Our Mission

CEATI International is a **user-driven organization** committed to providing technology solutions to its **electrical utility participants**, who are brought together to **collaborate and act jointly to advance the industry through the sharing and developing of practical and applicable knowledge.**
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Acknowledgements
Dear Valued Utility Partners,

As 2014 draws near, we are pleased that so many utilities have accepted and incorporated our vision of the future as their own and we are filled with a sense of excitement and urgency, as it has never been more important to leverage precious knowledge and resources. From our humble restructuring in 2001, as a largely made-in-Canada solution to national concerns, our president recognized the inherent values and benefits of expanding our business model beyond national to international frontiers. We are proud to acknowledge that the CEATI Family now includes over 120 utilities from 17 countries on six continents, including recent additions from Ghana, Colombia, Iceland and Russia and we fully expect these numbers to continue to grow as we share our vision of “Innovation through Collaboration”. While there has been a great deal of talk in recent years about developing a Smart Grid, we have been tremendously busy in developing a “Smart Network”; a smart network of utilities, engineers, government entities, regulators, consultants and contractors, working together with the CEATI Team to maximize time, knowledge and efficiency, while minimizing costs and redundancies. To quote Antoine de Saint-Exupéry, “Perfection is achieved, not when there is nothing left to add, but when there is nothing left to remove”. We continuously strive to attain such lofty goals by listening attentively to our participants’ needs and never resting on our laurels.

While our start-up days are behind us, we maintain the same energetic spirit and grassroots, bottom-up, and user-driven mentality which brought us here. Over the past few years we have successfully initiated programs in Grounding & Lightning, Protection & Control, and Vegetation Management, all at the behest of our participants who identified these as areas of specific concern which were not being adequately addressed by the industry at large. During this time, we continued to grow our existing portfolio of programs and noted the growing concerns experienced by our participants in dealing with succession planning, training, making critical O&M decisions, as well as the need to defend asset investment strategies. We have incorporated these important issues into all of our programs.

With utilities today facing many challenges, including the loss of expertise through retirement, aging infrastructure, budgetary cutbacks, and travel restrictions, it is easy to be pessimistic about what the future may hold, but we choose to see the potential. By already working together with a great deal of intelligent and committed people through our collaborative research projects and knowledge exchanges, we are maximizing our collective brainpower and substantially leveraging every project dollar spent. We see a great deal of opportunity in 2014 and intend on making it into a banner year, starting with our Spring 2014 Hydro/Stations/Cables Industry-Open Workshops in Palm Desert, California, and concluding with our Fall 2014 Transmission & Distribution Week in Niagara Falls, Ontario. We encourage you all to join, as together the future looks bright.

Elan Roiz, Executive Vice-President & Chris Hayes, Vice-President
CEATI International
Addressing Critical Needs in the Electricity Industry

The electricity industry is undergoing fundamental changes which are shaping the way engineering work is performed and energy services are provided. Low load growth, over-capacity and future market uncertainty are creating pressures on the availability of capital and the reduction of operating costs to address issues of Aging Infrastructure. As electrical utilities are looking to replace and refurbish assets, the need to perform effective condition assessment, risk management activities and strategic asset management planning arises.

These concerns are confounded by an overall Loss of Internal Technical Expertise. As senior engineers retire and new engineers with little to no field experience are being brought in, the need to retain institutional memory and provide training guidance becomes ever more critical.

As electrical utilities are forced to upgrade and replace their aging infrastructure, many experience challenges in keeping on top of the flood of Emerging Technologies entering the market. It is both time consuming and capital intensive to find, test, and evaluate these technologies and choosing the wrong one can lead to performance and financial consequences down the road.

Finally, in the wake of a growing global population with increasing energy demands along with increasing pressure to reduce greenhouse gas emissions and mitigate the effects of extreme weather events, the electric utility sector is faced with the unique challenge of providing energy services which are both Cleaner and More Reliable. Advancements in sustainability for all will require innovative approaches and rethinking business as usual.

Through its networking platform, collaborative projects, library of technical reports and training opportunities, CEATI International assists electrical utilities in addressing today’s most pressing issues while building more resilient systems for the future.

The CEATI Program Model

The CEATI Program Model provides electrical utilities with a cost-effective vehicle for sharing experiences and addressing issues pertinent to their day-to-day operations, maintenance and planning. In addition to serving as a strong technical resource tool through 18 focus areas across generation, transmission, distribution and utilization, CEATI programs accommodate project collaboration opportunities yielding practical deliverables with which organizations can leverage their expenditures.
CEATI’s efforts are driven by over 120 participating organizations (electric & gas utilities, governmental agencies, provincial and state research bodies). Continuously expanding its international reach, CEATI boasts representation from **17 countries across 6 continents**, a diversity that contributes to the strength of CEATI programs and brings value directly to our participants.

**History of Utility Participation**

![Utility Participation Chart]

<table>
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<th>Year</th>
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CEATI 2013 / 2014
How CEATI Helps

**Networking & Information Sharing**

The primary benefit to program participation lies in the ability to tap into the wealth of experience and knowledge of other electrical utility participants. To this end, CEATI facilitates on-demand Networking & Information Sharing in the form of cross-utility Requests for Information (RFI) as well as bi-annual face-to-face business meetings and regular conference calls with other utility experts. All shared information and presentations are catalogued and made available on our new MyCEATI Participant Portal.

**Industry Benchmarking**

Industry Benchmarking is another important component of the CEATI Interest Group & Task Force model, allowing utilities to stay abreast of the latest sector developments and emerging technical issues. CEATI provides a closed-door forum for participants to freely exchange information with other like-minded professionals and establish best industry practices in a time and cost effective manner.

**Technical Training**

CEATI also offers Technical Training on focused topics of high operational relevance to utilities. Our workshops, webinars & technical seminars foster professional development and technical skills to a rapidly changing workforce. Past workshop proceedings, training documentation and webinar recordings are made available through our MyCEATI Participant Portal.

CEATI Utility Training Solutions (UTS) promote and encourage continuous exchange and knowledge transfer through courses tailored to meet the needs of today’s electric utility professionals.

Along with the expert guidance of the instructor, each attendee receives a training package and electronic copies of the presentations. A certificate of attendance reporting the number of teaching hours is also awarded to each attendee upon course completion and may qualify for the requirements to obtain Professional Development Hours with certain accrediting bodies.
The Value in Participation

Collaborative Projects

CEATI's Collaborative Projects bring participating utilities, technology providers and consultants together to work across all phases of a project’s life-cycle, from technical conceptualization to final published reports and software. Participating utilities have the flexibility to support only projects which are relevant to their organization, meaning there is never a “black hole” associated with where research dollars are being placed. Furthermore, by splitting overall costs with other interested utilities these collaborative projects result in highly leveraged funding opportunities. Participants can then shape the scope of work to suit their needs, select the contractor team, and act as project monitors to further guide project development. Meanwhile, CEATI’s turn-key management system covers everything from development of project documentation, acquiring bid tenders, coordination of project schedules, payments and interim reporting, as well as publishing of final deliverables.

2013 Total Funding Break-Down by Sector

Unparalleled Return on Investment

Overall, CEATI Programs offer Unparalleled Return on Investment through its platform of learning from the mistakes and successes of others while addressing industry knowledge gaps through cost-sharing. All of CEATI’s projects are funded across several different utilities, helping lighten the burden that would otherwise be required to undertake the initiative alone. On average, CEATI projects are leveraged at a rate of 12:1.

High Value Project Leverage Up To 25:1

More than 65 new projects to choose from each year
The rising development and adoption of new electronic devices used for industry and the home has driven an increased demand for electricity production and outage mitigation. These increased customer demands come at a time when much of the current infrastructure, built decades ago, nears its life cycle end and requires refurbishment and replacement. CEATI’s generation groups help utilities network with each other with the ultimate goal of sharing best practices as well as engaging in highly leveraged and participant-driven research.

CEATI currently facilitates five distinct generation programs in the areas of:

- Hydraulic Plant Life
- Dam Safety
- Hydropower Operations and Planning
- Strategic Options for Sustainable Power Generation
- Thermal Generation

Also under the generation portfolio are two specialized Task Forces focused on:

- Penstocks
- Asset Management
Hydraulic Plant Life

Safety, environmental, and economic pressures are key challenges faced by hydraulic plant life operators and managers striving to remain competitive in today’s market. An increased emphasis on upgrading equipment, parts, and procedures is met by a retiring work force. Through the Hydraulic Plant Life Interest Group (HPLIG), utilities are looking to improve their plants by extending the useful life and providing increased efficiency, and ultimately protecting their capital investments.

Extending the Life of Your Hydraulic Plants

To address the needs of utilities, in 2013 HPLIG completed an overhaul guide for mechanical refurbishment of hydroelectric turbine generators, which typically operate for a period of 20 or more years before needing major intervention to restore their condition and prepare them for an extension of their service lives. The described procedures, including repairs, are based on experience and have been developed over years of providing technical support for many hydro unit refurbishments. Examples are given based on actual events to help reinforce points presented in the body of the document.

Another initiative launched this year will develop a comprehensive set of hydro generator maintenance inspection guidelines. This document will cover stator and rotor windings, stator core and frame, rotor spider and rims, bearings and lubrication systems, cooling system and excitation systems, along with information and guidance on those repair activities that generally may be safely completed by plant maintenance personnel.

To be as comprehensive as possible, the guide will include tool and material lists as well as examples of repair techniques and references to published materials.

Topics & Issues at a Glance

- Reliability & Performance Monitoring
- Capital & Maintenance Investment
- Work Force Productivity & Safety
- Hydropower Technology
- Environmental Performance
- Regulatory Affairs

2012-2013 Executive Committee

HPLIG Chair:  
James Kerr  
U.S. Army Corps of Engineers

HPLIG Vice-Chair:  
Oral Burry  
NALCOR Energy

Technical Advisor

Alastair Wilson  
Mr. Alastair Wilson has over 40 years of experience in the operation and maintenance of hydro-electric generating stations. During his career with Ontario Hydro / Ontario Power Generation, he was responsible for a wide range of technical and asset management work programs. Since joining CEATI in 2003, he has provided technical support to over fifty technology reviews and projects.
2014 Topics

- Penstock Inspection and Maintenance Guide
- Generator and Turbine Example Specifications
- Risk Management in the Hydropower Industry: Recognition, Quantification and Reduction Workshop
- Hydro Unit Vibration and Balancing Guide

Highlight Task Force: Asset Management

Building on the foundation and momentum of workshops and utility roundtable discussions on asset management, the HPLIG collectively decided to establish the Asset Management Task Force (AMTF) to formally address this area. Topics addressed through the AMTF include asset and risk management frameworks currently being employed by hydro utilities, processes and tools to support key asset management decisions, reliability and financial optimization, contracting strategies, cost benefit analysis techniques, project financing and financial modeling, business planning, and asset management software systems.

A State-of-the-Art Program for an Evolving Industry

From 1987 – 1998, a five-volume set of guidelines on good practices and appropriate tolerances for the erection and alignment of new and re-built vertical hydroelectric turbine generators were developed. The documents were prepared by senior engineers, drawn from a broad cross-section of electrical utilities, consultants and turbine generator designer/manufacturers. The Alignment Guide has since become a “de facto standard” broadly used by the hydro industry to specify static erection and alignment tolerances.

In 2007-2008, HPLIG undertook a general update and expansion of the Alignment Guide, with the addition of a sixth volume covering modern alignment tools. With the passage of time since this update, and given the wide acceptance and use of the Guide, 60 utilities have opted to collaborate once again to update the Alignment Guide in light of experience gained and technical advances made in alignment aids.

2014 Hydraulic Plant Life Meetings & Events

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Date/Location</th>
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<tbody>
<tr>
<td>Risk Management in the Hydropower Industry: Recognition, Quantification &amp; Reduction Workshop</td>
<td>March 19-20, 2014, Palm Desert, CA, USA</td>
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<tr>
<td>HPLIG Spring Meeting</td>
<td>March 20-21, 2014, Palm Desert, CA, USA</td>
</tr>
<tr>
<td>HPLIG Fall Meeting &amp; Workshop</td>
<td>September 17-19, 2014, Montreal, QC, CAN</td>
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For more information on the program and full project listing, please visit www.ceati.com/HPLIG
As many dams begin to age beyond their 50 year service life, safety becomes increasingly difficult to evaluate. New challenges also arise as owners must continually upgrade their dams to meet ever evolving safety standards. The Dam Safety Interest Group (DSIG) helps dam owners and managers by developing and evaluating new diagnostic monitoring tools as well as new repair techniques and materials which can significantly reduce improvement costs.

**Improving Dam Safety through Shared Best Practices**

Proper staff training is an important piece of the puzzle when looking to ensure the stability and safety of a dam. DSIG provides many of these opportunities through collaborative training initiatives. In 2013, the group hosted an industry workshop on improving operational reliability, risk management, and asset investment planning in the face of an aging infrastructure. The event allowed utility and industry experts to share best practices on topics including instrumentation, data management, decision making, failure mode analyses, and rehabilitation, as well as a variety of case studies related to incidents, accidents and failures.

In 2013, the group also collaborated to develop a training platform for plant operators on various inspection procedures. The e-learning tool is complete with online and printed teaching course material, interactive quizzes, and an instructor’s annotated presentation. It provides a non-engineering introduction to the design and structural characteristics of dams, failure mechanisms, and dam performance monitoring including guidance for inspections and the differences between maintenance and dam safety issues. Also covered is an explanation on potential failure modes and how this knowledge can be applied to operators’ specific locations.

### 2013 / 2014 Portfolio Highlights

- Dam Safety Performance Monitoring and Data Analysis - Management - Best Practices
- Dam Safety Inspection Procedures, Guidance and Training for Plant Operators
- Grouted Post-Tensioned Rock Anchor Assessment
- Using Maturity Matrices to Evaluate Dam Safety Programs
- Activation Guidelines for Dam Safety Emergency Preparedness Plans

### Topics & Issues at a Glance

- Investigation
- Instrumentation and Monitoring
- Analysis
- Performance Assessments
- Risk Management

### 2012-2013 Executive Committee

**DSIG Chair:**  
Bill Christman  
Chelan County PUD

**DSIG Vice-Chair:**  
Krista Halayko  
Manitoba Hydro

### Technical Advisor

**Constantine Tjoumas**

Mr. Constantine (Gus) Tjoumas worked for a decade as a geotechnical engineer with the U.S. Army Corps of Engineers before accumulating over 25 years of experience with the Federal Energy Regulatory Commission (FERC). He most recently held the position of Director, Division of Dam Safety of Inspections, overseeing the inspection of more than 1,700 licenced hydroelectric projects comprising 2,600 dams across the United States.
DSIG

2014 Topics Under Consideration

- Penstock Inspection and Maintenance
- Seismic Risk Training and Case Studies
- Best Practices for Engineers - Dam Safety Performance and Data Management
- Continued Safety Training for Plant Engineers

“It is a great experience to meet with like-minded people with both common problems and goals for improvement!”
- Carrie Harris, Manager of Engineering & Projects, PPL Montana

“This meeting was hugely valuable for me, with a great mix of structured presentations, working groups, and plenty of time to have one-on-one discussions and network”
- Chris Topham, Dam Safety Manager, Hydro Tasmania

Highlight Collaborative Initiative: Penstock Task Force

Supported by 33 electrical utilities, the Penstock Task Force (PTF) is a joint strategic initiative between CEATI’s Hydraulic Plant Life (HPLIG) and Dam Safety (DSIG) Interest Groups. The group engages in an annual face-to-face meeting as well as quarterly conference calls and periodic benchmarking surveys. Topics which are discussed and worked on include corrosion guidance, penstock inspection scoping, guidance instrumentation, repair and mitigation guidelines, maintenance procedures and frequencies, and budgetary justification for seismic and structural upgrades.

Assessment and Strategic Intervention on Aging Infrastructure

DSIG manages a number of collaborative research initiatives each year covering a wide range of issues from emergency action planning guidelines to seismic hazards and risks. In 2013, the group began work on a project to tackle the difficulties of grouted anchors including their inability to be load tested, high inspection and replacement costs, and lack of information regarding long term condition and performance through analyzing real data coming from actual site tests.

Another ongoing project will develop a technique to facilitate the self-evaluation of dam safety programs benchmarked against international peers. Through the use of maturity matrices, the produced tool will take well-defined performance measures to assess each level of a safety program’s components, current status, and rate of improvement. Ultimately, these matrices will provide invaluable feedback to help prioritize investments within a utility’s dam safety program.

2014 Dam Safety Meetings & Events

<table>
<thead>
<tr>
<th>DSIG Spring Meeting</th>
<th>Risk Management in the Hydropower Industry: Recognition, Quantification &amp; Reduction Workshop</th>
<th>DSIG Fall Meeting</th>
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<td>Palm Desert, CA, USA</td>
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For more information on the program and full project listing, please visit www.ceati.com/DSIG
Effective water management is at the backbone of successful generation of hydroelectricity. Proper resource management and decision making is dependent on having the right tools and experience. To help meet these needs, utilities have formed the Hydropower Operations and Planning Interest Group (HOPIG) in order to capture and expand their knowledge on the topic, covering meteorology, data validation, risk management, and environmental concerns.

**Forecasting & Data Collecting Tools for the Hydropower Industry**

In 2013, HOPIG coordinated a number of activities dealing with forecasting. One project is reviewing current data screening methods that are used to screen hydrologic discharge/inflow time series data, identifying the state-of-the-art methods, and classifying them according to selected criteria. This criteria includes ease of use, robustness, the applicable time step(s), ability of the method to find errors, outliers, and correct or fill-in missing data, limitations of the method, and ability to run in real-time and costs. This project will form the basis of a reference guide that will allow users to select the most suitable data screening method(s).

To address this topic in a more collaborative and interactive manner, HOPIG hosted a workshop with more than 50 industry professionals from across North America and Europe, in order to cover the uncertainties of renewable energy supply.

The workshop offered the opportunity for participants to improve their understanding of 1) acquisition, validation and dissemination of data needed to forecast inflow, wind energy and solar energy, 2) uncertainties and inadequacies of forecast models, and 3) the challenges of increased supply from non-dispatchable energy sources on market operations and hydropower operating costs.

**2013 / 2014 Portfolio Highlights**

- Integration of Radar & Satellite Precipitation Estimates into Rain & Snow Gauge Networks
- Review of Data Screening Methods for Discharge / Inflow Time Series
- Water Management Data Dissemination & Reporting
- Risk Informed Decision Making Framework for Hydro Project Operation under High Inflow Conditions
- Outage Planning Maturity Matrix - Methods & Processes for Minimizing Monetary Impacts from Outages

**Topics & Issues at a Glance**

- Watershed Management
- Meteorology and Hydrology
- Data Acquisition, Validation, Dissemination
- Hydraulics and Hydraulic Structures
- Planning, Operation and Risk Management
- Operational and Environmental Concerns

**2012-2013 Executive Committee**

**HOPIG Chair:**
Richard St-Jean
Brookfield Renewable Power Group

**HOPIG Vice-Chair:**
Andy Sheppard
Southern Company

**Technical Advisors**

**Robert Metcalfe**
Mr. Robert Metcalfe has extensive experience in hydroelectric development and environmental studies over the span of his 32 year career at Ontario Hydro / OPG.

**Marcel Paul Raymond**
Mr. Marcel Paul Raymond has 32 years of planning and operations experience within Hydro-Quebec and has consulted on major hydroelectric projects around the world.
2014 Topics Under Consideration

- Hydro Operation and Planning Maturity Matrix
- Implementation of Operational Monitoring
- Evaporative Losses at a Hydro Electric Reservoir
- Snow Pack and Snow Water Equivalent Estimation
- Impacts of Sedimentation

Working Group Under Development

A new working group under HOPIG has been proposed to focus on Forecast Systems, including FEWS-RiverWare and other routing models.

Building a Maturity Matrix to Assist Hydropower Operations and Planning

One of the long term objectives of the group is to develop a complete Hydropower Operations and Planning Maturity Matrix, the basis of which will be the evaluation of business processes. 2014 will see the continuation of one such project focused on outage planning. In this context, the purpose of the initiative is to identify methods which can be used to achieve decreased outage costs, provide meaningful and efficient performance measures, and enhance communications between operations, maintenance and senior management.

In order to formulate an industry best practice, a number of previously completed benchmarking studies will be used as a starting point, comparing and building on utility current practices. The goal is to merge different completed benchmarking studies into a format which can be directly used by water managers for outage planning activities. The scope of this phase will cover activities such as the planning and cost evaluation of outages in the forecast mode, the evaluation of actual outage costs done after the fact and issues related to efficient communication within the organization.

2014 Hydropower Operations & Planning Meetings & Events

HOPIG Spring Meeting
May 7-9, 2014
Atlanta, GA, USA

HOPIG Fall Meeting
November 13-14, 2014
Vancouver, BC, CAN

For more information on the program and full project listing, please visit www.ceati.com/HOPIG
Sustainable Power Generation

The scope of the Strategic Options for Sustainable Power Generation Interest Group (SOIG) is to study, evaluate and demonstrate sustainable emerging energy technologies that will result in an increase in clean and renewable power supply capacity and a reduction in greenhouse gas emissions.

2013 Success Story: CEATI’s Woody Biomass Evaluation Program

Within SOIG, 11 international utility participants have co-funded the Woody Biomass Evaluation Program, a multiphase comprehensive woody biomass torrefaction product and process evaluation program. The program, initiated in 2010, is designed to demonstrate the characteristics of modified woody biomass through processes including torrefaction, steam explosion, carbonization and densification, and to determine their performance as alternative fuels that may be fired or co-fired in existing coal-based generating stations. The results will form the foundation for a technical specification for woody biomass fuels for co-firing and full scale biomass combustion for energy generation, which will serve as a key reference for utilities planning to incorporate woody biomass in to their generation mixes.

A number of developments have taken place through the Woody Biomass Evaluation Program in 2013. Selected fuels were tested at a pilot-scale commercial mill to simulate impacts related to utility scale combustion facilities. Additionally, the program was featured at the 2013 Annual IEA Biomass Co-Firing Workshop in Groningen, the Netherlands, along with CEATI’s Agricultural Biomass Torrefaction Evaluation Program which is being conducted in parallel with the Woody Biomass Program. Both programs were also presented at the October 2013 CanBio Annual Conference & Trade Show in Gatineau, Quebec, Canada. In 2014, sponsoring utilities will be considering several options for the next phase of work.

2013 / 2014 Portfolio Highlights

- Woody Biomass Evaluation Program
- Energy Storage Scoping Study
- Agricultural Biomass Torrefaction Research Program
- Utility Experiences & Lessons Learned for Small Modular Reactors (SMRs) Projects

Topics & Issues at a Glance

- Renewable, Distributed, & Bio-Energy
- Energy Storage
- Climate Change Adaptation
- Sustainable Transportation

2013-2014 Executive Committee

SOIG Chair: Claudia Banner
American Electric Power

SOIG Vice-Chair: Alex Tu
BC Hydro

Technical Advisors

Hal Laflash
Mr. Hal Laflash has held various positions at Pacific Gas and Electric Company (PG&E), including Director of Emerging Clean Technologies in the Renewable Energy Department. Mr. LaFlash was on the executive board of the California Biomass Collaborative, a member of a Western Governors Association’s solar task force, served on Department of Energy peer review committees, and was the project director for a successful $25 million grant application to the Department of Energy for PG&E’s 300-MW Advanced Compressed Air Energy Storage demonstration project.
SOIG Specialized Working Groups

**Storage, Renewable & Distributed Energy Working Group**

**Diesel Alternatives Working Group**
Off-diesel Initiatives, Grid Islanding, Remote Communities, Mines, Military Bases

**Greenhouse Gas Mitigation Working Group**
Carbon capture and storage, Integration of Renewables, Biomass Co-firing

**Sustainable Transportation Working Group**
Alternative fuel vehicles, Electrification of Public Transit, PHEV/ Grid Interaction

Select Workshop Proceedings

- Managing System Impacts of the Renewable Portfolio
- Microgrids - Utility Perspectives and Lessons Learned
- Renewable Energy Integration and Management
- Wind and Solar Forecasting
- Utility Perspectives on Energy Storage

2014 Topics Under Consideration

- Technical Risk Assessment Prior to Pilot and Demo Project Deployment
- CNG/LNG experience in Northern Remote Communities
- Small Battery Systems to Increase Effectiveness of Diesel Optimization
- Cost-Benefit Analysis Model to Evaluate Diesel Alternatives
- Comparing Non-Battery Storage Technologies
- New California Legislation on Energy Storage and Impact on Utilities
- Li-ion Degradation

Providing an Accessible Energy Storage Scoping Study for the Benefit of the Industry

SOIG is initiating a comprehensive ‘Energy Storage Scoping Study’ that will enable utilities to identify and develop technical specifications for transmission and distribution connected storage options including battery systems, compressed air, liquid air, flywheels, pumped hydro, superconducting magnetic energy storage (SMES), and gravity power.

The study will also explore the applicability of utilizing Thermal Energy Storage combined with Turbine Inlet Cooling.

2014 Sustainable Power Generation Meetings & Events

**SOIG Spring Meeting**
May 5-6, 2014
Newark, NJ, USA

**Workshop: Utilizing EMS to Integrate DR, DG and Storage**
May 7, 2014
Newark, NJ, USA

**SOIG Fall Meeting**
October 6-7, 2014
Seattle, WA, USA

For more information on the program and full project listing, please visit www.ceati.com/soig
Today’s competitive energy market and environmental concerns require operators to improve efficiency, reduce greenhouse gas emissions and maximize the useful life of their conventional thermal power plants while minimizing both operating costs and capital investments. CEATI’s Thermal Generation Interest Group (TGIG) works to identify immediate design, operational, and maintenance issues while staying on top of emerging thermal technologies.

**Identifying the Impacts of Cyclic Operation on Thermal Generating Plants**

Many conventional and combined cycle thermal plants are being driven to operate in cycling modes as a result of the increasing use of non-dispatchable energy sources. Many plants were not designed to operate in cycling modes over long periods of time and consequently major equipment and components suffer enhanced rates of deterioration, leading to lower reliability and availability. While more modern plants have better capability to cycle, the severity of cycling can cause similar problems.

TGIG sought to address these issues by hosting a workshop in the fall of 2013 on the **Impacts of Cyclic Operation on Thermal Generating Plants**. The objective of this workshop was to provide participants with an understanding of the impacts of cyclic operation on the performance of conventional and combined cycle thermal plants and, in particular, to present information on equipment damage consequences and the short and long term cost implications.

Over 45 thermal plant operations and engineering managers, engineers and leading industry experts attended the workshop. The diverse backgrounds and experiences of the attendees provided a basis for a dynamic and informative technical exchange through presentations and discussions. As a result, participants gained valuable information and knowledge that may be applied to the operations and maintenance of major thermal generating plant equipment.

**Topics & Issues at a Glance**

- Reliability Improvement
- Greenhouse Gas Mitigation & Effective Pollution Control Strategies
- Improvements in Operations Maintenance
- Efficiency Enhancement
- Training, Personnel Practices and Safety
- Future Developments for Continued Operation of Coal-Fired Plants

**2013 / 2014 Portfolio Highlights**

- Potential for Increasing Thermal Efficiency of Existing Generating Units
- Primer on Power Plant Asset Management
- Conversion of Pulverized Coal Fired Units to Natural Gas
- Impact of Cycling/Two shift Damage on the O&M Cost and Reliability of Natural Gas-Fired Combined Cycle (NGCC) Power Plants
- Preservation Guidelines for CCGT & Conventional Power Plant During Short & Long Term Shutdowns

**2013-2014 Executive Committee**

**TGIG Chair:**
Dale Bradshaw
NRECA

**TGIG Vice-Chair:**
Charlie Ryan
New Brunswick Power

**Technical Advisor**

**Duncan Sidey** Mr. Duncan Sidey has over 30 years of experience in the power generation industry, including 25 years of involvement working for Ontario Hydro/Ontario Power Generation. His major contributions have been associated with resolving operating, maintenance and performance issues in thermal generating plants. Mr. Sidey also has experience with plant life assessment and extension developments, as well as maintenance optimization initiatives.
Addressing the Impacts of Low Load and Variable Load Operation on Environmental Control Equipment Used in Conventional and Combined Cycle Thermal Plants

For a variety of reasons, many conventional and combined cycle gas turbine (CCGT) plants are currently required to operate with high flexibility. This includes frequent on-off cycling (two shifting, etc.), low load operation and variable load conditions. Most major components, including environmental controls equipment, have been designed to achieve their best performance, with respect to highest efficiencies and reliability, at full base load conditions.

Recent developments in regulations governing emissions from thermal generating plants as well as the increasing need to cycle plants have had significant impacts on their operation and maintenance. These two issues have been discussed and studied by the TGIG for several years, and the group is now proposing to explore the relationship between these two major issues through a highly leveraged research project.

Major environmental controls are expected to treat/remove designated pollutants from flue gas to meet environmental laws and regulations. While removal efficiencies may be high at full load, they can decrease markedly under other operating scenarios. The objective of this study is to evaluate the performance of various types of environmental control equipment under differing load conditions. The results will provide utilities with information on the best ways to mitigate the identified issues, including estimated cost impacts which may influence utilities' investment and market bidding strategies.
# 2014 CEATI Generation Program Calendar of Events

## Spring Events

### March

March 17-18, 2014 - Palm Desert, CA, USA  
Dam Safety Interest Group (DSIG) Meeting

March 20-21, 2014 - Palm Desert, CA, USA  
Hydraulic Plant Life Interest Group (HPLIG) Meeting

**CEATI Hydro Workshop**  
Risk Management in the Hydropower Industry:  
Recognition, Quantification and Reduction  
March 19-20, 2014 • Palm Desert, CA

### April

April 24-25, 2014 - Atlanta, GA, USA  
Thermal Generation Interest Group (TGIG) Meeting

### May

May 5-6, 2014 - Newark, NJ, USA  
Strategic Options for Sustainable Generation Interest Group (SOIG) Meeting

May 7, 2014 - Newark, NJ, USA  
Workshop: Utilizing EMS to Integrate DR, DG and Storage

May 7-9, 2014 - Atlanta, GA, USA  
Hydropower Operations & Planning Interest Group (HOPIG) Meeting

## Fall Events

### September

September 17-19, 2014 - Montreal, QC, CAN  
Hydraulic Plant Life Interest Group (HPLIG) Meeting & Workshop

### October

October 6-7, 2014 - Seattle, WA, USA  
Strategic Options for Sustainable Generation Interest Group (SOIG) Meeting

October 15-17, 2014 - Dallas, TX, USA  
Thermal Generation Interest Group (TGIG) Meeting

October 23-24, 2014 - Niagara Falls, ON, CAN  
Dam Safety Interest Group (DSIG) Meeting

### November

November 13-14, 2014 - Vancouver, BC, CAN  
Hydropower Operations & Planning Interest Group (HOPIG) Meeting

### Quote

“CEATI Meetings afford an unparallelled opportunity to interact with the broader utility community. The compelling perspective is ‘you are not alone’ in facing difficulties with your utility equipment or programs”

- Jay Mearns, Senior Electrical Engineer, PG&E

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The dates and locations listed above may be subject to change. Please note that Interest Group Meetings are open to CEATI members and invited utility guests only. To learn if you and your colleagues are able to attend, please contact info@ceati.com for more information.

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G-12  CEATI 2013 / 2014
The reliability of transmission circuits is paramount to the performance and operation of electrical power systems. Unscheduled outages can lead to abnormal system operating conditions, impacting customer service and the security of the grid. Transmitting power over great distances with extremely high operational reliability requires great expertise in the design, construction, repair and maintenance of assets. In many cases, specialized crews with those skills are a significant part of the utility workforce and with a wave of retirements from the industry this expertise risks being lost.

To address these and other topical issues, CEATI operates four transmission-focused programs, covering both overhead and underground systems:

- Life Cycle Management of Stations & Apparatus
- Transmission Line Asset Management
- Transmission Overhead Line Design & Extreme Event Mitigation
- Transmission Underground Cables

Other cross-utility programs which contain components related to transmission include Infrastructure Protection & Security, Power System Planning & Operations, Grounding & Lightning, Protection & Control, Smart Grid, and Vegetation Management.
Life Cycle Management of Stations

The Life Cycle Management of Station Equipment & Apparatus (LCMSEA) Interest Group focuses on optimizing station related components, resulting in improved performance and reliability, and reduced operating and maintenance costs.

Improving Safety and Extending the Life for Metal-clad Switchgear

The risks associated with the failure of the metal-clad switchgear were largely disregarded until standards which regulated protective clothing for electrical work were introduced. Since that time, more attention has been paid to the dangers and risks to worker safety associated with arc flash. While much concern has been directed towards protecting workers from the hazards of arcing faults in low voltage switchgear, there has been an increasing need for utility and non-utility management and workers to understand the standards that already provide for medium voltage arc-resistant switchgear construction and testing.

To address the risks associated with non-arc resistant medium voltage metal-clad switchgear, the LCMSEA recently developed and published a report documenting the hazards and describing possible approaches to address their reliability, life extension and personnel safety concerns. The study explores the possible failure of existing populations of non-arc resistant metal-clad switchgear (4kV to 27.6kV) in transmission and distribution substations and generating stations, to provide a means of risk assessment. Proven mitigation measures that are available for new and existing equipment and those that are under investigation are also identified.

2013 / 2014 Portfolio Highlights

- Station Equipment Outage Costs
- Technology Review: Use of Microprocessor-Based Relays in Stations
- Safety in Substations
- Selection and Specification Guide for HV Surge Arresters
- Guide for the Development of Business Cases for Replacement of Substation Assets
- Guide for Tender Evaluation, Design Review and Factory Inspections (FI) and Acceptance Tests (FAT) for Power Transformers

Topics & Issues at a Glance

- Procurement & Installation
- Maintenance Practices
- Condition Assessment
- Strategic Asset Management

2013-2014 Executive Committee

LCMSEA Chair:
Brian Penny
Nova Scotia Power Inc.

LCMSEA Vice-Chair:
Eileen Duarte
National Grid

Technical Advisor

Jack Shaver
Mr. Jack Shaver has over 30 years of engineering experience with Manitoba Hydro holding key positions related to apparatus maintenance.

Frederick Kimsey
Mr. Fred Kimsey has significant experience in substation engineering, material standards and specifications, and contracting through nearly 40 years at Duke Power.
2014 Topics Under Development

- Utility Asset Management Experiences and Best Practices
- Specification Guide for High Voltage Shunt Capacitors
- Specification Guide for Mixed Technology Switchgear
- Station Battery Systems
- Technology Review on Utility Contracting Out
- Enhanced LTC Diagnostics by Oil Analysis
- Development of a Health and Risk Index Tool for a Station
- Techniques for Assessing Moisture in Power Transformers
- Evaluating the Advanced Substation Monitoring Capabilities of Digital Fault Relays, Fault Recorders, Power Quality Monitors, and PMU Equipment
- State-of-Art Study Review of Room Temperature Vulcanizing (RTV) Coatings and Silicone Grease for Substation Porcelain-Insulated Equipment Applications

Providing Practical and Applicable Training on Circuit Breakers

Modern breakers are known to be very reliable and can withstand many operations before requiring testing, maintenance and eventual replacement. This component longevity creates unique issues, including developing and maintaining expertise for staff who are not exposed to the equipment on a more frequent basis.

To address this issue, the LCMSEA Interest Group will be holding an open-industry workshop in Palm Desert, CA, March 19 - 20, 2014, focusing specifically on Circuit Breaker Testing and Maintenance. This workshop will tackle topics such as effective practices for circuit breakers including routine checks or tests and condition assessment.

The agenda will focus on the objectives of a circuit breaker test and maintenance program, key elements for such a test and maintenance program, and how to use test results and other data for condition assessment.

2014 Life Cycle Management of Stations Meetings & Events

LCMSEA Spring Meeting
March 17-18, 2014
Palm Desert, CA, USA

Workshop: Circuit Breaker Tests & Maintenance
March 19-20, 2014
Palm Desert, CA, USA

LCMSEA Fall Meeting
October 8-9, 2014
Niagara Falls, ON, CAN

Eileen Duarte, Principal Engineer,
National Grid

“CEATI is a small technical family in which I feel confident and comfortable reaching out and getting the technical answers I need to help me do my job. Recently, I had the need to justify a battery replacement program and reached out to the CEATI community and received the technical justification I sought.”
Transmission Line Asset Management

The Transmission Line Asset Management (TLAM) Interest Group facilitates the exchange of information on asset management practices and techniques in addition to conducting research for the optimization of overhead transmission line assets.

Designing, Constructing and Maintenance of Overhead Transmission Lines

Designing a transmission line is a complex process that includes achieving a number of objectives. Performance and initial cost of an installation are primary considerations, as is the constructability of a design for varied site conditions. In design there is always the recognition that the life cycle cost should be minimized wherever possible. Establishing life cycle costing for comparison purposes includes many additional considerations, some of which include material type and expected rate of degradation, short term and longer term performance, provisions for live line maintenance, maintainability, ongoing maintenance costs, environmental considerations, access, equipment and skills needed to carry out maintenance, restoration times, and public safety provisions.

In the fall of 2013, TLAM co-hosted a workshop devoted to overhead transmission line design, construction and maintenance issues. Open only to CEATI participants, the event featured opportunities for attendees to learn about line design issues alongside each other, participate in brainstorming discussions related to industry improvements, and network with other transmission line experts from around the world.

Presentations provided insight into live line maintenance, restoration and repair practices, and inspections taking into account a number of different designs and environmental conditions. Line designers presented solutions for particular site conditions that demonstrate a proactive approach to maintainability, constructability and which minimize life cycle costs in the process.

2013 / 2014 Portfolio Highlights

- Measurement of cm-Scale Soil Subsidence and Structure Movement in Remote Areas Using Satellite Imagery
- Potential Applications of Spatial/Object Recognition Technology for Transmission Lines
- Expected Life of Vibration Dampers
- Guide to Optimizing Transmission Line Asset Replacement
- Transmission Line Asset Replacement Guide Based on Asset Condition
- Transmission Line Maintenance Benchmarking
- Integrating New Technologies in Existing Asset Management Practices
- Corrosion of Transmission Line Components
- State of the Art Study on Unmanned Aerial Vehicles (UAVs) for Transmission Line Asset Management
- Data Acquisition and Monitoring of Transmission Lines with High Resolution Satellite Images
- Composite Poles in Transmission & Distribution – Experience and Issues
- Best Practices for Transmission Line Insulator Condition Assessment

2013-2014 Executive Committee

**TLAM Chair:**
Ed Watson
Southern Company

**TLAM Vice-Chair:**
Wes Mueller
Manitoba Hydro

**Technical Advisor**

George Juhn

Mr. George Juhn is a professional engineer with 28 years of experience in the electrical utility industry, most of which was spend at Ontario Hydro / Hydro One. His areas of expertise include maintenance planning, field operations, transmission and distribution asset management, line design, rate applications and regulatory proceedings.
2014 Topics Under Development

- Transmission Line Component Failure Probability Distributions and Risk Identification
- Commissioning Guide for Transmission Lines
- Transmission Line Structure Coatings
- Guide for Cathodic Protection of Buried Steel on Transmission Line Structures
- Guide for Condition Assessment of Lightning Arrestors

Topics & Issues at a Glance

- Asset Investment Decision Making
- Corrosion Control & Mitigation
- Development of Optimum Maintenance Techniques
- Health Assessment & End-of-Life Prediction
- Effective Transmission Line ROW Management
- New Technologies to Enhance Inspection, Condition Assessment, Maintenance

Benchmarking for Transmission Line Maintenance

In 2011, the TLAM group expressed interest in completing a benchmarking exercise to better understand transmission line industry maintenance practices. The study was envisioned to allow participants the ability to compare their practices against others in the group in order to identify areas for improvement in risk management and potential efficiencies.

The collaborative benchmarking study will identify the different maintenance practices used in the transmission line industry, the degree or frequency to which they are used, and an indication of standards employed to mitigate risks. Also included is an analysis explaining why practices might differ between utilities considering system voltage, line types, terrain, geographic location, etc.

Following the completion of the study, the work presented will allow utilities to compare their maintenance and risk management practices to that of other TLAM participants and assess the effectiveness of their approach. It will also provide a baseline for what could be considered as acceptable utility practices and can be used in regulatory proceedings and business planning to justify expenditures. The final deliverable is anticipated for 2014 with the ability to further refine and update the benchmarking document over time.

"This is a fantastic tool for like-minded individuals to meet, share and learn from others. I've been helped and have helped others and at the end of the day make sure everyone has power"

- Patrick Manor, Senior Maintenance Analyst, AltaLink

2014 Transmission Line Asset Management Meetings & Events

<table>
<thead>
<tr>
<th>TLAM Spring Meeting</th>
<th>TLAM Fall Meeting</th>
<th>Transmission Lines for the 21st Century: Design &amp; Asset Management Workshop</th>
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<tbody>
<tr>
<td>San Diego, CA, USA</td>
<td>Niagara Falls, ON, CAN</td>
<td>Niagara Falls, ON, CAN</td>
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For more information on the program and full project listing, please visit www.ceati.com/TLAM
Transmission Overhead Design

The Transmission Overhead Design & Extreme Event Mitigation (TODEM) Interest Group is a consortium of international transmission utilities with a common goal to exchange knowledge on overhead line design issues. Its objective is to develop and share strategies to improve overhead transmission lines designs to mitigate extreme weather events, develop best practices and guides for cost effective increased utilization of existing lines, address corrosion of transmission components and their behavior under special situations, and determine the use of developing technologies to reduce life cycle costs.

Costing the Consequences of Overhead Transmission Line Failures

In 2013, TODEM published a report which included a simple optimization model for a radial line configuration to compute the optimum return period. The optimization was done by balancing the initial line cost against the present value of the cost of losses due to line failures. The failure cost consists of two components: (1) expected cost of line replacement and (2) the expected cost of energy not supplied.

Findings showed that the optimum design return period is significantly influenced by the duration of the line repair once it has failed as well as the cost of energy interruption (a parameter known as ‘IEAR’, Interrupted Energy Assessment Rate). The information provided in this report can assist overhead line designers in optimally designing lines in light of repair considerations.

### Topics & Issues at a Glance

- Extreme Events Mitigation
- Overhead Transmission Lines:
  - Monitoring
  - New Technologies
  - Identifying Design Constraints
  - Maximizing Utilization of Existing Lines
- Strategies for Life Cycle Management
- Means of Minimizing Environmental Impacts

### 2013 / 2014 Portfolio Highlights

- Historic Transmission Line Structure Design Practices Compared to Today’s Practices and Requirements
- Dynamic Response of Transmission Lines under Wind
- Best Practices for Data Capture, Analysis, and Archiving from Aerial Inspections and Videos of Transmission Lines
- Guide for Fire Protection of Transmission Lines
- Best Practices for Design of Transmission Line Structures Located in Water
- Application Guide for Wind Speed-Up Factors
- Guide for Design, Installation and Repair of ACSR Conductor Splices
- Monitoring Package for Extreme Events and Emergency Restoration
- Corrosion Assessment for Tubular Steel Poles
- Guide for Determining Deflection Criteria
- Technology Watch on New Conductors for Transmission Lines
- Guide to Assist Utility Engineers in Costing the Consequences of Overhead Transmission Line Failures

### 2013-2014 Executive Committee

**TODEM Chair:**
Dennis Mize
Southern Company

**TODEM Vice-Chair:**
Brian Townsend
AltaLink

**Technical Advisor**

**Anand Goel**
Dr. Anand Goel is a professional engineer with over 40 years of experience in line engineering with Hydro One Networks. A highlight of his career was leading the diagnostic engineering team and restoration efforts for the 1998 Ice Storm. He has authored and co-authored over 20 technical papers and is recognized internationally as a technical expert on atmospheric icing of power networks.
This workshop will provide utility engineers and managers with the best available information on overhead line design and asset management issues so that they may bring this knowledge back to their respective organizations. Additionally, younger engineers are encouraged to attend to be exposed to emerging challenges and the future needs of the industry.

Unique to the program, a position whitepaper will be circulated to attendees prior to the event and will then be refined through a series of break-out sessions. Each session will be facilitated by top experts in the field covering topics including:

- Wind Load Assessments on Overhead Lines
- Emergency Restoration of Overhead Lines
- Foundations of Overhead Lines -Design and Installation Challenges
- Asset Condition Assessment (Inspection and Maintenance)
- Mitigation Against Catastrophic Loss of Power Networks and Lines (Cascade Prevention)
- Recent Advancements on Innovative Conductor Design and HTLS Performance
- Asset Health Index and Life Cycle Costs of Overhead Lines
The Transmission Underground Cables Interest Group (TUCIG) provides a forum for the exchange of information on cable asset management and establishes techniques and tools for improving installation, maintenance and replacement procedures for fluid-filled and XLPE High Voltage underground cable systems.

A Unique Approach to Identify Best Practices for High Voltage Underground Cable Maintenance

The driver for this particular initiative is a result of the reduction of in-house knowledge as cable experts retire from the work force. In 2009, the TUCIG began an inter-utility collaborative effort to develop a reference manual for high-voltage underground cable systems. The Reference Manual for Transmission Underground Cables summarizes accepted practices and procedures across various types of cables, including HPFF, SCFF and XLPE systems.

Participation in the group's Reference Manual Task Force (RMTF) is included in TUCIG membership and participating utilities may delegate representative(s) to contribute to the strategic direction and review of the Reference Manual contents. To date, the Task Force has met on eight separate occasions and a ninth meeting is scheduled for the fall of 2014. A unique aspect to the project is that all work procedures have been drafted based on best-practice materials provided by participants utilities.

The group collectively decided to address procedures related to maintenance first, allowing utilities to refine their in-house practices and provide detailed guidance to new employees. By the end of 2013, the first printed volume of the Reference Manual will be made available to TUCIG members, including 23 stand-alone maintenance procedures for high-voltage underground transmission cable systems.

Topics & Issues at a Glance

- Asset Health Index Models
- Design & Construction of HV Underground Cable Systems
- Preventive & Corrective Maintenance
- Strategies for Life Cycle Management
- Means of Minimizing Environmental Impacts
- Worker Safety

2013 / 2014 Portfolio Highlights

- Transmission Cable Reference Manual: Volume on Maintenance
- Manhole Entry Practices and Safety Technology for Crews Working in the Vicinity of Energized Cable Circuits
- Real Time Thermal Rating Systems for Underground Cable Systems
- Transmission & Distribution Underground Cable Systems
- HVDC Cable Systems

2013-2014 Executive Committee

TUCIG Chair:
Frank Frentzas
Exelon

TUCIG Vice-Chairs:
Hon Suen  Joseph Rezutko
BC Hydro   FPL

Technical Advisor

Joseph Jue

Mr. Joseph Jue is a professional electrical engineer with over 35 years of experience in the design, management and maintenance of high-voltage underground cables. While he has experience working with high-voltage cable manufacturers and designing 230 kV HPFF cable projects in Ontario, the majority of his professional career was spent at BC Hydro where he was responsible for underground and submarine cable systems.
The TUCIG is known for its collaborative spirit and quick response time to other participants on Requests for Information (RFIs). TUCIG participants have recently provided peer-to-peer feedback on:

- Monitoring Devices for HPFF Cables
- Cable Pulling Calculation Softwares
- Link Boxes for Maintenance Programs
- Replacing SCFF Cables
- Cable Life Cycle Assessments

Sharing Best Practices and Experiences with Diagnostic Testing and Condition Assessment Tools

Building on a successful history of bringing electrical utility engineers, high-voltage cable manufacturers and industry experts together to address emerging areas of concern, the TUCIG will be hosting an industry-open workshop in March 2014 focused on Diagnostic Testing and Condition Assessment for High-Voltage Underground Transmission Cables. The theme for the event is a result of an identified need to understand and interpret test results for HPFF, SCFF and XLPE cable systems.

The workshop will provide a forum for information sharing on transmission cable diagnostic tests and condition assessment techniques, featuring presentations in the areas of:

- Factory Tests, Field Tests and Commissioning Tests
- Dissolved Gas in Oil Analysis
- Failure Analysis Procedures
- Distributed Temperature Sensing (DTS)
- Remedial Measures

Attendees will learn practical applications for proactive testing and condition monitoring of cables and accessories. Additionally, there will be discussions on maintenance programs used to avoid unscheduled outages and to assist both cable engineers and asset managers in determining remaining life of transmission underground cable systems. The workshop will cover well-established diagnostic techniques as well as some newer testing technologies being introduced to the industry. A benefit of the 2014 TUCIG program is that each participating utility receives two complimentary registration passes to the event.

2014 Transmission Underground Cables Meetings & Events

Workshop: Diagnostic Tools and Condition Assessment for Underground Cables
March 19-20, 2014
Palm Desert, CA, USA

TUCIG Spring Meeting
March 20-21, 2014
Palm Desert, CA, USA

TUCIG Fall Meeting & RMTF Meeting
September 17-19, 2014
Montreal, QC, CAN

For more information on the program and full project listing, please visit www.ceati.com/TUCIG
# 2014 CEATI Transmission Program Calendar of Events

## Spring Events

<table>
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<tr>
<th>Month</th>
<th>Event Details</th>
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| March | **March 10-11, 2014 - San Diego, CA, USA**  
Transmission Line Asset Management Interest Group Meeting |
| March | **March 17-18, 2014 - Palm Desert, CA, USA**  
Life Cycle Management of Station Equipment & Apparatus Interest Group Meeting |
| March | **March 20-21, 2014 - Palm Desert, CA, USA**  
Transmission Underground Cables Interest Group Meeting |
| April | **April 10-11, 2014 - Chicago, IL, USA**  
Transmission Overhead Design & Extreme Event Mitigation Interest Group Meeting |

## Fall Events

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<tr>
<th>Month</th>
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| September | **September 17-19, 2014 - Montreal, QC, CAN**  
Transmission Underground Cables Interest Group Meeting |
| October | **Sept.30 - Oct.1, 2014 - Niagara Falls, ON, CAN**  
Transmission Line Asset Management Interest Group Meeting |
| October | **October 1, 2014 - Niagara Falls, ON, CAN**  
Transmission Overhead Design & Extreme Event Mitigation Interest Group Meeting |
| October | **October 2-3, 2014 - Niagara Falls, ON, CAN**  
Transmission Lines for the 21st Century: Design & Asset Management Workshop |
| October | **October 6-7, 2014 - Niagara Falls, ON, CAN**  
CEATI's 6th Annual Grounding & Lightning Workshop |
| October | **October 8, 2014 - Niagara Falls, ON, CAN**  
Grounding & Lightning Task Force (GLTF) Meeting |
| October | **October 8-9, 2014 - Niagara Falls, ON, CAN**  
Life Cycle Management of Station Equipment & Apparatus Interest Group Meeting |

## November

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<th>Event Details</th>
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| **November 17-18, 2014 - Vancouver, BC, CAN**  
CEATI Protection & Control Task Force 2014 Workshop |
| **November 19, 2014 - Vancouver, BC, CAN**  
CEATI Vegetation Management Workshop |
| **November 2014 - Vancouver, BC, CAN**  
Protection & Control Task Force (PCTF) Meeting |
| **November 2014 - Vancouver, BC, CAN**  
Vegetation Management Task Force (VMTF) Meeting |

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*The dates and locations listed above may be subject to change. Please note that Interest Group and Task Force Meetings are open to CEATI members and invited utility guests only. To learn if you and your colleagues are able to attend, please contact info@ceati.com for more information.*
CEATI maintains three groups dedicated to distribution and utilization, which assist utilities in making informed managerial decisions in their day-to-day operations. Through comparative best practices and collaborative research, the groups address issues including maintenance practices, upgrading vs. replacement of assets, and the integration of new technologies. This has never been more necessary as utilities face challenges raised by new sources of electricity from distributed generation and the introduction of big data resulting from a smart metered grid. These groups address the following areas:

- Distribution Assets Life Cycle Management
- Power Quality & Advanced Technologies
- Customer Energy Solutions

A number of cross-utility task forces and interest groups contain components and topics relevant to distribution and/or utilization, including:

- Infrastructure Protection & Security
- Power System Planning & Operations
- Grounding & Lightning
- Protection & Control
- Smart Grid
- Vegetation Management
Distribution Assets Life Cycle Management

With over 100 specialized reports, the Distribution Assets Life Cycle Management (DALCM) Interest Group supports utilities with the full life cycle management of their distribution systems by assisting with in-depth understanding of the problems associated with distribution assets. With a focus on collaborative reports, the program helps utilities minimize the cost of existing plants through their life cycle, optimize equipment/material selection while improving safety and environmental sustainability. To this end, the Group also provides tools to improve the quantification of customer and shareholder expectations, the business assessment of alternatives, and the maintenance and continuous assessment of plant conditions.

Worker Safety: Addressing the Concerns of Utilities

2013 saw the completion of a series of reports on “Worker Protection on De-Energized Distribution Lines.” The reports investigated the shock hazards due to current induced on the de-energized lines and not only provided guidelines based on these results but also assessed the effectiveness of current practices. Divided into three parts, the series tackled work safety on a de-energized overhead distribution line without protective grounding and bonding, accidental energization hazard to line technicians, and has investigated worker protection methods employed such de-energized lines.

In response to the huge success of this work, the Group has extended this study to underground systems with voltage levels of up to 35 kV. The focus will be on protecting line technicians working on de-energized cables from the shock hazard of accidental energization and electromagnetic coupling from nearby energized cables.

2013 / 2014 Portfolio Highlights

- Distribution System Health Indices
- Data Analysis and Modeling Tools Applied to Utility Vegetation Management Programs
- Outage Costs
- Amorphous Core Distribution Transformers
- Composite Poles in Transmission & Distribution
- Distribution Roadmap Update
- Assessment/Test Methodology of In-Service Electrical Connectors for Overhead Lines
- Worker Protection on De-Energized Distribution Lines & Underground Systems
- Non-Destructive Condition Assessment of ACSR Distribution Conductors

Topics & Issues at a Glance

- Improving Reliability of Distribution Equipment & Systems
- Cost Effective Asset Life Cycle Management
- Improving Safety of the Distribution System
- Environmental Sustainability
- Future Distribution System

2013-2014 Executive Committee

DALCM Chair: Fred Dennert
BC Hydro

DALCM Vice-Chair: Lyla Garzouzi
Hydro One

Technical Advisors

Frank Chan
Mr. Frank Chan has nearly 30 years of distribution and transmission experience working with TransAlta Utilities Corp., Aquila Networks Canada and FortisAlberta Inc.

Eric Valois
Mr. Eric Valois has close to 40 years of experience in the electrical utility industry, holding leadership positions at BC Hydro and various utilities in south-western Ontario.
2014 Topics Under Consideration

- Laying the Foundation for the Smart Grid
- Distribution Inspection & Maintenance Benchmarking
- Validation of NDE Tools Used to Determine Present Condition, Residual Strength and Remaining Life of In-Service Wood Poles
- Composite Crossarms Standard Development
- Bonding of Telecommunications Sheath/Messenger to the Power Neutral
- Loss of Life in Regulators from Areas with Frequent Intermittent DG
- Gap Analysis of Research Conducted in DG Integration
- Distributed Automation and Load Shedding Functions
- Assessment/Test Methodology of In-Service Pole Line Anchors
- Inspection of in-Service Concrete and Steel Power Poles
- Detection of Unintentional Islanding,
- Surge Arrester Applications

Planning Ahead: The Distribution Roadmap

In the face of fast-changing technologies and the wealth of work being done on Smart Grid, as well as the emergence of new focus areas and issues, 41 of DALCM’s participating utilities are developing a series of Distribution Roadmap Reports focused on a common industry infrastructure and the case for change.

The technology picture will look ahead as far as 2035 and consider over 500 technologies that will have an impact on distribution. The reports will also address the need for new and improved terminology, drivers, processes, applications, focus areas such as security, as well as lessons learned.

In March 2014, DALCM will be hosting a one-day, seminar for its utility participants on the Distribution Roadmap in Atlanta, GA. The seminar will include a how-to session covering various transformation tools, an interactive session looking at how the technology will impact the distribution design and operations, as well as various utility case studies.

2014 Distribution Asset Life Cycle Management Meetings & Events

Workshop: Distribution Roadmap
March 26, 2014
Atlanta, GA, USA

DALCM Spring Meeting
March 27-28, 2014
Atlanta, GA, USA

DALCM Fall Meeting
October 8-9, 2014
Niagara Falls, ON, CAN

“CEATI DALCM meets my needs very well. We get more bang for the buck; faster turnaround on projects we help fund than we would otherwise receive”

- H. Stewart Martin, Project Manager
  Distribution Asset Management,
  Southern Company

For more information on the program and full project listing, please visit www.ceati.com/DALCM
The objective of the Power Quality & Advanced Technologies (PQAT) Interest Group is to share information and experience with respect to arising power quality issues and mitigation techniques, in addition to exploring the more advanced uses of PQ data for equipment predictive maintenance, DG integration and power system automation.

Are You Prepared to Integrate Distributed Generation?

PQAT emphasizes a broadened strategic direction to not only focus on identifying the harmful aspects of power disturbances and its sources and finding effective mitigating techniques, but to explore the more advanced uses of PQ data in areas such as system predictive maintenance, system automation and DG integration.

PQAT recently started work on characterizing the Power Quality (PQ) phenomena caused by Distributed Generation (DG). Field-recorded power quality measurements from a sampling of existing projects has been collected and analyzed to create a characterization of the impacts DG can have on different power quality phenomena, such as flicker, harmonics, sags/swells, etc. Through upcoming program initiatives, the Group is addressing the industry-wide lack of measured PQ data related to DG installations.

To complement its project portfolio, PQAT hosts a number of collaborative events each year. Attended by over 40 utilities, the group held a webinar on the impacts of DG on PQ, comparing simulations and measured results. The webinar covered an analysis of PQ measurements from almost 30 connected DGs, verified compliance with inter-connection requirements, and the determined impact of DG operation on distribution utility.

2013 / 2014 Portfolio Highlights

- Flicker Evaluation Program
- Harmonic Distortion Level Evolution at Residential PCC
- Successful Accommodation of Mass Penetration of High-inrush Current Devices on Distribution Networks
- Single-phase Tripping and Lock-out on Three-phase Distribution Circuits
- Effective Collection and Management of Power Quality Data for Analysis and Detection of Incipient Distribution System Components Faults and Identification of their Locations
- Understanding, Avoiding and Mitigating Distribution Power Lines Electrical Noise Transfer to Communication Circuits
- Distribution System Losses Caused by Harmonic Emissions and Their True Economic Impact on System Operation
- Characterizing the Power Quality Phenomena Caused by Distributed Generation

2013-2014 Executive Committee

PQAT Chair: Devinder Bahra
BC Hydro

PQAT Vice-Chair: Cristiana Dimitriu
Con Edison

Technical Advisor

Jerry Lepka
Mr. Jerry Lepka draws from his experience working with Ontario Hydro (Hydro One / Ontario Power Generation) in the areas of maintenance and operation of high-voltage transmission facilities. His areas of expertise include power system auditing and the utilization of PQ data for distribution automation.
Recently Initiated

- Effectiveness of Power Quality Mitigation Measures and Technologies
- Power Quality Reference Guide for Customers and Utility Representatives
- Recloser Schemes for Ground Fault Detection under Single-Phase Tripping and Other Significant Temporary Current Imbalance Conditions

2014 Topics Under Consideration

- Determination of Distribution Network Characteristics Using PQ Waveform Data
- Alternative & Advanced Uses of PQ Disturbance Data
- Impact of High Frequency Harmonics on Power Systems
- Voltage Transformers Suitable for Continuous Monitoring of Harmonics in Transmission Systems
- Software Application for Estimation of IEC Flicker Indices using Measured Voltage Quantities
- Accurate Assessment of the Power Quality Impact of High Penetration of Solar in Distribution Systems and Storage as a Mitigation Option

Taking Power Quality Data to the Next Level: Alternative and Advanced Uses

PQAT is developing a project which will conduct a survey and document findings on a new, important and significant class of applications of PQ disturbance data and related hardware. This comprehensive survey will be conducted on the emerging field of information-oriented use of power disturbance data, which could impact disturbance monitoring in the coming years and may become an important area of smart grid activities.

Information provided will assist PQAT participants to position future PQ activities proactively and strategically within their companies. The alternative use of PQ data also represents a great opportunity to make effective use of PQ monitoring assets and justify investments.

2014 Power Quality & Advanced Technologies Meetings & Events

**PQAT Spring Meeting**  
April 28-29, 2014  
Montreal, QC, CAN

**PQAT Fall Meeting**  
October 20-21, 2014  
Minneapolis, MN, USA (tentative)

For more information on the program and full project listing, please visit www.ceati.com/PQAT
Customer Energy Solutions

The Customer Energy Solutions Interest Group (CESIG) assists energy providers, the related energy services industry, and government agencies in helping consumers achieve energy and demand reduction through the development, demonstration and commercialization of customer energy solutions. Participants work together to create new products and energy streams, develop new regulations, standards and guidelines for energy efficiency and DSM applications, as well as provide new technology solutions for customer challenges.

Case Studies: Helping Customers Adapt to New Technologies

Advances in both cooling and heating technologies create the need for a better understanding of Roof Top Units (RTU) energy savings potential. To help participants and their customer adapt, the group initiated a Review of Packaged Roof Top Equipment (RTU) Upgrades for DSM Utility Programs. Using thorough market and technical assessments of commercially available and emerging RTU advanced technologies, the work will determine gas and electricity savings potential compared to current baseline operation for select climates and building archetype. Ultimately, it is expected that the implementation of the highest efficiency RTU options will benefit both customers and utilities through reduced site/source energy use and operating costs.

The group has also commenced work on Energy Savings in Buildings with Energy Management Systems (BEMS) and Advanced Fault Detection and Diagnostics (AFDD). This work will develop an inventory of BEMS and AFDD tools, paying special attention to the experiences of users and the savings obtained. In addition, the initiative will help evaluate the impact of advanced control systems and advanced automated fault detection and diagnosis on electricity and natural gas consumption.

2013 / 2014 Portfolio Highlights

- Packaged Roof Top Equipment (RTU) Upgrades for DSM Utility Programs
- Life of Energy Efficient Measures
- Energy Efficient Lighting Guide Update
- Energy Benchmarking Model for Refrigerated Warehouses
- Inventory and Energy Savings for Residential Programmable Thermostats

Topics & Issues at a Glance

- End Use Technologies:
  - Lighting Motor Systems
  - HVAC Energy Management Systems
- Demand Side Management
- Information & Best Practices
- Supporting Regulations, Codes & Standards

2013-2014 Executive Committee

CESIG Chair:
John Holmes
San Diego Gas & Electric

CESIG Vice-Chair:
Chris Milan
Bonneville Power Admin.

Technical Advisor

Grad Ilic
Mr. Grad Ilic has spent the majority of his professional career at BC Hydro where he led the organization’s Industrial Power Smart Program and BC Hydro’s Water and Wastewater Centre. He has developed numerous emerging technology investigations related to conservation innovation.
For more information on the program and full project listing, please visit www.ceati.com/CESIG
# 2014 CEATI Distribution & Utilization Related Events

## Spring Events

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<th>Month</th>
<th>Events</th>
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<tbody>
<tr>
<td><strong>March</strong></td>
<td><strong>March 20-21, 2014 - Palm Desert, CA, USA</strong> Infrastructure Protection &amp; Security Interest Group (IPSIG) Spring Meeting <strong>March 26-28, 2014 - Atlanta, GA, USA</strong> Distribution Assets Life Cycle Management (DALCM) Spring Meeting</td>
</tr>
<tr>
<td><strong>May</strong></td>
<td><strong>May 7, 2014 - Newark, NJ, USA</strong> Workshop: Utilizing EMS to Integrate DR, DG and Storage <strong>May 8-9, 2014 - Newark, NJ, USA</strong> Customer Energy Solutions Interest Group (CESIG) Meeting</td>
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## Fall Events

<table>
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<tr>
<th>Month</th>
<th>Events</th>
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<tbody>
<tr>
<td><strong>September</strong></td>
<td><strong>September 8-9, 2014 - Vancouver, BC, CAN</strong> Smart Grid Task Force (SGTF) Meeting <strong>September 10, 2014, Vancouver, BC, CAN</strong> BCIT Microgrid Tour <strong>September 11-12, 2014 - Vancouver, BC, CAN</strong> Infrastructure Protection &amp; Security Interest Group (IPSIG) Meeting</td>
</tr>
</tbody>
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*The dates and locations listed above may be subject to change. Please note that Interest Group and Task Force Meetings are open to CEATI members and invited utility guests only. To learn if you and your colleagues are able to attend, please contact info@ceati.com for more information.*
Cross-Utility

Over the years, several topics and areas of interest have emerged in multiple CEATI Groups, spanning the entire spectrum of electrical power activities. Generation, transmission, distribution, and utilization sectors all have the potential to be touched by emerging smart grid technology, the increased integration of renewable power sources, and increasing pressures to provide secure and reliable power. Recognizing the need to bring utility experts together to discuss common cross-utility issues, Interest Groups and specialized Task Forces have been incorporated into CEATI's program offering in the areas of:

- Infrastructure Protection & Security
- Power System Planning & Operations
- Grounding & Lightning
- Smart Grid

Additionally, 2013 has witnessed the introduction of two new Task Forces, as CEATI participants identified a need to further explore:

- Protection & Control
- Vegetation Management
Infrastructure Protection & Security

Through closed door meetings, the Infrastructure Protection & Security Interest Group (IPSIG) facilitates the sharing of experiences among utilities in a vendor and regulator free environment and develops solutions to better secure their systems from physical and cyber threats.

Beyond Fenced Compounds: Security of Right of Ways and Linear Assets

CEATI has developed practices and standards for the security of transmission and distribution assets that are physically located within fenced compounds, such as substations and switchyards. However, these same practices and standards do not exist for the electrical assets that are not within fenced compounds. These assets include towers, conductors, guy wires, cross-arms, insulators, transformers and other attachments. Collectively, IPSIG participants own hundreds of thousands of miles of transmission and distribution lines located in terrain that varies from extremely remote to high density urban environments. Security of these rights of way and linear assets is critical to the stability of the electrical grid.

To address these concerns, IPSIG recently completed a project on the Security of Right of Ways and Linear Assets. The initiative has produced a “Practice and Products” report that reflects the current industry state for improving the security of transmission and distribution right-of-ways, towers, conductors, insulators, transformers and other linear assets that reside outside fenced compounds. The difference in terrain was taken into consideration when addressing the various technologies and soft strategies for linear asset protection.

The sponsors of this project will benefit from the knowledge of available applicable practices and standards by which they can improve the security of their transmission and distribution systems. Metal theft and vandalism are significant costs to utilities and by improving security the expectation is that costs associated with these illegal activities can be reduced.

2013 / 2014 Portfolio Highlights

- Secure Wireless Communications in the Electric Utility Industry
- Security of Right of Ways and Linear Assets
- Security System Design and Engineering
  Specification Templates for Electrical Utility Use

2013-2014 Executive Committee

IPSIG Chair:
Joey St-Jacques
Hydro Ottawa

IPSIG Vice-Chair:
John Greaves
Southern Company

Topics & Issues at a Glance

- Physical and Cyber Security of:
  - Substations & Storage Yards
  - T&D Assets and ROWs
  - Generating Assets
  - Network, Communication & Smart Grid
  - Corporate Environments
  - NERC CIP Compliance

Technical Advisor

Dave Cattanach
Mr. Dave Cattanach is a specialist in dam safety with over 35 years of experience at BC Hydro working in all facets, including security, public safety and emergency management. He was previously in charge of BC Hydro’s security program for dams and power houses, including implementing a comprehensive program to reduce security risks.
As the IPSIG program has developed, it has become clear that the field of security is both diverse and highly specialized in certain areas. In order to provide more targeted discussion surrounding current events and emerging topics, four specialized Working Groups have emerged in the areas of cyber, operational, security management and NERC CIP compliance. The working group model allows IPSIG participants to delegate topic experts within their organization to attend conference calls and webinars on a regular basis.

Another facet of the working group model is the development and monitoring of projects. Heading into 2014, the initiatives being spear-headed range from facility access control and physical security risk mitigation techniques to NERC CIP compliance tools and lessons learned for utility audit success. Additionally, a whitepaper which will document best practices for designing and running effective corporate security programs for electric utilities is also under development. These and other upcoming projects provide practical guidance for the implementation or refinement of security measures and practices.

“Southern Company has derived enormous benefit from our participation in CEATI’s IPSIG program. Whereas some industry working groups talk about common problems but rarely ever identify practical solutions, IPSIG collaboration produces a range of practical options that move the dialog from academic discussions to practical solutions. IPSIG’s project management, vendor vetting and validation testing are top notch. Additionally, professional networking through IPSIG has resulted in high value relationships spanning the U.S. and Canada”

- John Greaves, Investigations Supervisor, Southern Company

2014 Topics Under Consideration

- Evaluation of Physical Security Risk Mitigation Techniques
- Electric Utility Facility Access Control
- NERC CIP Compliance Tools for Audit Success
- Reference Guide for Running Corporate Security Departments
- Copper Theft Mitigation
- Data Mining to Detect Theft and Vandalism

2014 Infrastructure Protection & Security Meetings & Events

IPSIG Spring Meeting
March 20-21, 2014
Palm Desert, CA, USA

BCIT Microgrid Tour
September 10, 2014
Vancouver, BC, CAN

IPSIG Fall Meeting
September 11-12, 2014
Vancouver, BC, CAN

For more information on the program and full project listing, please visit www.ceati.com/IPSIG
Power System Planning & Operations

The long term strategic direction of Power System Planning & Operations (PSPO) Group is to explore and develop tools and techniques to plan and operate systems in a reliable, secure and cost-effective manner.

Addressing Power System Planning and Operations Challenges Associated with the Integration of Renewable Energy Sources

The PSPO held a collaborative joint workshop with CEATI’s Strategic Options for Sustainable Power Generation (SOIG) Group on the topic of Another Look at Renewable Integration: Exploring Opportunities for Synergy and Challenges Involved. This one-day workshop open only to utility participants and invited guests focused on the evolving role of microgrids in future electrical systems, the growing importance of energy storage and the role of demand-response in renewable energy integration. Throughout the program, the planning and operational implications of these emerging technologies were addressed and discussed amongst attendees.

Building on the need to explore renewable integration from a systems point of view in more depth, the PSPO launched its first working group focused on Resource Integration (RIWG). The main focus of the RIWG is to establish commonalities which cut across integration issues relating to transmission level and distributed generation, ancillary services, market operations, demand response, energy storage and other operational considerations. During its inaugural call, key knowledge gaps and priority areas were identified amongst participants.

Moving forward, the RIWG will address topics such as peak-load shaving, day ahead market operation impacts and the impacts that demand response and energy storage have on spinning reserves requirements.

2013 / 2014 Portfolio Highlights

• Dynamic Models For Electric Power Systems In Renewable Resource Integration Studies
• New Capability Applications for Synchrophasor Measurements
• Wear and Tear Impacts of Renewables
• Assessment of Short Circuit Contribution of Renewables

Topics & Issues at a Glance

• Grid and Generation Level Planning & Operations
• System Adequacy, Grid Capacity & Security
• Restructuring & Competitive Markets
• Modern Simulation & Modeling Tools

2013-2014 Executive Committee

PSPO Chair:
Clifton Black
Southern Company

PSPO Vice-Chair:
Hamid Hamadani
Hydro One

Technical Advisors

Brian Scott
Mr. Brian Scott is an electrical engineer with over 34 years of power utility experience with New Brunswick Power and is a senior member of the IEEE.

George Gross
Dr. George Gross is a professor of Electrical & Computer Engineering at the University of Illinois. Prior to this, he worked for nearly two decades at PG&E.
As deeper penetration of renewable generation becomes realized, system planners and operators need appropriate tools to gain better understanding of, and ability to deal with, the intermittency and variability impacts of wind and solar resources on the stability of the power system. As a first step, dynamic models of resources are required to study the interactions between the system with conventional units and any newly integrated renewable resources.

Utilities have been able to capture and store increasing amounts of data in real-time as well as from corporate/administrative sources. Yet, all the data that is available presents a challenge for quick and intelligent processing and the ability to make wise decisions with regards to the operation of power systems.

PSPO is looking to develop a project to improve the extraction of useful information for the operation and planning of a power system using big data analytics techniques. The intent of the project is to make use of big data analytics to uncover hidden patterns, unknown correlations and other useful information. The project should identify areas where significant improvements in useful information can be achieved that would not be possible through normal data processing methods.

Dynamic Modeling for Electric Power Systems: A Study in Renewable Resource Integration

As deeper penetration of renewable generation becomes realized, system planners and operators need appropriate tools to gain better understanding of, and ability to deal with, the intermittency and variability impacts of wind and solar resources on the stability of the power system. As a first step, dynamic models of resources are required to study the interactions between the system with conventional units and any newly integrated renewable resources.

This project investigates the interaction between the variability of renewable sources of energy and controllers in the power system by modelling the key elements and controls involved in long-term transient stability studies of systems with significant amounts of renewable sources.

In particular, the final deliverables will provide an incredibly useful tool for the determination of reserve levels for a system with integrated renewable resources and its variability as a result of deepening penetration. The development of this extended transient / dynamic stability simulation software with the ability to explicitly represent the variability and intermittency impacts of renewable resource farms will provide major benefits to both planners and operations staff.

2014 Power System Planning & Operations Events

Flexible AC Transmission Systems (FACTS)  
January, 2014  
Webinar

PSPO Spring Meeting  
April 3-4, 2014  
White Plains, NY, USA

For more information on the program and full project listing, please visit www.ceati.com/PSPO
Grounding & Lightning

Grounding issues across the world have typically been dealt with by technical groups, each with their own specific terms of reference. The **Grounding & Lightning Task Force (GLTF)** takes a complete spectrum approach. In addition to addressing infrastructure protection and resiliency against lightning strikes and other power surges, the group also tackles important peripheral issues such as soil resistivity, copper theft, and worker safety.

### Gaining an International Perspective on Grounding & Lightning Concerns

2013 has been a prolific year for GLTF participation, as thirteen utilities have added their voice to the ongoing grounding and lightning protection discussion. This past year has featured participation of electrical industry professionals from Canada, the United States, France, Australia, Russia, Switzerland and Sweden. To facilitate this international participation, the group offers regular interactive online webinars, conference call discussions, and various opportunities to join collaborative research projects.

Today there is a greater awareness and desire to ensure that grounding for safety is achieved in addition to improving lightning performance of transmission and distribution systems. Recognizing that there is a wealth of knowledge to be tapped into from various sectors, the GLTF has established a flagship event which includes a two-day industry-open workshop, followed by the Group's annual General Business Meeting. These face-to-face opportunities allow experts in the field to compare best practices and review technology developments.

### 2013 / 2014 Portfolio Highlights

- **Grounding Practices:** Determine Causal Factors Of and Resolve Bolt Failures In Concrete Poles
- **Performance Review:** Various Voltage Gradient Control Mats (Portable and Fixed Types) on the Market
- **Comparison of IEEE & IEC Lightning and Grounding Standards with Explanation of Changes in IEEE Standards**
- **Soil Resistivity Testing**
- **Evaluation on Comparison of Grounding Test Equipment**
- **Grounding System Risk in Design, Construction and Testing a New Grounding System**
- **Grounding System Maintenance Guide and Grounding System Health Index Methodology**
- **Power Connections for Grounding Systems**

### Technical Advisor

**John Williamson**

Mr. John Williamson is a professional engineer with 36 years of experience in the electrical utility industry working at New Brunswick Power. He specializes in lightning protection and grounding system design.
2014 Topics Under Consideration

- Use of Low Resistivity Soil for Gradient Control
- GPR Issues for Customers Near Substations
- Best Practices in Rehabilitating Deficient Grounding Grid Performance
- Application of Geology and Geochemistry to Locating Optimal Substation Grounding Sites
- Transmission Line Lightning Monitoring Pilot Project
- Realistic Corrosion Test of Buried Grounding Connectors
- Substation Grounding Design Review Spreadsheet
- Bonding of Telecommunications Sheath / Messenger to the Power Neutral
- Review of Distribution System Grounding Practices and Rules
- Investigation of Effective Ground Impedance Measurement to Mitigate Distribution System Operating Parameters
- Guidelines to carry out Helicopter Electromagnetic Surveys for Power Utility Applications

Filling the Gaps: Utility-Driven Research

Grounding systems are a crucial component of any power supply system, due to their impact on public and employee safety, supply system reliability, power quality, and life expectancy of power equipment. GLTF has a number of utility-driven initiatives underway for 2014, including guidelines for maintenance of different components of grounding systems, covering simple grounding systems from a single ground rod to complex grounding systems employed in large substations. This work will describe the health degradation modes of different components, and reviews the best industry practices for inspection and testing of grounding systems.

Work is also underway to summarize the processes and tools employed in design, construction and testing of grounding systems with the objective of identifying potential sources of errors that can result in either overly pessimistic (non-optimal) or overly optimistic (with unsatisfactory performance) designs of the grounding system. Oversights in these areas can introduce unintended risks in achieving the safe grounding conditions in the most cost efficient manner.

Recent GLTF Webinars

Throughout 2013, CEATI hosted several learning webinars exclusively available to GLTF participants and invited utility guests. Below are the webinars which recently took place:

- **Geomagnetically Induced Current: Its Effect on the Transmission & Distribution Grid**
  - Storm Analysis Consultants

- **Lightning Protection System Design**
  - Harger Lightning & Grounding

- **Selection & Performance Tools for Transmission Line Arresters**
  - Hubbell Power Systems

- **Lightning Safety Solutions for Transmission & Distribution Systems**
  - Schneider Electric

2014 Grounding & Lighting Meetings & Events

<table>
<thead>
<tr>
<th>GLTF 6th Annual Workshop</th>
<th>GLTF Annual Meeting</th>
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<tr>
<td>October 6-7, 2014</td>
<td>October 8, 2014</td>
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<tr>
<td>Niagara Falls, ON, CAN</td>
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For more information on the program and full project listing, please visit www.ceati.com/GLTF
Smart Grid

The primary role of the Smart Grid Task Force (SGTF) is to provide clarity to Smart Grid concepts, helping utilities understand the transition from a generalized vision to a practical operational Smart Grid system. The task force is also intended to create a platform for industry organizations to network and exchange practical knowledge by discussing experiences, sharing technical expertise, and resolving common issues and barriers with Smart Grid technologies.

Addressing the Challenges and Opportunities of Distribution Automation

SGTF’s future project plans include a report to serve as a ‘Guide to Estimate Benefits from Distribution Automation Equipment’ and study on ‘Utility Communications Platform Deployment in Distribution Automation.’

The idea for the first potential project was developed through the SGTF’s Automation Working Group. Acknowledging the deployment of several Distribution Automation applications during the last ten years, the group believes there is a need for a reference guide to help utilities quantify equipment benefits and select vendor products. This guide will assist utilities to build business cases for Smart Distribution deployment with special emphasis on Volt VAR Control (VVC) and Fault Location Isolation and Service Restoration (FLISR) applications.

The second project is intended to address telecommunications, which is often described as the biggest challenge to the implementation of Smart Grid distribution technologies. The intent is to inform distribution utilities about best practices to integrate the right telecommunications technology with the desired or needed Smart Grid distribution application. Ultimately, the deliverables will guide utilities in selecting the optimal telecommunication technologies for Smart Distribution applications to be deployed.

2014 Topics Under Consideration

- Guide to Quantify Benefits from Smart Grid Equipment
- Utility Communications Platform Deployment in Distribution Automation

2014 Smart Grid Meetings & Events

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<th>Event</th>
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<td>SGTF Fall Meeting</td>
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<td>BCIT Microgrid Tour</td>
<td>September 10, 2014</td>
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2013-2014 Executive Committee

- **SGTF Chair:**
  - Ravi Seethapathy
  - Hydro One

- **SGTF Vice-Chair:**
  - Joe Schatz
  - Southern Company

Topics & Issues at a Glance

- Distribution & Transmission Impacts
- Operations
- Customer Energy Management
- Smart Grid Life Cycle Management
- Deployment Strategies

Technical Advisors

- **Jerry Melcher**
  - Mr. Jerry Melcher has 30 years of electric utility industry experience in advanced technology management.

- **Georges Simard**
  - Mr. Georges Simard has 30 years of distribution network planning and development experience working with Hydro-Québec.

For more information on the program, please visit www.ceati.com/SGTF
Protection & Control

The main objective of the Protection & Control Task Force (PCTF) is to bring industry professionals together to identify, discuss and develop solutions to common issues by creating a networking opportunity for utilities concerned with application, optimization and innovative use of protection and control technologies.

Inaugural Protection & Control Workshop & Meeting Held in Niagara Falls

As part of its annual programming, the PCTF hosted an industry-open workshop and closed-door general meeting uniquely focused on protection and control systems. The events brought together leading transmission and distribution experts from around the world to Niagara Falls, NY, on November 13-15, 2013.

2013 Webinar Recordings

- Synchrophasor Solutions and Application
- A Power Line Signalling Based DG Anti-Islanding Protection Scheme
- SevereGeomagnetic Disturbances
- Multifunction IED’s

2014 Topics Under Consideration

Integration of Protection Functions, Communication Links & Protocols, Cyber Security, Station Automation
- Networking relays
- Capabilities of Aspen, Cyme, Cape – Relay Coordination Software
- Protection Assets Management (Software/ Database Interaction)
- Networking and Cyber Security (Physical / Electronic)
- Justifying the Implementation of IEC 61850 for Small and Mid-Size Utilities
- Pilot-Signaling-Based Protection Schemes
- Application of “Zero Crossing” Circuit Breakers
- Protection Testing & Automation
- Relay Settings Coordination between Utilities and Non-Utility Generators
- Steps for Substation Automation

Improving and Optimizing Protection Systems Maintenance Practices & Records, Compliance Reporting, Derivation & Management of Protection Relay Settings
- Relay Settings, Protection Maintenance & Test Reports
- NERC Maintenance Standards & Compliance
- Third Party Generation Interconnection
- Reclosing/Automatics Training & Practices
- Firmware Management: New Relays & Existing Fleet

Protection & Relay Design Practices, Replacement Strategies, Optimization of Functionality Expansion & Integration
- Protection Control Standards & Best Practices
- Dealing with Aging Infrastructure
- Equipment Specifications & Emerging Technologies
- Integration of Distributed Generation
- Distribution System Automation

2014 PCTF Meetings & Events

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<th>PCTF Workshop</th>
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<td>November 17-18, 2014</td>
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<tr>
<td>Vancouver, BC, CAN</td>
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For more information on the program, please visit www.ceati.com/PCTF

Technical Advisor

Jerry Lepka
Mr. Jerry Lepka draws from his experience working with Ontario Hydro (Hydro One / Ontario Power Generation) in the areas of maintenance and operation of high-voltage transmission facilities. His areas of expertise include power system auditing and the utilization of PQ data for distribution automation.
Vegetation Management

The effective management of vegetation on transmission and distribution corridors is essential to the reliable supply of electricity and to ensure public and worker safety. Vegetation programs must also comply with new and emerging regulations, meet public and landowner expectations and consider environmental issues. Managing vegetation can range from pruning or removing individual trees to encouraging the establishment of low growing compatible plant communities on a right-of-way.

Furthermore, it involves responding to public, First Nations, Government and landowner requests and concerns, while still achieving controls that will comply with NERC and other regulations in a cost effective manner. These are a few of the aspects needed to develop a comprehensive and effective vegetation management program.

With an official program launch in January 2014, CEATI’s new Vegetation Management Task Force (VMTF) will focus on many of the areas noted above with an emphasis on asset management and program planning. It is anticipated that areas of focus will develop and evolve over the course of 2014.

**2014 Topics Under Consideration**

- Environmental Constraints (ex. migratory birds, species at risk, riparian areas, etc.)
- Frameworks for Regulatory Submissions for both Transmission and Distribution
- Regulatory Requirements and Compliance Frameworks
- Strategies for Urban Vegetation Management to Ensure Reliability and Safety
- Vegetation Management Cost Optimization Analyzing Various Relevant Right of Way and Vegetation Conditions - Analytical Template
- Applications and Use of LiDAR or Other Methods to Ensure Electrical Clearances and Compliance
- Effective and Efficient Processes to Respond to Audits
- Conducting Vegetation Inventories and Patrols
- Decision Making Guidelines for the use of Herbicides & Strategies for Changing Forest and Tree Health

**2014 VMTF Meetings & Events**

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<tr>
<td>November 2014</td>
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<td>Vancouver, BC, CAN</td>
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For more information on the program, please visit www.ceati.com/VMTF

**Technological Advisor**

Gwen Shrimpton
Gwen Shrimpton (RPF, RPBio, MPM) is a Registered Professional Forester, Biologist, and holds Masters in Pest Management. She worked for BC Hydro for 20 years developing vegetation management strategies and standards. Her specializations include First Nations negotiation, environmental issues and regulations, and integrated vegetation management.
2014 CEATI Cross-Utility Calendar of Events

Spring Events

March

March 20-21, 2014 - Palm Desert, CA, USA
Infrastructure Protection & Security Interest Group (IPSIG) Meeting

April

April 3-4, 2014 - White Plains, NY, USA
Power System Planning & Operations (PSPO) Interest Group Meeting

Fall Events

September

September 8-9, 2014 - Vancouver, BC, CAN
Smart Grid Task Force (SGTF) Meeting

September 10, 2014 - Vancouver, BC, CAN
BCIT Microgrid Tour

September 11-12, 2014 - Vancouver, BC, CAN
Infrastructure Protection & Security Interest Group (IPSIG) Meeting

October

CEATI’s 6th Annual Grounding & Lightning Workshop
October 6-7, 2014 - Niagara Falls, ON, CAN

October 8, 2014 - Niagara Falls, ON, CAN
Grounding & Lightning Task Force (GLTF) Meeting

November

CEATI Protection & Control Task Force 2014 Workshop
November 17-18, 2014 • Vancouver, BC, CAN

CEATI Vegetation Management Workshop
November 2014 • Vancouver, BC, CAN

The dates and locations listed above may be subject to change. Please note that Interest Group and Task Force Meetings are open to CEATI members and invited utility guests only. To learn if you and your colleagues are able to attend, please contact info@ceati.com for more information.
Keeping Your Team Plugged In

CEATI Utility Training Solutions (UTS) promote and encourage continuous exchange and knowledge transfer through courses tailored to meet the needs of today’s electric utility professionals. Along with the expert guidance of the instructor, each attendee receives a training package, electronic copies of the presentations and a certificate of attendance. These courses are available on-demand anywhere in the world as well as being scheduled periodically throughout the year.

Professional Development Hours
A certificate of attendance reporting the number of teaching hours is awarded to each attendee upon course completion. Check with your local accrediting body as these courses may qualify for the requirements to obtain Professional Development Hours.

Available Courses

- Ampacity of Overhead Line Conductors
- Brush Gear Maintenance
- Cable Accessory Installation Training
- Comparison of Flood Hazard Estimation Methods for Dam Safety
- Current Interruption Transients Calculation
- Grounding Systems Training
- Stray Voltage in Higher Load Density Environments
- Surge Protection of Power Systems
- Preparation of an Emergency Restoration Plan
- Understanding Legal and Regulatory Issues Related to UVM
- Transmission Line Maintenance & Asset Replacement Planning
- Understanding the Importance of Utility Vegetation Management
- Utility Power Quality Approach for Better Customer Service
- Wood Pole Inspection Training & Standards

Do you wish to host a training course for employees at your utility? Contact us at uts@ceati.com to learn about possible group discounts and CEATI’s other on-demand Utility Training Solutions.
Overview: This one day course is specifically related to electric power grounding systems with material supported by years of experience trouble-shooting utility grounding problems. The course is targeted to all individuals either responsible for grounding systems or simply wishing to become more knowledgeable about grounding systems.

Curriculum Highlights:
- Definitions, Standards, & Objectives
- Grounding System Components
- Design Methodology
- Maintenance Practices
- Grounding System Testing Techniques

Instructor: Mr. John Williamson is a professional engineer with 36 years of experience in the electrical utility industry. He specializes in lightning protection and grounding design and carries a global reputation for expertise in troubleshooting utility grounding problems.

Overview: This two-day course will cover ways to improve the lightning performance of distribution and transmission lines by using arresters and other means. The training course is largely targeted towards utility executives, managers, engineers and technicians who are involved in leading major transformations of their electric distribution business.

Curriculum Highlights:
- Surge Protection of Power Systems & Substations
- Arrester Modeling & Application
- Appropriate Lightning Protection
- Arresters Failures & System Standards

Instructor: Mr. Jonathan Woodworth is a consulting engineer with over 30 years of experience in the design, development, and manufacturing of arresters and is greatly recognized for his knowledge on protection of power systems and surge arrester manufacturing.

Overview: This three-day interactive advanced course covers the origin and derivation of the transient recovery voltage (TRV) requirements for circuit breakers applied for fault clearing and the switching of inductive and capacitive loads. TRV requirements in IEC and IEEE standards and how to successfully deal with exceptional cases will be covered over the course.

Curriculum Highlights:
- Fundamental Basis for TRVs
- Derivation of Pole & Amplitude Factors
- Calculation of the Effects of Adding Surge Capacitors to Control TRVs, Shunt Capacitor Banks, Load Sharing, & more

Instructor: Dr. David Peelo is a former switching specialist at BC Hydro and is now a consultant to utilities and switchgear manufacturers worldwide. He is recognized for his expertise in switching in high voltage networks and is a Distinguished Member of CIGRE and a recipient of the IEC 1906 Award.

Interest Groups, Task Forces, Training Courses: How Our Programs Evolve

All of CEATI’s Programs have started out as an identified need for further understanding in specific technical areas from our electrical utility representatives. CEATI then provides the managerial, administrative and marketing support to share these emerging issues with other utilities and bring in the technical experience and expertise to facilitate evaluation and analysis. We help to facilitate in-depth discussions on both day-to-day and long-term operational strategies, but it is our utility participants who drive both our existing and future programs.

If you or a representative from your organization is interested in finding out more on a specific area but do not see it listed within CEATI’s existing programming, please don’t hesitate to let us know. We would be pleased to explore possibilities of addressing these issues and building solutions together.
We wish to thank our 2013 CEATI participants who represent some of the world’s leading organizations:

We value your support and look forward to continued collaboration and success in 2014!