
IEEE Canada

Electrical Power and Energy Conference 2013
La Conférence sur l'Énergie Électrique D'IEEE Canada 2013

Innovative Leadership for Renewable Energy
Leadership Novateur pour L'énergie Renouvelable



August 21-23, 2013
Marriott Harbourfront Hotel
1919 Upper Water Street
Halifax, Nova Scotia, Canada

Organized and Sponsored by IEEE Canada and IEEE Canadian Atlantic Section

www.ieee.ca/epec13

EPEC History

The Electrical Power and Energy Conference (EPEC) 2013 is focused on Innovative Leadership for Renewable Energy to serve the rising need within academia, industry and government circles as a key strategy to attain a global green economy.

The conference is sponsored by IEEE Canada and sponsored plus organized by the IEEE Canadian Atlantic Section. This event is a natural extension/spin-off of the Electrical Power Symposia (EPS) that started in Ottawa and for the first six consecutive years were very successfully organized by the IEEE Ottawa Section.

The Electrical Power Symposia (EPS) started in 2001 with a focus on deregulation of electricity industry, a little understood and hot topic introduced by the Ontario Government at that time. As EPS grew into an annual event, it was expanded into other aspects of the Ontario electricity scene, in particular the increasing debt and the widening gap between demand and supply, and, in 2004, on the tough choices facing Ontario, ranging from what to do with large-scale nuclear generation to how much can we rely on demand-side management and encouraging adoption of distributed energy.

In 2005, the focus moved to general issues such as the convergence of power and high technologies. Five major areas of the convergence between the power and high technologies were showcased: communications, real-time applications, wide-area protection, smart metering, and automation in power systems. Due to the presence of the highly developed communication industry that made Ottawa known as Silicon Valley North, the Symposium drew upon that world class expertise available in Ottawa, yet also reached out and had several distinguished speakers from outside Canada.

That approach of addressing the topics of wider interest and to have both Canadian and international speakers, was followed in 2006 as well. The crucial role of Distributed Generation and Smart Grid is increasingly getting recognition in the economy, energy, and environment, which form a basis for nation's sustainability, security, and development. Because 2006 marked the 150th anniversary of the birth of Nikola Tesla, the inventor of AC power systems, who also was a member of the IEEE predecessor - American Institute of Electrical Engineers (AIEE) - its Fellow, and Vice-President 1892-1894, the EPS 2006 was organized under the theme "From Tesla's AC Power System to Distributed Generation and Smart Grids".

The following lists past EPEC locations and themes:

2012: Electric Power & Energy Conference: Resilient Green Energy systems for a Sustainable Society, London, ON, http://www.ieee.ca/epec12/

2011: Electric Power & Energy Conference: Advance Technologies for Energizing Power Systems, Winnipeg, MB http://www.ieee.ca/epec11/

2010: Electric Power & Energy Conference: Sustainable Energy Systems for an Intelligent Grid, Halifax, NS, http://www.ieee.ca/epec10/

2009: Electric Power & Energy Conference: Sustainable/ Renewable Energy Systems and Technologies, Montréal, QC, http://www.ieee.ca/epec09/

2008: Electric Power & Energy Conference: Energy Innovation, Vancouver, BC, http://www.ieee.ca/epc08/index.php

2007: Electric Power Conference: Renewable and Alternative Energy Resources, Montreal, QC, http://www.ieee.ca/epc07/index.htm

2006: Electrical Power Symposium: From Tesla's AC Power System to Distributed Generation and Smart Grids, Ottawa, ON, http://www.ewh.ieee.org/soc/pes/ottawa/EPS2006/

2005: Electrical Power Symposium: Convergence of Power and High Technologies, Ottawa, ON, http://www.ewh.ieee.org/soc/pes/ottawa/EPS2005/

2004: Electrical Power Symposium: Ontario's Tough Electricity Choices, Ottawa, ON, http://www.ewh.ieee.org/soc/pes/ottawa/EPS2004/

2003: Electrical Power Symposium: Supply and Demand Challenges, Ottawa, ON, http://www.ewh.ieee.org/soc/pes/ottawa/EPS2003/

2002: Electrical Power Symposium: Tricks and Treats in Evolving Electricity Markets, Ottawa, ON, http://www.ewh.ieee.org/soc/pes/ottawa/EDST2002/

2001: Electrical Power Symposium: Electricity Deregulation (in Ontario), Ottawa, ON

The Electrical Power Symposia (EPS) clearly identified a need for a forum in which the information and ideas related to Power Systems Engineering could be exchanged among the experts, professionals from the engineering and business communities, and general public. Subsequent Electrical Power conferences since 2009 will continue to addres this need.

Founders:
Dr. Wahab Almuhtadi
Dr. Branislav Djokic
Dr. Aidan Foss
Mr. Raed Abdullah

L'Histoire d'EPEC

Electrical Power and Energy Conference (EPEC) 2013 est axé sur le leadership novateur pour l'énergie renouvelable comme une stratégie pour atteindre une économie mondiale verte. La conférence est parrainée par l'IEEE Canada (Région 7) et organisé par la section IEEE Canadian Atlantic Section. Cet événement est une extension naturelle d'Electrical Power Symposia (EPS) qui a débuté à Ottawa.

Lors de son début en 2001 l'EPS abordait la question de la déréglementation dans l'industrie de l'électricité. C'était un sujet d'intérêt beaucoup discuté qui a suscité beaucoup d'attention due à l'initiative simultanée de déréglementation du gouvernement de l'Ontario. L'EPS s'est naturellement développée en événement annuel, et est devenue ainsi l'hôte de nouveaux sujets comprenant : « La dette croissante et l'élargissement de l'écart entre l'offre et demande » et, en 2004, « les décisions difficiles auxquelles faisait face l'Ontario, s'étendant de la production nucléaire à grande échelle à la gestion de la demande et à l'énergie distribuée ».

Avec l'EPS2005 l'attention s'est déplacée vers des sujets plus généraux tels que la convergence de l'énergie et des hautes technologies. Cinq secteurs importants de convergence entre l'énergie et les hautes technologies ont été présentés : les communications, les applications en temps réel, la protection grande surface, la mesure intelligente, et l'automatisation des systèmes énergétiques. En raison de la présence de l'industrie des communications fortement développée qui a fait connaître Ottawa sous le nom de la Silicon Valley du nord, le colloque a attiré une expertise de classe mondiale disponible à Ottawa, mais a également rejoint atteint plusieurs conférenciers distingués de l'extérieur du Canada.

Cette approche d'aborder des sujets d'intérêt plus large et d'avoir des conférenciers canadiens et internationaux, a été bien suivie en 2006. Le rôle crucial de la production distribuée et des réseaux intelligents est de plus en plus reconnu au niveau de l'économie, de l'énergie, et de l'environnement, qui forment une base pour la durabilité, la sécurité, et le développement d'une nation. L'année 2006 marqua le 150ième anniversaire de la naissance de Nikola Tesla, l'inventeur du système de courant alternatif qui fut également membre de l'organisme prédécesseur de l'IEEE - l'institut américain des ingénieurs électriques (AIEE) - Fellow, et vice-président de 1892-1894. L'EPS 2006 a été en

organisée sous le thème « du système de courant alternatif de Tesla à la production distribuée et aux réseaux intelligents ».

En 2007 le colloque a été renommé la conférence sur l'énergie électrique (EPC) 2007 et s'est concentrée sur les ressources d'énergie renouvelable. Ce sujet était identifié comme celui ayant suscité beaucoup d'attention au niveau mondial aux cours des dernières années. La conférence était commanditée par l'IEEE Canada et commanditée et organisée par les sections de l'IEEE de Montréal et d'Ottawa. C'était une prolongation/avantage supplémentaire naturelle des colloques EPS qui ont débuté à Ottawa et ont été organisés avec succès par la section de l'IEEE d'Ottawa pendant 6 années consécutives.

Le thème pour la conférence sur l'énergie électrique (EPEC) 2008 était « innovation énergétique ». Avec une attention portée sur les sujets suivants :

- Élargissement des limites de la transmission et de la distribution
- Production en expansion et énergie de substitution
- Technologies de réseaux intelligents
- Conservation et technologies d'efficacité énergétique

La conférence sur l'énergie électrique (EPEC) 2009 portait sur les systèmes énergétiques et technologies durables/renouvelables qui est l'un des secteurs de croissance dans le domaine de l'énergie dans le monde entier.

2012: Systèmes robustes d'énergies vertes pour une société viable

2011: Technologies avancées pour des systèmes énergétiques émergents

2010: Énergie durable pour un réseau intelligent

2009: Les Systèmes Énergiques Durables/Renouvelables Et Les Technologies

2008: Innovation énergétique

2007: Ressources d'énergie de substitution renouvelable & réseaux intelligents

2006: Du Système de Pouvoir de courant alternatif de Tesla à la Génération Distribuée et aux Grilles Élégantes

2005: La convergence de Pouvoir et de Technologies de pointe

2004: Les Choix d'Électricité Résistants d'Ontario

2003: Défis d'offre et la demande

2002: Les trucs et les Plaisirs dans les Marchés d'Électricité Évoluants

2001: La Dérégulation d'Électricité (à Ontario))

Les Symposiums de Génération électrique (EPS) ont clairement identifié un besoin pour un forum dans lequel les renseignements et les idées rattachées à l'Architecture des systèmes de Pouvoir peuvent être échangés parmi les experts, les professionnels de l'ingénierie et les communautés d'affaires et le grand public. La conférence de Génération électrique prochaine 2007 continuera à adresser ce besoin.

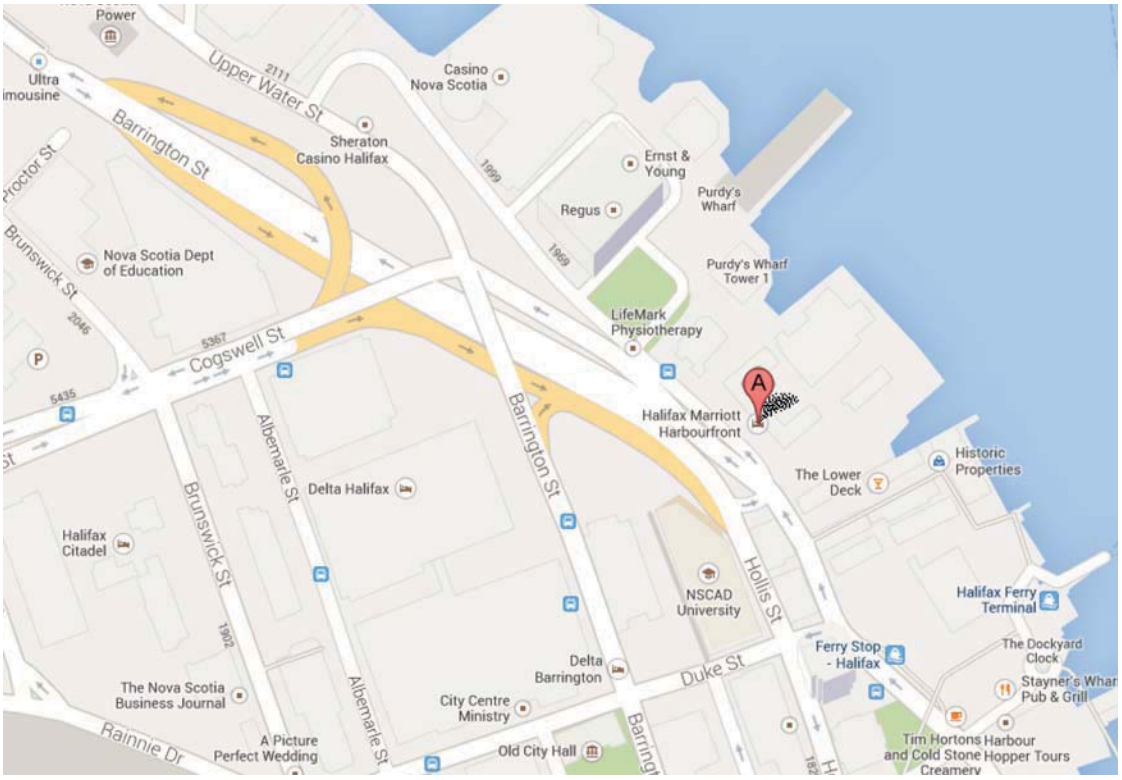
Fondateurs:
Dr. Wahab Almuhtadi
Dr. Branislav Djokic
Dr. Aidan Foss
Mr. Raed Abdullah

Contents

General Information / Informations générales

Local Map

Halifax Marriott Harbourfront Hotel, 1919 Upper Water Street, Halifax, Nova Scotia B3J 3J5 Canada. Phone: 902-421-1700, 1-800-943-6760



From Halifax airport:

1. Take the Nova Scotia 102 S ramp to Halifax/Dartmouth
2. Merge onto NS-102 S
3. Keep left to continue on NS-118 S, follow signs for Nova Scotia 118/Nova Scotia 107/Nova Scotia 111/Dartmouth/Halifax via Bridges
4. Continue onto Woodland Ave
5. Turn left onto Victoria Road/NS-322 S
6. Turn right onto Nantucket Ave
7. Continue onto Angus L. Macdonald Bridge
8. Turn right onto the ramp to Barrington Street
9. Sharp right onto North St
10. Take the ramp onto Barrington St
11. Turn left toward Upper Water St
12. Turn left onto Upper Water St, Marriott on right

Registration Desk

The Conference Registration Desk will be set up in the lobby of the Conference Centre outside the Sable Room for authors and attendees to register and pick up their conference packages.

Hours of operation are:
Wednesday, August 21: 8:30 to 17:00 and 18:00 to 21:00
Thursday, August 22: 8:00 to 19:00
Friday, August 23: 8:30 to 16:00

If you require emergency assistance outside these hours, please contact the Conference Office or one of the conference volunteers.

Meals and Inclusions

Each author, attendee, and full partner registration includes the following:

- Wednesday Welcome Reception Light snacks and soft drinks will be served; a cash bar will be available
- Thursday and Friday Breakfasts
- Thursday and Friday Lunches
- Thursday evening Banquet

See Program for times and locations

Extra tickets for lunches ($30) and the banquet ($100) will be available from the Registration Desk in the main lobby or the Conference Office.

Conference Proceedings USB Memory Stick

Each author and attendee full registration also includes the Conference Proceedings (on USB Memory Stick), and an attractive commemorative bag.

Additional copies of the Conference Proceedings on memory sticks are available to fully registered delegates during the conference from the Conference Office at a cost of $50 each. Following the conference, Proceedings will be available from the IEEE Publications.

Dietary Needs

If you indicated special dietary needs when you registered, we have accommodated you; however please identify yourself and specify your need to your server who will be glad to help at the meal time.

Internet Access

Internet wireless access is available for conference delegates.

Authors Screening Room

A computer is available for authors to verify the software compatibility of their audio/visuals for oral presentations. Authors are strongly encouraged to verify their presentation before their assigned session and be ready to load it onto the session computer in the appropriate room before the start of their session. Consult your Session Chair or Session Volunteer for accessibility times (normally 15 minutes before the session start). Authors are reminded that they must use the computers provided in the Session Rooms, and their presentations must be loaded onto these computers BEFORE the session start time. Laptop and other personal computer cannot be accommodated.

Messages and Help

A Message Board is available by the Conference Office for the use of attendees and for incoming messages.

If you require help, please contact the Conference Office or any of the conference volunteers.

Exhibits

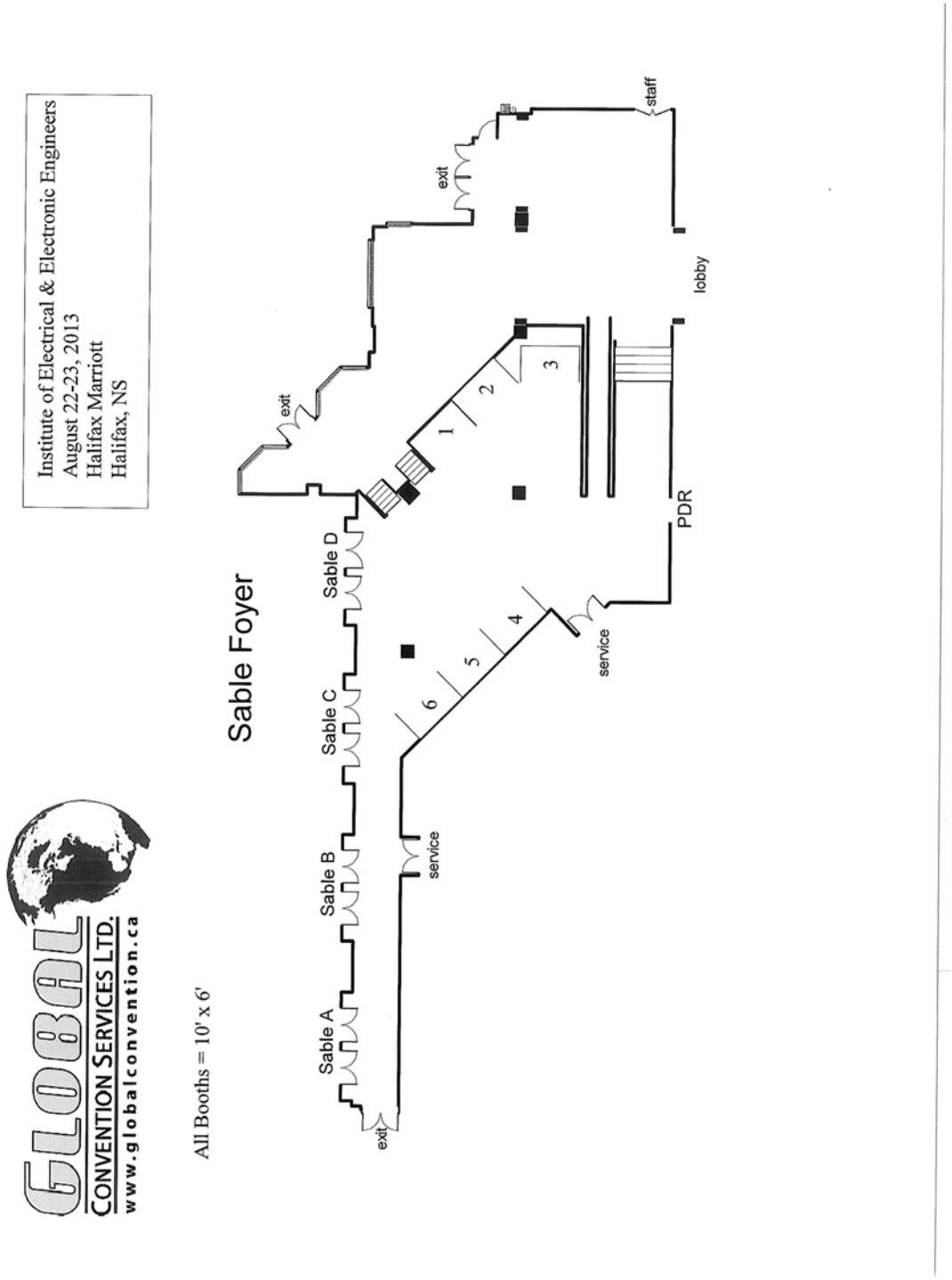
Exhibits will be located at the Hotel from 10:00 to 16:00 on Thursday and Friday, during the conference.

Local Attractions & Events

Halifax boasts numerous local attractions for your enjoyment. In addition, there are always a variety of interesting events scheduled in the area. Please refer to:
http://www.destinationhalifax.com/
http://www.novascotia.com/en/home/default.aspx

Our conference volunteers will be happy to assist.

Hotel Floor Layout



Welcome by the General Co-Chairs

It is a real pleasure to welcome you all to Halifax host of the IEEE Canada Electrical Power & Energy Conference 2013, with the theme "Innovative Leadership for Renewable Energy". IEEE Canada and the IEEE Canadian Atlantic Section are the sponsors. Emera and Nova Scotia Power are our major patrons.

Their staff members have done an extremely valuable job bringing this conference to fruition.Also, the Department of Electrical and Computer Engineering and the Faculty of Engineering and the Office of the Vice President of Research at Dalhousie University provided much needed support. Plus as usual valuable, support from the IEEE Montreal and Ottawa Sections have been very helpful. The conference organizing committee has been busy preparing for this week and we are delighted to have you visit with us during the latter part of August when our fair city shines and displays its true hospitable side. There is lots of entertainment and lots of waterfront activities that you will want to partake in. Halifax is a great city with a history unparalleled in Canada. There are numerous historical and cultural attractions and fine dining. We hope you have the time to sample some of these during your visit here.

It is worth noting that the law in our province requires targets specifying that by 2015, 25 per cent of Nova Scotia's electricity will be supplied by renewable energy. By 2020, 40% of our energy needs will be renewable.

We would like to take this opportunity to acknowledge the organizational capabilities of all who ensured that everyone put their best effort to make this conference a success. Most importantly, I wish to thank our steering and technical committee members Jason Gu, Voicu Groza, Wahab Almuhtadi, Raed Abdullah, Branislav Djokic, Amir Aghdam, and Sheldon Williamson. Dr. Gu has once again carried the lion's share of the technical program organization; many

thanks. To Vincent Zhang: Thanks for your patience with all the changes that we all wanted you to make; superb job.

We want to acknowledge with gratitude the support of Nova Scotia Power Inc, and in particular the leadership of Mr. Rob Bennett, P. Eng., Executive VP and COO, Emera Inc and his staff volunteers. Special thanks to David McGregor, Phil Zinck, Joy Brake, Jennifer Gough, Jaclyn Monaghan, Perry Mason, Baron Young, and Glen Rockett. You all have done a wonderful job. You all make us proud. To our sponsors, you make our conference look good with your tireless efforts.
We look forward to meeting you in Halifax and hope that you have a pleasant and rewarding experience. In due course, please come back to the shores of Nova Scotia.

Sincerely,

Ferial and Mo El-Hawary, General Co-Chairs

IEEE Canada President, Greeting to Conference Participants

IEEE Canada

On behalf of the IEEE Canada leadership team, it is a pleasure to welcome the attendees to the 2013 Electrical Power and Energy Conference (EPEC) in Halifax, Nova Scotia. EPEC is a major conference of IEEE Canada and we continue to be its largest sponsor.

The organizing committee has gone to great lengths to plan a memorable event and to ensure the presentations and content meet a high technical standard. These original technical papers and tutorials by experts on leading-edge topics cover the entire spectrum of electrical power application – from power systems resiliency to energy storage to asset management and maintenance to electrical grid computation methods and advanced power technology developments.

The purpose of this conference is to bring together electric power and energy systems experts from industry, academia, and other interested organizations to discuss the latest developments and challenges in the field – to foster

interaction and networking between industry and academia. This includes important discussions on electrical energy regulatory and policy issues.

As such, I strongly encourage all participants, whether this is your first time at EPEC or you have attended in the past, to make the most of this opportunity and to take the time to connect, collaborate, and communicate with fellow attendees. EPEC serves as an outstanding forum to share ideas, which in turn have the potential to become extraordinary technological innovations for the benefit of humanity.

In closing, I wish you an enjoyable, memorable, and productive time here at this year's EPEC and look forward to the partnerships that result from your networking and discussions.

Keith B. Brown, Ph.D., P.Eng., SMIEEE
2012-13 President, IEEE Canada
2012-13 Director/Delegate (Region 7), IEEE Inc.

EPEC 2013 Committee Members

General Conference Co-Chairs:	Ferial & Mo El-Hawary, Dalhousie University
Steering Committee Co-Chairs:	Dr. Amir Aghdam, P. Eng. Concordia University, Montreal
	Dr. Branislav Djokic, National Research Council, Ottawa
	Dr. Wahab Almuhtadi, P. Eng. Algonquin College, Ottawa, Ontario, Canada
Technical Committee Co-Chairs:	Dr. Sheldon Williamson Concordia University, Montreal
	Dr. Jason J. Gu, Dalhousie University

	Dr. Voicu Groza University of Ottawa
Organizing Committee:	Dr. Mo El-Hawary
	Dr. Ferial El-Hawary
	Phil Zinck, P. Eng
	Joy Brake, P. Eng
	Jaclyn Monaghan
	Baron Young
	Perry Mason, P. Eng
	Dave McGregor
	Jennifer Gough
Finance Chair:	Glen Rockett F.C. O'Neill Scriven and Assoc. Ltd. Canada
Industry Program Committee:	Dave McGregor Baron Young
Tutorial/Workshop Chair:	Jaclyn Monaghan
Publications Chair:	Joy Brake, P. Eng
Sponsorship Chair:	Phil Zinck, P. Eng
Exhibits Program:	Baron Young
Registration:	Mrs. Preeti Raman
Local Arrangements Chair:	Dr. Ferial El-Hawary
Publicity Chair	Mr. Raed Abdullah, P.Eng., SMIEEE IEEE Ottawa Section Chair
Webmaster:	Vincent Zhang Dalhousie University
IEEE Canada Conference Chair	Wahab Almuhtadi Algonquin College, Canada
IEEE Canada President:	Keith B. Brown

EPEC 2013 Program at a glance

Wednesday, August 21, 2013	
8:30 –17:00 18:00-21:00	**Registration** in the Sable Room Foyer (Hotel Lobby Level)
9:00-12:00	**Tutorial 1:** VSC MMC Modeling, Randy Wachal Location: Sable A
10:20-10:40	**Coffee Break and Exhibitions** in the Sable Room Foyer (Hotel Lobby Level)
12:30:13:30	**Lunch and Exhibitions** in the Sable Room D
14:00–17:00	**Tutorial 3:** Transmission Lines – Electricity's Highways, Bill Kennedy Location: Sable A
14:00–17:00	**Tutorial 4:** Advanced Power Electronics and Motor Drives Applications for Future Transportation Electrification, Sheldon S. Williamson Location: Sable B
14:00–17:00	**Workshop:** IEEE After Graduation Location: Sable C
19:00-21:00	**Welcome Reception** in the Sable Room

Thursday, August 22, 2013

8:00 –19:00	**Registration** in the Sable Room Foyer (Hotel Lobby Level)			
7:30 –8:30	**Breakfast** in the Sable Room Foyer (Hotel Lobby Level)			
9:00-9:10	**Official Opening Address** Dr. Mo El-Hawary, Dalhousie University, General Conference Chair Room: Sable Room			
9:10-10:00	**Keynote Speaker** Mr. Rob Bennett, Executive VP and COO, Emera Inc. Room: Sable Room			
10:00-10:20	**Coffee Break and Exhibitions** in the Sable Room Foyer (Hotel Lobby Level)			
10:20-12:00	Session TM 1 **Power Quality I** Room: Sable A	Session TM 2 **Computational Methods in Power Systems I** Room: Sable B	Session TM 3 **Energy Conservation and Efficiency I** Room: Sable C	Session TM 4 **Energy Storage I** Room: Sable D
12:30-14:00	**Lunch** in the Sable Room and **Exhibitions** in the Sable Room Foyer (Hotel Lobby Level)			

Thursday, August 22, 2013

12:30-14:00	**Lunch and Exhibitions**			
14:00-15:40	Session TP 1 **Power Quality II** Room: Sable A	Session TP 2 **Computational Methods in Power Systems II** Room: Sable B	Session TP 3 **Energy Conservation and Efficiency II** Room: Sable C	Session TP 4 **Energy Storage II** Room: Sable D
15:40–16:00	**Coffee Break and Exhibitions**			
16:00-17:40	Session TE 1 **Distribution Systems** Room: Sable A	Session TE 2 **Building Energy Systems** Room: Sable B	Session TE 3 **Energy Conservation and Efficiency III** Room: Sable C	Session TE 4 **Transmission Systems** Room: Sable D
19:00-22:00	**Banquet and Awards**			

Friday, August 23, 2013	
8:30 –16:00	**Registration** in the Sable Room Foyer (Hotel Lobby Level)
7:30-8:30	**Breakfast** in the Sable Room
9:15-9:30	**Welcome:** Dr. Mo El-Hawary, Dalhousie University, General Conference Chair
9:30 – 11:30	**Marine Energy Panel: Electric Power Integration Challenges and Solutions for Marine Energy** in the Sable Room
10:20-10:40	**Coffee Break and Exhibitions** in the Sable Room Foyer (Hotel Lobby Level)
12:30-14:00	**Lunch and Exhibitions** in the Sable Room Foyer (Hotel Lobby Level)

Friday, August 23, 2013

12:30-14:00	**Lunch and Exhibitions** in the Sable Room Foyer (Hotel Lobby Level)			
14:00-15:40	Session FP 1 **Smart Grid including HVDC and FACTS I** Room: Sable A	Session FP 2 **Integrated Energy System Planning I** Room: Sable B	Session FP 3 **Energy Conservation and Efficiency IV** Room: Sable C	Session FP 4 **Shipboard Electrical Engineering Design Challenges and Recommendation (workshop)** Room: Sable D
15:40-16:00	**Coffee Break and Exhibitions** in the Sable Room Foyer (Hotel Lobby Level)			
16:00-17:40	Session FE 1 **Smart Grid including HVDC and FACTS II** Room: Sable A	Session FE 2 **Integrated Energy System Planning II** Room: Sable B	Session FE 3 **Computational Methods** Room: Sable C	

Wednesday, August 21, 2013 09:00 – 17:00

Tutorial I 09:00 to 12:00 — Room: Sable A

VSC MMC Modeling - Randy Wachal

Abstract:

HVDC VSC technology has developed extremely quickly and offers many attractive alternatives over the more mature LCC HVDC technology. This workshop will discuss VSC converter theory, VSC system configuration, the operation of VSC technology, as well as a comparison of VSC and LCC HVDC technologies. There is significant operational flexibility of VSC convertors control systems. VSC Control methods are introduced. The simulation of VSC MMC technology presents several EMT simulation challenges. The current status of simulation and model development is presented. A sample of simulation results discussing the unique issues for start-up and Dc line recovery for VSC systems is introduced.

Presenter Bio:

Randy Wachal graduated from the University of Manitoba with BSc EE in 1981. Randy joined Manitoba Hydro where he worked for 13 years on the Nelson River HVDC System as a Control Design and Commissioning Engineer. In 1995, Randy joined the Manitoba HVDC Research Centre where he is currently the Engineering Systems Manager. Randy has been involved in specification, PSCAD simulation, commissioning and lifetime investigation studies on a number of HVDC and SVC systems. Randy is a professional engineer registered in Manitoba, a senior member of IEEE, a member of CIGRE, and currently CIGRE WG Conveyor of B4-57 on DC Grid HVDC VSC Modeling.

Tutorial III 14:00 to 17:00 — Room: Sable A

Transmission Lines – Electricity's Highways – Bill Kennedy

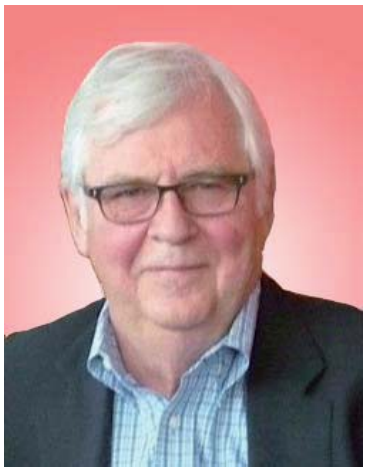
Abstract:

Electric transmission lines are a vital component of every electric power system. These lines connect load to generation. Transmission lines have different voltages and various lengths. Transmission lines are challenges for civil, mechanical and electrical engineers. This seminar will examine transmission lines from the electrical point of view. The approach taken uses a minimum of mathematics and emphasis is placed on

the physical aspects of transmission lines.
Topics to be covered:

- Surge Impedance Loading (SIL)
- Visualizing how a transmission line works using the St. Clair Curve
- Picking the correct voltage using the St Clair Curve
- Understanding reactive power flow on a transmission line
- Selecting the right conductor
- Calculating the voltage and angle across a transmission line
- Rating of transmission lines
- Conductor Impedances
- Trip & Reclose
- Illustrating the reliability of transmission lines
- Developing an economic conductor evaluation
- Using shortcut methods

By the end of the seminar the attendee will come away with a good understanding of the electrical properties of transmission lines



Presenter Bio:

W.O. (Bill) Kennedy is Principal of b7kennedy & Associates Inc., a consulting firm based in Calgary specializing in power system engineering. He has over 40 years' experience in the power system industry. He has appeared as an expert witness before the Alberta Utilities Commission and its predecessor board. He has worked in nine of Canada's ten provinces. Some of his Canadian experience includes the Nelson River HVDC project in Manitoba, transmission planning in Saskatchewan, generator additions to industrial facilities in British Columbia and extensive interconnection work in Alberta. His overseas experience includes 500 kV transmission in Pakistan, 400 kV transmission in Iran, 138 kV transmission in Peru and power supply to a pulp mill in the former Yugoslavia.

He is a registered Professional Engineer in Alberta, Saskatchewan, Manitoba and British Columbia. Active in IEEE, he is a Senior Member. In 1998, he made a Fellow of the Engineering Institute of Canada.
He can be reached during weekdays at this office. During weekends, he's usually skiing in the mountains in the Winter and biking the Summer.
His website is: www.b7kennedy.com

Tutorial IV 14:00 to 17:00 — Room: Sable B

Advanced Power Electronics and Motor Drives Applications for Future Transportation Electrification - Sheldon S. Williamson

Abstract:

Shortage of petroleum is considered as one of the most critical worldwide issues today. At the same time, as of today, car owners in Canada and North America, in general, spend more money at the gas station than they have done ever before. The most practical solution to the oil crisis problems lies in commercially available electric and plug-in hybrid electric vehicles (EVs and PHEVs). EVs and PHEVs present a significant opportunity to reduce greenhouse gases and dependence on foreign oil. Major car companies have already developed exciting new EVs, such as the Chevy Volt and the Nissan Leaf. The Tesla Roadster is a brand new product in the market as a result of a successful start-up company project. Finally, Toyota most recently developed the plug-in model of the popular Prius. Thus, it is clear that new EVs are being introduced at an increasing rate.

In order to convince customers to buy EVs, urban communities will need to enable the necessary large-scale charging infrastructure. An EV can reduce fuel consumption by charging its battery from the utility grid. The typical battery charging time for EVs and PHEVs is 6-8 hours, if charged slowly at home. However, if the charging is required to be done at a faster rate, it can be performed in less than 20 minutes, at a charge station (instead of a gas station). However, the required charging energy will have a major impact on the utility. Alternatively, green renewable energy sources, such as photovoltaics (PV) and wind energy could be used to provide the necessary charging energy at a cleaner and cheaper rate. Such energy sources can also be installed at home or in urban buildings in large cities, thereby allowing for battery charging during work hours. This lecture will start-off by presenting the structure and basic design aspects of EVs and PHEVs. Future trends in EV manufacturing will also be presented. Integration of EVs with green, renewable energy sources will be presented, along with an introduction to the design of such systems. Various charging scenarios for EV batteries will be presented, when charging at home, at work, or in between routes. Future advanced battery charging infrastructures, such as from combined PV and grid sources, as well as inductive surface charging infrastructures will be presented. A brief design for an inductive surface charging infrastructure for an urban building scenario will be presented. Finally, Concordia University's efforts in research and teaching with regards to integration of renewable energy and electric vehicles will also be presented.

Presenter Bio:

Sheldon S. Williamson (S'01–M'06) received his Bachelor of Engineering (B.E.) degree in Electrical Engineering with high distinction from University of Mumbai, Mumbai, India, in 1999. He received the Master of Science (M.S.) degree in 2002, and the Doctor of Philosophy (Ph.D.) degree (with Honors) in 2006, both in Electrical Engineering, from the Illinois Institute of Technology, Chicago, IL, specializing in automotive power electronics and motor drives, at the Grainger Power Electronics and Motor Drives Laboratory. Dr. Williamson is an Associate Professor within the Department of Electrical and Computer Engineering, at Concordia University, Montreal, Canada, where he has been working since June 2006. His main research interests include the study and analysis of electric drive trains for electric, hybrid electric, plug-in hybrid electric, and fuel cell vehicles. His research interests also include modeling, analysis, design, and control of power electronic converters and motor drives for land, sea, air, and space vehicles, as well as the power electronic interface and control of renewable energy systems. Dr. Williamson has offered numerous conference tutorials, lectures, and short courses in the areas of Automotive Power Electronics and Motor Drives. He is the principal author/co-author of over 150 journal and conference papers. He is also the author of 4 chapters in the book entitled, Vehicular Electric Power Systems (Marcel Dekker, 2003). He is also the author of 2 chapters in the book entitled, Energy Efficient Electric Motors (CRC Press, 2004). In addition, Dr. Williamson has been selected as the General Chair for the IEEE Transportation Electrification Conference, to be held in Detroit, Michigan, in June 2014. He also served as the Technical Program Chair for various conferences, including the Annual Conference of the IEEE Industrial Electronics Society (IEEE IECON 2012), the IEEE Vehicle Power and Propulsion Conference (2011), and the IEEE Canada Electrical Power and Energy Conference (2009). Dr. Williamson also served as the Project Coordination and Awards Chair at the 2007 IEEE Canada Electrical Power Conference, Montreal, Canada. He was the Conference Secretary for the 2005 IEEE Vehicle Power and Propulsion Conference, Chicago, Illinois.

Dr. Williamson is also the beneficiary of numerous awards and recognitions. He was the recipient of the prestigious "Paper of the Year" award, for the year 2006, in the field of Automotive Power Electronics, from the IEEE Vehicular Technology Society (IEEE VTS). In addition, he also received the overall "Best Paper" award at the IEEE PELS and VTS Co-sponsored Vehicle Power and Propulsion Conference, in Sept. 2007. He was awarded the "Best Paper" award at the IEEE Canada Electrical Power and Energy Conference, in Halifax, Nova Scotia, Canada, in Aug. 2010. He was awarded the prestigious Sigma Xi/IIT Award for Excellence in University Research, for the academic year 2005-2006. In 2006, he also received the "Best Research Student"

award, Ph.D. category, within the ECE Department, at the Illinois Institute of Technology, Chicago. Dr. Williamson is a member of the IEEE. He currently serves as a Distinguished Lecturer of the IEEE Vehicular Technology Society (VTS). He also serves as Associate Editor for the IEEE

Transactions on Industrial Electronics and the IEEE Transactions on Power Electronics. He also serves as the IEEE Industry Applications Society (IAS) Chapter Chair for the IEEE Montreal section. He is a member of the IEEE PELS, IES, and VTS.

Session: Workshop **Invited Speaker: James N. Riess, PE, Immediate Past IEEE Region 4 Director** **Chair: Dr. Ferial El-Hawary**	**Room: Sable D**
14:00 – 17:00	***IEEE After Graduation***

Thursday, August 22, 2013 09:00 – 12:00

9:00	***Opening Ceremony***	**Room: Sable**
Keynote Speaker **Rob Bennett, Executive VP and COO, Emera Inc.**		**Room: Sable**

10:20 – 12:00	***Oral Sessions***
Session TM1: Power Quality I **Chair:** Petr Musilek/ Walid Morsi	**Room: Sable A**

10:20	**Prediction of PV Power Quality: Total Harmonic Distortion of Current.** Petr Musilek (University of Alberta); James Rodway (University of Alberta); Stanislav Misak (VSB-Technical University of Ostrava); Lukas Prokop (VSB-Technical University of Ostrava)
10:40	**Application of PSO and Fuzzy Logic for Underfrequency Load Shedding.** Walid Morsi (University of Ontario Institute of Technology); Matt Gray (UOIT)
11:00	**Time-varying Power Quality in Unbalanced Three-phase Systems .** Walid Morsi (University of Ontario Institute of Technology); Matt Gray (UOIT); Saurabh Talwar (UOIT); Taufique Zafar (UOIT)
11:20	**Investigation on the System Grounding Types for Low Voltage Direct Current Systems.** Xiaoyu Wang (Carleton Univeristy); Lulu Li (Chongqing University; China); Jing Yong (Chongqing University; China); Liqiang Zeng (Chongqing University;China)
11:40	**CDM Application on Power System as a Load Frequency Controller.** Yaser Soliman Qudaih (Kyushu Institute of Technology); Yasunori Mitani (Kyushu Institute of Technology); Michael Bernard (Kyushu Institute of Technology); Tarek Mohamed (Aswan University)
Session TM2: Computational Methods in Power Systems I **Room: Sable B** **Chair:** U. D. Annakkage/Hung Huynh	
10:20	**Investigation of the Applicability of Lyapunov Exponents for Transient Stability Assessment.** Darshana Wadduwage (Univeristy of Manitoba); Janath Geeganage (University of Manitoba); Udaya Annakkage (University of Manitoba); Christine Wu (University of Manitoba)
10:40	**AMPds: A Public Dataset for Load Disaggregation and Eco-Feedback Research.** Stephen Makonin (Simon Fraser University); Fred Popowich (Simon Fraser University); Lyn Bartram (Simon Fraser University); Bob Gill (British Columbia Institute of Technology); Ivan Bajic (Simon Fraser University)

11:00	**A Two-Stage Method for Assessment of Voltage Stability in Power System with Renewable Energy.** Yang Wang (Tianjin University); Hsiao-Dong Chiang (School of Electrical and Computer Engineering; Cornell University); Tao Wang (School of Electrical and Computer Engineering; Cornell University)
11:20	**Vulnerability Analysis of Power Grid Network against Failures by State Classification .** Akansha Singh (International Institute Of Information Technology; Bangalore); Jyotsna Bapat (IIIT-B); Debabrata Das (IIIT-B)
Session TM3: Energy Conservation and Efficiency I **Room: Sable C** **Chair:** Geza Joos/Phil Zinck	
10:20	**Dispatch Techniques for Canadian Remote Communities with Renewable Sources.** Juan Clavier (McGill University); Michael Ross (Mcgill University); Geza Joos (Mcgill University)
10:40	**Voltage Stability and Power Quality Issues of Wind Farm with Series Compensation.** Md. Shihanur Rahman (UNSW Canberra); Tahsin Fahima Orchi (UNSW Canberra); Hemanshu Pota (UNSW Canberra); Md. Jahangir Hossain (Griffith University)
11:00	**Impact of V2G on Real-Time Adaptive Volt/VAr Optimization of Distribution Networks .** Moein Manbachi (SFU); Hassan Farhangi (British Columbia Institute of Technology); Ali Palizban (British Columbia Institute of Technology); Siamak Arzanpour (Simon Fraser University)
11:20	**Reduced Model and Control of Diode-Interfaced Offshore Wind Farms with DC Power Systems.** Shadi chuangpishit (uoft); Ahmadreza Tabesh (Isfahan University of Technology)
11:40	**Distributed Generation Grid Connection Experiences Minimizing High Voltage Equipments .** Aidan Foss (ANF Energy Solutions Inc.); Kalle Leppik (ANF Energy Solutions Inc.)
Session TM4: Energy Storage I **Room: Sable D** **Chair:** Petr Musilek/Perry Mason	

10:20	**Managing the Energy-for-Data Exchange in Remote Monitoring Systems.** Petr Musilek (University of Alberta); Asher Watts (University of Alberta); Loren Wyard-Scott (University of Alberta)
10:40	**Optimization of Compressed Air Storage's Volume for a Stand-Alone Wind-Diesel Hybrid System .** Adel Merabet (Saint Mary's University); Hussein IBRAHIM (TechnoCentre éolien); Ali Bourji (Lebanese University); Mazen Ghandour (Lebanese University)
11:00	**Batteries-Supercapacitors Storage Systems for a Mobile Hybrid Renewable Energy System.** Daniella Esperanza Pacheco Catalán (Centro de Investigación Científica De Yucatán; A. C.); Manuel Israel Flota Bañuelos (Universidad Autónoma de Yucatán); José Manuel Sandoval (Centro de Investigación Científica de Yucatán); Ysmael Verde (Instituto Tecnológico de Cancún); María de Jesus Espinosa (Centro de Investigación Científica de Yucatán A.C.)
11:20	**An Optimal Battery Energy Storage Charge/Discharge Method.** Stephen Cialdea (Worcester Polytechnic Institute); John Orr (Worcester Polytechnic Institute); Alexander Emanuel (Worcester Polytechnic Institute); Tan Zhang (Worcester Polytechnic Institute)
11:40	**The Influence of Parallel Capacitor to Output Voltage in High-Frequency ESP Power Supply.** Kexin Zhang (Harbin Institute of Tec;Harbin Institute of Technology)

Thursday, August 22, 2013 14:00 – 15:40

14:00 – 15:40	***Oral Sessions***
Session TP1: Power Quality II **Chair: Xiaoyu Wang /Walid Morsi**	**Room: Sable A**

14:00	**Harmonic Analysis of Power System with Wind Generations and Plug-in Electric Vehicles.** Ze Zhang (Tianjin University); Hsiao-Dong Chiang (School of Electrical and Computer Engineering; Cornell University); Tao Wang (School of Electrical and Computer Engineering; Cornell University)
14:20	**Induction Motor Interactions after Voltage Sags.** Xiaoyu Wang (Carleton Univeristy); Zhijun Wang (Shandong University; China)
14:40	**Performance of a Three-Level H-bridge Series Voltage Compensation System under Multiple Loop Control Strategy.** John E. Quaicoe (Memorial University of Newfoundland); Amir Tahavorgar (Memorial University of Newfoundland)
15:00	**Advanced Power Quality Laboratory.** Thomas Marshall (McMaster University); Nafia Al-Mutawaly (McMaster University / Mohawk College)
15:20	**Low and High Order Harmonic Emission Quantification of Plug-in Hybrid and Battery Electric Vehicles .** Walid Morsi (University of Ontario Institute of Technology); Matt Gray (UOIT); Kassem Jamal (UOIT)
Session TP2: Computational Methods in Power Systems II **Chair: Benjamin Jeyasurya/Jaclyn Monaghan**	**Room: Sable B**
14:00	**Comparison of Biogeography Based Optimization and Genetic Algorithm for Power System Damping-Based Controllers Design.** Ehab El-Saadany (University of Waterloo); Magdy Salama (University of Waterloo); Amr Said (U Waterloo)
14:20	**Determination of Power Transfer Capability by Incremental Changes.** MUTLU YILMAZ (); Bulent Bilir (Northeastern University)
14:40	**Dynamic State Estimation in Power Systems Using Kalman Filters.** Benjamin Jeyasurya (Memorial University of Newfoundland); Hamed Tebianian (Memorial University)
15:00	**Measurement-Based Analysis of Power System Small Signal Stability.** Dan Lin (Memorial University of Newfoundland); Benjamin Jeyasurya (Memorial University of Newfoundland)

Session TP3: Energy Conservation and Efficiency II **Room: Sable C** **Chair: Adel Merabet/Bill Kennedy**	
14:00	**Open-Loop Maximum Power Point Tracking Strategy for Marine Current Turbines Based on Resource Prediction.** Francisco Paz (University of British Columbia); Martin Ordonez (University of British Columbia)
14:20	**DSP-Based SVM Generation Algorithm For DFIM.** Wamkeue René (UQAT); Jean-Jacques Beaudoin (Université du Québec en Abitibi-Témiscamingue); Djilali kairous (uhbc)
14:40	**Modeling and Simulation of a Novel Small-Scale Compressed Air Hybrid System for Stand-Alone Off-Grid Applications.** Adel Merabet (Saint Mary's University); Hussein IBRAHIM (TechnoCentre éolien); Adrian Ilinca (Université du Québec à Rimouski); Jean Perron (Université du Québec à Chicoutimi)
15:00	**Control System Simulation for Stand-Alone Hybrid Wind Diesel System.** Adel Merabet (Saint Mary's University); Hussein IBRAHIM (TechnoCentre éolien); Rachid Beguenane (Royal Military College); Jogendra Thongam (Royal Military College); Vigneshwaran Rajasekaran (Saint Mary's University; Halifax; Canada)
15:20	**Modeling Solar Photovoltaic Cell and Simulated Performance Analysis of a 250W PV Module.** Adel Merabet (Saint Mary's University); Hussein IBRAHIM (TechnoCentre éolien); Rachid Beguenane (Royal Military College); Md. Aminul Islam (Saint Mary's University)
Session TP4: Energy Storage II **Room: Sable D** **Chair: Alexander Emmanuel/Baron Young**	
14:00	**Electric Energy Cost Reduction by Shifting Energy Purchases from On-Peak Times.** Stephen Cialdea (Worcester Polytechnic Institute); John Orr (Worcester Polytechnic Institute); Alexander Emanuel (Worcester Polytechnic Institute); Tan Zhang (Worcester Polytechnic Institute)
14:20	**Demand Response and Energy Storage in MV Islanded Microgrids for High Penetration of Renewables .** Walied Alharbi (University of Waterloo); Kankar Bhattacharya (University of Waterloo)

14:40	**Grid Connected Dispatch-able Operating Modes for Hydrogen Production from Renewable Energy Sources .** khaled Nigim (Lambton College); Joshua McQueen (Lambton College)
15:00	**Use of Energy Storage for Belgian Power Network.** Brecht Zwaenepoel (); Mohammad Moradzadeh (UGent); Lieven Vandevelde (UGent)

Thursday, August 22, 2013 16:00 – 17:40

16:00 – 17:40	***Oral Sessions***
Session TE1: Distribution Systems **Chair: D. Bouchard/Jaclyn Monaghan**	**Room: Sable A**
16:00	**Management of a Smart Grid with Controllable Delivery of Discrete Levels of Energy.** Roberto Rojas-Cessa (New Jersey Institute of Technology); Yifei Xu (New Jersey Institute of Technology); Haim Grebel (New Jersey Institute of Technology)
16:20	**Trends in Naval Ship Propulsion Motor Technology.** Aime Francis Okou (Royal Military College of Canada); Mohammed Tarbouchi (Royal Military College of Canada); Rachid Beguenane (Royal Military College); Jogendra Singh Thongam (Royal Military College of Canada); Derrick Bouchard (Royal Military College of Canada)
16:40	**Advanced Power System Laboratory.** Nafia Al-Mutawaly (McMaster University / Mohawk College); Jasmeet Bhattal (McMaster University); Gobi Jayakumar (McMaster University); Muhammad Sarwar (McMaster University)
17:00	**A New Selection Criteria for Combined Optimal Allocation of RESs based DGs in Restructured Electricity Market.** Amit Kumar Singh (IIT Patna; India)

17:20	**Future Distribution Feeder Protection using Directional Overcurrent Elements.** John Kumm (POWER Engineers); Doug Jones (POWER Engineers)
Session TE2: Building Energy Systems **Room: Sable B** **Chair: Adel Merabet/Qinmin Yang**	
16:00	**Model Predictive Control of Chilled Water Temperature for Centralized HVAC Systems.** Qinmin Yang (); Jianhua Zhu (Zhejiang University); Jiangang Lu (Zhejiang University)
16:20	**Design and Implementation of a Web-based Energy Management Application for Smart Buildings.** Yunfei Qu (Tianjin University); Hongjie Wang (Tianjin University); Shauming Lun (Intelicis Corporation); Hsiao-Dong Chiang (School of Electrical and Computer Engineering; Cornell University); Tao Wang (School of Electrical and Computer Engineering; Cornell University)
16:40	**Predictive Algorithm for System Architecture of the Sustainable Energy System for Buildings.** Vladimir Grebenyuk (Ascent Systems Technologies)
17:00	**Demand Request Dispatch Approach for Electric Distribution Systems.** Vinay Sharma (London Hydro Inc.); Luke Seewald (London Hydro Inc.)
Session TE3: Energy Conservation and Efficiency III **Room: Sable C** **Chair: Reza Iravani/Phil Zinck**	
16:00	**Control System for Hybrid Wind Diesel Based Microgrid.** Adel Merabet (Saint Mary's University); Hussein IBRAHIM (TechnoCentre éolien); Vigneshwaran Rajasekaran (Saint mary's University); Rachid Beguenane (Royal Military College); Jogendra Thongam (Royal Military College)
16:20	**A Review of the Impacts of Multiple Wind Power Plants on Large Power Systems Dynamics.** Ahmed El-Klhy (U Toronto); Reza Iravani (U Toronto)
16:40	**Half-Bridge Based Multilevel Inverter Generating Higher Voltage and Power.** kamal al-haddad (École de technologie supérieure); Hani Vahedi (ETS)

17:00	**Flexible Programming in Connections Between Supercapacitors in a Module to Maximizing the Energy Discharge Time.** María Guadalupe Reveles Miranda (Centro de Investigación Científica de Yucatán); Daniella Esperanza Pacheco Catalán (Centro de Investigación Científica De Yucatán; A. C.); Manuel Israel Flota Bañuelos (Universidad Autónoma de Yucatán)
17:20	**Diesel Consumption in a High Penetration Remote Hybrid Power System with a Pumped Hydro and Battery Storage.** Tariq Iqbal (); Md. Rahimul Asif (Memorial University of Newfoundland)
Session TE4: Transmission Systems **Chair: Roger Wiget/Baron Young**	**Room: Sable D**
16:00	**Power Grid Protection against Geomagnetic Disturbances (GMD).** Fred Faxvog (University of Minnesota)
16:20	**Wide-area Control for Damping Inter-area Oscillations: A Comprehensive Review.** Mohamed Younis (University of Toronto); Reza Iravani (University of Toronto)
16:40	**DC Optimal Power Flow Including HVDC Grids.** Roger Wiget (ETH Zurich); Göran Andersson (ETH Zurich)
17:00	**COMPARISON OF BIO-FUELS USED IN CO-GENERATION BASED SUGAR INDUSTRY OF PUNJAB: A CASE STUDY.** Rubalpreet Saini (Guru Nanak Dev Engineering College)
17:20	**Optimal Partitioning of Power Networks and Locating Pilot Buses proposed for Voltage Regulation.** Hasan Mehrjerdi (IREQ)

Friday, August 23, 2013 09:15 – 11:30

9:15	**Welcome:** Dr. Mo El-Hawary, Dalhousie University

09:30-11:30	**Room: Sable**
Marine Energy Panel: Electric Power Integration Challenges and Solutions for Marine Energy **Panel Chair: Ghanashyam Ranjitkar, Natural Resources Canada**	
Panel members	• Melanie Nadeau - Emera • Tony Wright – Fundy Ocean Research Centre for Energy • Greg Trowse – Fundy Tidal Inc. • Aaron MacNeil– Dalhousie University
Marine Energy is one of the major potential sources of renewable electricity power for the near future. Countries like Canada, USA and Europe have significant marine energy potential and they have made significant investment to develop the marine energy industry. This industry has been progressing very quickly in last 5 to 10 years, and there are number of demonstration projects utilizing wave, tidal and river current resources. The projects have been, as small as, 5 kW to tens of MWs being planned in North America and Europe. Much of the focus has been developing the devices or the energy converters that would be efficient, cost effective and reliable. The energy converters are converging into select number of concepts that are likely to be industry standard, similar as in the wind energy. It does seem that time is appropriate to address the need for transmission of electric power from the marine energy converters that are located off-shore, normally 100's of meters or even kilometers from the shore. The cost of subsea cables used for transmission is high. There are number of technical, economical and reliability challenges to transmit power for the devices that are installed off-shore. This panel will provide insight into interconnecting these devices to the local transmission and distribution network.	

Friday, August 23, 2013 14:00 – 15:40

14:00 – 15:40	***Oral Sessions***
Session FP1: Smart Grid including HVDC and FACTS I **Chair: Wahab Almuhtadi/Hung Huynh**	**Room: Sable A**

14:00	**Phasor-Assisted Automated Topology Processing for State Estimators.** Luigi Vanfretti (KTH Royal Institute of Technology; Electric Power Systems Department); Mostafa Farrokhabadi (University of Waterloo)
14:20	**An Intelligent Multi-Agent Approach to Enhance the Transient Stability of a Smart Power Grid.** Md. Shihanur Rahman (UNSW Canberra); Tahsin Fahima Orchi (UNSW Canberra); Hemanshu Pota (UNSW Canberra)
14:40	**Application of Multi-Agent Control to Multi-Terminal HVDC Systems.** mohammad nazari (KTH Royal Institute of Technology; Electric Power Systems Department); mehrdad Ghandhari (KTH Royal Institute of Technology)
15:00	**Co-Simulation of Real-Time Decentralized Vehicle/Grid (RT-DVG) Coordination Scheme for E-mobility within Nanogrids.** Samah Mansour (McGill University); Intissar Harrabi (INRS-EMT); Geza Joos (McGill); Martin Maier (INRS-EMT)
15:20	**Optimizing Wireless Performance of Current Metering and Consumption Control in Commercial Buildings.** Wahab Almuhtadi (;); Wahab Almuhtadi (Algonquin College); Kelvert Ballantyne (Algonquin College); Shilian Zhao (Algonquin College); Natalia Gorbenko (Algonquin College); Denis Gallant (Triacta Power Technologies; Inc.)
Session FP 2: Integrated Energy System Planning I **Chair: Ahmed Cheriti/Phil Zinck**	**Room: Sable B**
14:00	**A Game Theoretic Framework for DG Optimal Contract Pricing .** Ashkan Sadeghi Mobarakeh (University); Abbas Rajabi Ghahnavieh ()
14:20	**A real time energy management for electrical vehicle using combination of rule-based and ECMS.** Hanane HEMI (University of Moncton); jamel ghouili (); ahmed cheriti ()
14:40	**Hybrid SVM & ARMAX Based Mid-term Electricity Market Clearing Price Forecasting.** Xing Yan (University of Saskatchewan); Nurul Chowdhury (University of Saskatchewan)

15:00	**A hybrid Genetic Radial Basis Function Network with Fuzzy Corrector for Short Term Load Forecasting.** Ehab El-Saadany (University of Waterloo); Wael Ghareeb (University of Waterloo)
15:20	**Microgrid Level Competitive Market Using Dynamic Matching.** Swapan Sikdar (Queen's Univeristy); Karen Rudie (Dept. of Electrical and Computer Engg.; Queen's University)
Session FP 3: Energy Conservation and Efficiency IV **Chair: Adel Merabet/Perry Mason**	**Room: Sable C**
14:00	Novel Method of Pre-determining Induction Machine Parameters and Energetic Efficiency . Adel Merabet (Saint Mary's University); Valentin Giurgiu (;); Voicu Groza (University of Ottawa); Constantin Pitis (BC Hydro- Power Smart Engineering)
14:20	Comparison of Bio-Fuels Used In Co-Generation Based Sugar Industry of Punjab: A Case Study. Charan Preet Singh Gill (Guru Nanak Dev Engineering College; Gill Road; Gill Park; Ludhiana; Punjab; India); Rubalpreet Saini (Guru Nanak Dev Engineering College); Harmeet Singh Gill (Guru Nanak Dev Engineering College; Ludhiana;)
14:40	Electric Water Heaters Control Strategy for Providing Regulation Services and Load Leveling in Electric Power Systems. Simon Ayoub (University of Sherbrooke)
15:00	A Revised Incremental Conductance MPPT Algorithm for Solar PV Generation Systems. Xiaoyu Wang (Brookhaven National Laboratory); Meng Yue (Brookhaven National Laboratory)

Session FP 4: Workshop **Invited Speaker: Moni Islam, IEEE Standard Association** **Chair: Dr. Ferial El-Hawary**	**Room: Sable D**
14:00 – 17:40	**Shipboard Electrical Engineering Design Challenges and Recommendation**

Friday, August 23, 2013 16:00 – 17:40

16:00 – 17:40	***Oral Sessions***
Session FE1: Smart Grid including HVDC and FACTS II **Room: Sable A** **Chair: Hussein Mouftah/Hung Huynh**	
16:00	**A Modular Solid State Transformer with a Single-Phase Medium-Frequency Transformer.** Geza Joos (McGill University); Ali Shojaei (McGill University)
16:20	**E-Mobility in Smart Microgrids: A New Research Area for Communications Networks.** Intissar Harrabi (INRS-EMT); Martin Maier (INRS-EMT)
16:40	**A Game Theoretic Approach for Plug-in Hybrid Electrical Vehicle Load Management in the Smart Grid.** Naouar Yaagoubi (University of Ottawa); Hussein T. Mouftah (university of Ottawa)
17:00	**Time Slot Allocation in WSNs for Differentiated Smart Grid Traffic.** Hussein Mouftah (); Irfan Al-anbagi (University of Ottawa); Melike Erol-Kantarci (University of Ottawa)
17:20	**A Risk Assessment Framework for the Smart Grid.** Voicu Groza (University of Ottawa); Dan Krewski (University of Ottawa); Greg Paoli (Risk Science International; Ottawa)
Session FE2: Integrated Energy System Planning II **Chair: Ehab El-Saadany/Phil Zinck** **Room: Sable B**	
16:00	**Effect of Network Configuration on Maximum Loadability and Maximum Allowable DG penetration in Distribution Systems .** Ehab El-Saadany (University of Waterloo); Aboelsood Zidan (University of Waterloo)
16:20	**Accommodating high penetration of PEV in distribution networks.** Ehab El-Saadany (University of Waterloo); Mostafa Shaaban (U Waterloo)

16:40	**In Search of An Optimization Tool for Renewable Energy Resources: Homer vs. In-House Model.** Amar Kumar (Tecsis Corporation)
17:00	**Oil Barrel Price Forecasting: A Case Study of Saudi Arabia**. M.E. El-Hawary (Dalhousie University); Bandar Mutwali (Dalhousie University)
17:20	**An Overview of Inverter Topologies for Photovoltaic Electrical Energy.** M.E. El-Hawary (Dalhousie University); Hamed Aly (Dalhousie University); Shadi Shehadeh (Dalhousie University)
Session FE3: Computational Methods **Chair:** Benjamin Jeyasurya **/Perry Mason**	**Room: Sable C**
16:00	**Dynamic State Estimation in Power Systems Using Kalman Filters .** Benjamin Jeyasurya (Memorial University of Newfoundland); Hamed Tebianian (Memorial University)
16:20	Differential Protection of Transformer Based on Artificial Neural Network and Programmable Logic. Ricardo Caneloi Santos ()
16:40	**Measurement-Based Analysis of Power System Small Signal Stability .** Dan Lin (Memorial University of Newfoundland); Benjamin Jeyasurya (Memorial University of Newfoundland)
17:00	**The Influence of Parallel Capacitor to Output Voltage in High-Frequency ESP Power.** Kexin Zhang (Harbin Institute of Tec;Harbin Institute of Technology)

Session FP 4: Workshop **Invited Speaker: Moni Islam, IEEE Standard Association** **Chair: Dr. Ferial El-Hawary**	**Room: Sable D**
14:00 – 17:40	**Shipboard Electrical Engineering Design Challenges and Recommendation**

Thank you to Our Patrons & Sponsors

Patrons

Nova Scotia POWER An Emera Company

Brookfield

CBCL

DALHOUSIE UNIVERSITY *Inspiring Minds*

HUBBELL

EPEC 2013 IEEE Sponsors

IEEE Canada

IEEE Canadian Atlantic Section

The Canadian Atlantic Section of the Institute of Electrical and Electronics Engineers

IEEE Canada .....http://www.ieee.ca/
IEEE Canadian Atlantic Section.....http://cas.ieee.ca
IEEE Power & Energy Society .....http://www.ieee.org/portal/site/pes/