

# Transmission Lines for the 21<sup>st</sup> Century: Design & Asset Management Workshop

October 2-3, 2014 • Niagara Falls, ON, CAN

This Workshop is Organized with the Support of the Transmission Overhead Design & Extreme Event Mitigation (TODEM) and Transmission Line Asset Management (TLAM) Interest Groups.



The purpose of this workshop is to provide the industry with the best available information on overhead line design and asset management issues, challenges and opportunities. The workshop will provide a platform to exchange information on recent technological advancement and new initiatives.

Key experts will deliver topic-specific presentations, followed by breakout sessions to discuss these issues in more detail. Each of these presentations will identify problems, gaps and further needs for research and development as well as point out new opportunities. A final workshop report will be compiled after the event and will be made available to all participants.

## Sessions

- Wind Load Assessments on Overhead Lines (Synoptic and Non-Synoptic)
- Emergency Restoration of Overhead Lines
- Foundations of Overhead Lines - Design and Installation Issues and Challenges
- Asset Condition Assessment (Inspection and Maintenance)
- Mitigation Against Catastrophic Loss of Power Lines
- Recent Advancement on Innovative Conductor Design and HTLS Performance
- Asset Health Index and Life Cycle Costs of Overhead Lines
- Deicing Techniques and Methodologies

## TODEM & TLAM Participating Organizations



# Transmission Lines for the 21st Century: Design & Asset Management Workshop



Workshop Chair



**Dr. Asim Haldar, Nalcor Energy (Canada)**

Key Speakers



**Overhead Line Design**  
**Dr. Konstantin O. Papailiou,**  
Chairman CIGRE Study Committee  
B2 Overhead Lines (Switzerland)



**Asset Management**  
**Mr. Mike Penstone, Vice President**  
of Network Development and  
Regional Planning, Hydro One  
(Canada)

DAY 1: Thursday, October 2, 2014

<b>07:30 - 08:30</b>	<b>REGISTRATION - CONTINENTAL BREAKFAST</b>
08:30 - 08:45	Opening Remarks <i>Mr. George Juhn, CEATI International (Canada)</i>
08:45 - 08:55	Workshop Overview - Expected Results <i>Dr. Asim Haldar, Nalcor Energy (Canada)</i>
08:55 - 09:45	<b>Opening Speaker: Overview of Overhead Line Design Issues and Challenges</b> <i>Dr. Konstantin O. Papailiou, Chairman - CIGRE Study Committee SC B2 (Switzerland)</i>
09:45 - 10:35	<b>Opening Speaker: Overview of Overhead Line Asset Management Issues and Challenges</b> <i>Dr. Mike Penstone, Hydro One (Canada)</i>
<b>10:35 - 10:50</b>	<b>NETWORKING BREAK</b>
10:50- 11:30	<b>Session 1: Wind Load Assessments on Overhead Lines (Synoptic and Non synoptic)</b> <i>Dr. John Holmes, JDH Consulting (Australia)</i>
11:30 - 12:30	<b>Session 2: Emergency Restoration of Overhead Lines</b> <i>Dr. Jerry Wong, Florida Power &amp; Light (USA) and Dr. Anand Goel, CEATI International (Canada)</i>
<b>12:30- 01:30</b>	<b>NETWORKING LUNCH</b>
01:30 - 02:15	<b>Session 3: Foundations of Overhead Lines- Design and Installation Issues and Challenges</b> <i>Dr. Tony Digoia, Digoia Gray Associates (USA)</i>
02:15- 03:00	<b>Session 4: Asset Condition Assessment (Inspection and Maintenance)</b> <i>Mr. Andrew Stewart, EDM International (USA) &amp; Mr. George Juhn, CEATI International (Canada)</i>
<b>03:00 - 03:20</b>	<b>NETWORKING BREAK</b>
03:20 - 04:50	Breakout Sessions : 1, 2, 3 & 4 - Future Research Needs & Prioritization of Topics
04:50-05:00	Day 1 Concluding Remarks
<b>05:30 - 07:30</b>	<b>RECEPTION</b>

## Session 1: Wind Load Assessments on Overhead Lines (Synoptic and Non-Synoptic)

**Chair: Dr. John Holmes, JDH Consulting (Australia)**



The focus of this session will be to present an overview of the recent developments in wind load assessment on overhead lines with specific reference to non-synoptic winds such as downdrafts and tornadoes. Although overhead lines are primarily designed for boundary layer wind profile (synoptic wind), increasingly it is being recognized around the world that most severe loading on the transmission towers may come from non synoptic wind profile due to localized high intensity wind caused by downbursts, which have caused majority of transmission line failures. In recent years, considerable amount of work has been done in Canada and Australia to understand the effects of downburst winds on overhead lines and the session will review such information from the studies conducted and present its practical use in overhead line design to minimize damage during such events. The session will identify the knowledge gaps in current design practices and address how to close them.

## Session 2: Emergency Restoration of Overhead Lines

**Chairs: Dr. Jerry Wong, Florida Power & Light (USA) and Dr. Anand Goel, CEATI International (Canada)**



This session will present an overview of the latest developments in emergency restoration planning and practice of overhead lines and the key steps and tools that the utilities need to develop an effective emergency restoration plan and its implementation. The presentation will use the results from the work that CEATI member utilities have done as funded research projects and the recommended guidelines on "best practices" and will draw on discussion during the delivery of the CEATI Utility Solutions courses on Emergency Restoration Planning. The results from the CEATI studies will further be complemented by some specific real life examples on emergency restoration of power lines that the utilities have undertaken in recent years. The session will assist workshop participants in improving their emergency restoration plans and methods and minimize power outage durations during extreme weather emergencies.

## Session 3: Foundations of Overhead Lines - Design and Installation Issues and Challenges

**Chair: Dr. Tony Digoia, Digoia Gray Associates (USA)**



The presentation will review various foundation types such as grillages, reinforced concrete spread footings, drilled shaft/pier, direct embedment, micro-pile foundations and anchors. This session will focus on the overhead line foundation design and installation issues with particular reference to the transfer of load to the foundation, critical failure modes, evaluation of geotechnical geotechnical design parameters based on in-situ and laboratory tests, as well as the potential impacts of the installation process on expected foundation capacity. Design and the installation activities should be coordinated in order to ensure that the expected capacity is realized fully and the session will focus on how to achieve this objective. The session will also identify some of the gaps that exist in current standards and provide guidance how to close these gaps.

## Session 4: Overhead Line Inspections, Asset Condition Assessment and Maintenance

**Chairs: Mr. Andrew Stewart, EDM International (USA) and Mr. George Juhn, CEATI International (Canada)**

This group will review the "best practices" on overhead line inspection methodologies based on visual and NDE technologies. Based on the inspection techniques and expected results, various key factors will be identified in the assessment of asset condition and a framework for the effective use of this information for maintenance planning will be presented. The session will discuss the effectiveness of the current inspection and maintenance practices particularly with respect to restoring and maintaining reliability through component failure data, optimum inspection intervals, coordination of inspection activities, targeted inspections, diagnostics, etc.



# Transmission Lines for the 21st Century: Design & Asset Management Workshop



## Session 5: Mitigation Against Catastrophic Loss of Power Lines

**Chairs: Dr. Asim Haldar, Nalcor Energy (Canada) and Dr. Leon Kempner, Bonneville Power Administration (USA)**

The purpose of this session will be to review the current "best practices" of designing lines against catastrophic losses. A framework for understanding the mechanism of overhead line cascade will be presented along with some specific case studies on overhead line cascades. Recent works on understanding the static/dynamic effects of line components failure that can trigger a cascade will be discussed and the use of load control devices to mitigate cascading risk will be presented. Current standards for designing overhead lines against cascade (line security) will be reviewed and the session will identify some of the gaps that exist in current standards and provide guidance how to close these gaps.



## Session 6: Recent Advancement on Innovative Conductor Design and HTLS Performance

**Chairs: Dr. Herve Deve, 3M Electrical (USA) and Mr. Dennis Mize, Southern Company (USA)**

Increasingly utilities are being challenged to optimize power transfer capability through existing ROWs and are using innovative solutions to increase ampacities. The session will present such solutions by the use of HTLS in minimizing environmental footprint as well as new ROW acquisition. Different types of HTLS conductors e.g ACSS, ACCR, ACCC, Gap and Invar, will be discussed with respect to (1) Characteristics i.e strength and creep data, (2) Installation and Maintenance Considerations, (3) Vibration Fatigue Characteristics, (4) Electrical Losses, (5) Sag & Tension implications, and (6) Costs etc.



## Session 7: Asset Health Index and Life Cycle Costs of Overhead Lines

**Chair: Mr. Yury Tsimberg, Kinectrics (Canada)**

The optimum return on asset investment depends on finding a balance between customer service to be provided, i.e., reliability, power quality, etc., and the total cost of ownership. Asset health indices that are normally derived from condition assessment work are key parameters in determining remaining life and end of life, and are part of the asset renewal process as well as cost optimization. Consideration is given to more simplistic approaches that involve asset age as a surrogate for condition to in-situ testing as can now be done with conductors, and laboratory testing as might be required to improve replacement decisions. In order to optimize cost, consideration is given to replacing individual line components as opposed to larger scale projects involving a rebuild, as well as increasing upfront capital investments using new technologies that will reduce ongoing maintenance.



## Session 8: Deicing Techniques and Methodologies

**Chair: Professor Jiang Xingliang, Chongqing University (China)**

This session will review the deicing techniques and methodologies that can be used effectively on power lines during icing or sometimes after icing. An overview will be presented on various techniques such as joule effects, DC melting etc. After the major ice storm of 2008 in China, the deicing methodology for EHV lines has been developed successfully and the technique was used through the installation of DC ice-melting devices in more than 200 substations. The experience gained during its successful operations in removing ice from EHV lines in recent icing storms will be shared with the workshop participants.



DAY 2: Friday, October 3, 2014

08:00 - 08:30	<b>CONTINENTAL BREAKFAST</b>
08:30 - 08:45	Review Day One/Announcements <i>Dr. Asim Haldar, Nalcor Energy (Canada)</i>
08:45 - 09:30	<b>Session 5: Mitigation Against Catastrophic Loss of Power Lines</b> <i>Dr. Asim Haldar, Nalcor Energy (Canada)</i> <i>Dr. Leon Kempner, Bonneville Power Administration (USA)</i>
09:30 - 10:15	<b>Session 6: Recent Advancement on Innovative Conductor Design and HTLS Performance</b> <i>Dr. Herve Deve, 3M Electrical (USA) &amp; Mr. Dennis Mize, Southern Company (USA)</i>
10:15 - 10:30	<b>NETWORKING BREAK</b>
10:30 - 11:15	<b>Session 7: Asset Health Index and Life Cycle Costs of Overhead Lines</b> <i>Mr. Yury Tsimberg, Kinectrics (Canada)</i>
11:15 - 12:00	<b>Session 8: Deicing Techniques &amp; Methodologies</b> <i>Prof. Jiang Xingliang, Chongqing University (China)</i>
12:00 - 01:00	<b>NETWORKING LUNCH</b>
01:00 - 02:30	Breakout Sessions: 5, 6, 7 & 8
02:30 - 02:50	<b>NETWORKING BREAK</b>
02:50 - 04:50	Reports From All Working groups & Prioritization of Selected Topics
04:50 - 05:00	Closing <i>Dr. Asim Haldar, Nalcor Energy (Canada)</i>

## Co-Located CEATI Transmission & Distribution Events

<b>Sept. 30 - Oct. 1, 2014:</b>	Transmission Line Asset Management (TLAM) Interest Group Fall Meeting
<b>October 1, 2014:</b>	Transmission Overhead Design & Extreme Event Mitigation (TODEM) Interest Group Fall Meeting
<b>October 6-7, 2014:</b>	6th Annual Grounding & Lightning Workshop
<b>October 8, 2014:</b>	Grounding & Lightning Task Force (GLTF) Annual Meeting
<b>October 8-9, 2014:</b>	Life Cycle Management of Station Equipment & Apparatus (LCMSEA) Interest Group Fall Meeting
<b>October 8-9, 2014:</b>	Distribution Assets Life Cycle Management (DALCM) Interest Group Fall Meeting

# Transmission Lines for the 21st Century: Design & Asset Management Workshop



Online registration can be completed at [www.ceati.com/register/transmission](http://www.ceati.com/register/transmission)

## Your Information

Name

Title

Organization

Street Address

City, Province/State

Country



Postal/Zip Code

E-mail

Phone

Fax

## Payment Options

Visa   Mastercard 

Card No.

Expiry Date  /

Signature

Cardholder

Completed registration forms can also be sent by **email** to [workshops@ceati.com](mailto:workshops@ceati.com)  
or by fax to **(514) 904-5038**

## Workshop Location



### CROWNE PLAZA

5685 Falls Avenue Niagara Falls,  
ON L2E 6W7 Canada

For reservations please call

+1 905-374-4444

<https://resweb.passkey.com/go/b1931457>

All workshop guests are eligible for a discounted rate of \$119 (CAD) subject to availability. Simply mention "CEATI International" when reserving. Reservations must be made prior to August 21, 2014.

## Registration Fees & Discounts

Register by May 1, 2014 and receive a **\$50 discount**

- \$955 Standard Registration
- \$675 CEATI Program Participant Registration
- Free Presenters & TLAM & TODEM Members\*

\* TLAM Participating Organizations receive 1, & TODEM Participating Organizations receive 2 complimentary registrations for the Transmission Lines for the 21st Century Workshop.

- \$120 Optional WindEEE Research Facility Tour  
Saturday Oct. 4, 2014

More information about the tour can be found at [www.ceati.com/Meetings/TW2014/tour.html](http://www.ceati.com/Meetings/TW2014/tour.html)

## Register for Both Workshops & SAVE up to \$200!

CEATI's 6th Annual Grounding & Lightning Workshop will be taking place on October 6th & 7th, 2014. More information can be found at [www.ceati.com/Meetings/GLTF2014](http://www.ceati.com/Meetings/GLTF2014)

Register for both workshops, and SAVE!

- \$1710 Standard Registration - Both Workshops
- \$1350 CEATI Program Participant Registration - Both Workshops

Ask Us About Exhibitor & Sponsorship Opportunities!  
[email workshops@ceati.com](mailto:workshops@ceati.com) for more information

## Important Information

Registration fees include proceedings package, breakfast, breaks, lunches, and reception where indicated on the schedule.

- Please check if you wish to be contacted about allergies or other dietary requirements

Charges will appear as 'CEATI International Inc' and are subject to applicable taxes and fees.

All cancellations received 30 days prior to event will be subject to a \$200 processing fee. There will be no refunds granted after this date. Delegate substitution is permitted at no extra cost.