Come join us this summer in the heart of historic Old Québec—one of America's oldest European settlements—as we explore new paths in the drive toward the emerging Smart Grid. The Electric Power Research Institute (EPRI) and Hydro-Québec invite you to the 2010 EPRI Power Quality (PQ) and Smart Distribution 2010 Conference and Exhibition as we explore the future challenges of PQ, Smart Distribution, and electric transportation. The rapid growth of PQ data coupled with Smart Distribution systems gives us the opportunity to explore new possibilities to manage and improve the grid efficiency. We encourage you to attend and discover all the possibilities for your own application.

This conference will provide an unparalleled forum for electric power end users, distribution engineers, reliability and power quality professionals, and related technology manufacturers to gather, share experiences, and learn from one another in a highly efficient and focused environment.

**Week of Events**

The week of events will also include three pre-conference tutorials on Electric Transportation, Smart Distribution, and the End-Use PQ. EPRI will also hold an important Volt-Var Implementation Workshop post conference as well as a workshop associated with the power quality based program for distribution and transmission (PS1A).

*As a friendly reminder, a passport is required for International travel into Canada. For more information, please contact your local passport agency.*

The week of events begins Monday afternoon on June 14th with three concurrent tutorials. EPRI is adding new content to this year's conference with the inclusion of an *Electric Transportation Tutorial*. This tutorial will feature a number of dynamic presentations including the Plug-In Hybrid Electric Vehicle (PHEV) loading characteristics on distribution systems, the time of use electric rate impact of EVs, Smart Chargers, Arc Flash issues related to DC charging, driving habit impacts, charging infrastructure issues, and power quality standards for EVs.

A concurrent tutorial *Using OpenDSS from Smart Distribution Simulations* EPRI has made its Distribution System Simulator (DSS) program available as an open source project. The OpenDSS software is a comprehensive electrical power system simulation tool for electric utility distribution systems. This open source program will enable the user community to contribute useful models for grid modernization. Led by the author of the software, the tutorial will focus on the use of Open DSS in Smart Distribution Simulations.

In the Power Quality arena, a special tutorial entitled *Voltage Dip Immunity of Equipment Used in Installations* will review the findings of the CIGRE/CIRED/UIE Working Group C4.110. This tutorial will contain the latest thinking on this important topic. Present IEC power quality standards do not sufficiently address complex customer loads such as variable speed drives or the complex interaction between the power-system event, the sensitive equipment and the industrial process, this working group was formed in 2006 to address these issues. The tutorial will focus on the outcome of the working group including a review of voltage dip characteristics including the new concept of event segmentation. The tutorial will specifically review the recommended test vectors for evaluation of three phase equipment and the voltage dip statistics that are at the heart of the recommendations. The tutorial will address immunity objectives based on new performance classes suggested by the group and address the economics of power quality.

On Monday evening a reception will be held in the exhibition hall with finger foods, drinks, fun and door prizes. Attendees can greet one another while mingling amongst the exhibitor booths and seeing the latest of Power Quality and Smart Grid Technology. Exhibitors will also have the opportunity to speak with their target audience in a great atmosphere as we celebrate the eve of the conference.

The official opening session of the technical conference will be on Tuesday, June 15th. The conference will begin with an outstanding plenary session. The conference will split in mid morning into two separate tracks to address Power Quality and Smart Distribution.

On Tuesday evening, Hydro-Québec is hosting a social event in the heart of Old Québec at the Aux Anciens Canadiens Restaurant. Located in a mansion built in 1676, this event will be one to remember. The conference will continue on June 16th in two separate tracks and conclude with a closing plenary session that will address topics such as Dynamic Fault Location, the NIST Smart Grid roadmap, and PQ Benchmarking in the age of the Smart Grid.
Pre-Conference Concurrent Tutorials

1:00 pm - 5:00 pm

Electric Transportation and the Grid
Introduction to Electric Transportation
Mark Duvall, EPRI

Evaluation of PHEV Loading Characteristics on Hydro-Québec’s Distribution System Operation
Angelo Giumento, Hydro-Québec

Time-of-Use Electric Rate Impact on Electric Vehicle Charging and Electric Grid
Arindam Maitra, EPRI

SAE J2894 – Power Quality Requirements for Plug-In Electric Vehicle Chargers
Jose Salazar, SCE

Are you SMARTer than your Charger?
Pascal Beauregard-Pontinha, Hydro-Québec

Understanding Electric Vehicle DC Charging Issues Related To Isolation and Arc Flashes
Satish Rajagopolan, EPRI

Analysis of the Driving Habits to Optimize the Plug-in Electric Vehicles Charging Infrastructure
Ali Ashtari, Tom Molinski, Manitoba Hydro, Eric Bibeau, University of Manitoba

Open Distribution Simulations System Workshop
Using Open DSS for Smart Distribution Simulations
Mark McGranaghan and Roger Dugan, EPRI
- Introduction to OpenDSS
- Distribution System Modeling Basics
- Using OpenDSS
- Modeling Control Systems
- Selected example results to illustrate applications:
  - Distribution Loss Studies
  - Evaluating Impacts of PHEV Penetration
  - Evaluating impacts of PV
  - Modeling and evaluating energy storage
  - Voltage optimization studies
  - Harmonic Studies
- Interfacing with Other Applications – the Common Information Model (CIM)

Voltage Dip Immunity of Equipment Used in Installations: CIGRE/CIRED/UIE C4.110 Tutorial

Voltage Dip Characteristics
Math Bollen, STRI

Equipment and Processes
Kurt Stockman, University College West Flanders, Ghent University Association

Immunity Testing
Bill Brumsickle, SoftSwitching Technologies

Voltage Dip Economics
Alex McEachern, Power Standards Lab

Voltage Dip Statistics and Classification
Robert Neumann, Qualitrol

Immunity Objectives
Gaetan Ethier, Hydro-Québec

5:00 - 7:00 PM – Evening Reception in the Exhibitor Hall and Door Prizes
## Opening Plenary: Transporting You Into the 21st Century Distribution System

**Chair:** Mark McGranaghan, EPRI, Director, Distribution, PQ, and Intelligrid

### Introduction and Welcome
- Antonio Pinho, Director of Asset Management, Hydro Québec

### Hydro-Québec Vision of Smart Distribution
- Antonio Pinho, Director of Asset Management, Hydro Québec

### Impact of Electric Vehicles on Distribution Systems
- Mark Duvall, EPRI

### IREQ Research Facilities and Smart Distribution
- Denis Faubert, IREQ

---

## Morning Break

### Track 1: Power Quality

#### PQ and Energy Efficiency
- **Chair:** Charles Perry, EPRI
- **Power Quality and Energy Saving Solutions**
  - Daniel J Carnovale, Eaton
- **EPRI Retrofit Energy Savings Device (RESD) Project Update**
  - Mark Stephens, EPRI
- **Potential Effects of Low Steady State Voltage for Energy Efficiency Improvements on PQ**
  - Bill Howe, EPRI

### Track 2: Smart Distribution

#### Smart Distribution Advanced Technologies
- **Chair:** Georges Simard, Hydro-Québec
- **Pulse Closer Testing at the IREQ Distribution Test Line**
  - Ashok Sundaram, EPRI
- **The Distribution Transformer Smart Node in Distribution Systems**
  - Mike Rowand, Duke Energy (Invited)
- **Implementing the Smartest Grid for the Least Amount of Time and Money**
  - Heart Akerson, Heart Transverter S.A.
- **Reliability of Smart Grid Technologies for the Distribution System**
  - Craig Befus, BC Hydro

---

### Lunch: 12:00 PM - 1:15 PM

### Track 1: Power Quality

#### PQ Issues in the Smart Grid
- **Chair:** Math Bollen, STRI
- **Power Quality Aspects of Smart Grids**
  - Jin Zhong, University of Hong Kong and Math Bollen, STRI
- **Symbiosis between ADA Applications and PQ Monitoring in Smart Grids**
  - Francisc Zavoda, IREQ, Hydro-Québec
- **Demand Management and PQ in Building Industry Based on a Real Case Study of a Hotel in Indonesia**
  - Rudolf Mueller, Janitza Electronics and David Ezer, Omnimverter

### Track 2: Smart Distribution

#### Integrating Distributed Resources
- **Chair:** Chad Abbey, IREQ, Hydro Québec, CIGRE C6.11
- **Power Quality Monitoring for Wind Farms**
  - Robert Neumann, Qualitrol LLC
- **Community Energy Storage as a Distribution Resource**
  - Tom Walker, American Electric Power
- **Grid Stability and Distributed Generation – A New Application of Low-Cost Micro-Synchrophasor**
  - Alex McEachern, Power Standards Lab

---

### Afternoon Break: 3:00 PM - 3:30 PM

### Track 1: Power Quality

#### PQ Case Studies
- **Chair:** Scott Anderson, Salt River Project (Invited)
- **Equipment Compatibility in Manufacturing Operation**
  - Salman Sabbah, Intel
- **Hydro Québec’s Power Quality Service for Major Customers: Service Signature**
  - François Lèvesque, Hydro-Québec Distribution
- **PQ Monitoring of a Hotel Load as Spinning Reserve**
  - Theo Laugher, Tennessee Valley Authority
- **Flicker Control with an MV Hybrid Var Compensator**
  - Rémí Bolduc, Schneider Electric – France

### Track 2: Smart Distribution

#### Smart Distribution Volt/Var Control
- **Chair:** Tom Rizzy, Oak Ridge National Labs, Chairman, IEEE Volt/Var Control Task Force
- **The Impact of a Volt & Var Control System (VVC) on Power Quality**
  - Francisc Zavoda, IREQ, Hydro-Québec
- **Overview of Volt-Var Control from EPRI Green Circuits Project**
  - Karen Forsten, EPRI
- **How DEEP is the Energy in Alabama?**
  - Chuck Wallis, Alabama Power
PQ Monitoring for Smart Distribution
Chair: Bill Howe, EPRI
Automated Capacitor Switching Analysis at Con Edison
Dan Sabin, Electrotek Concepts, Inc.
Smart Distribution Grid Telemetry Recommendations
Larry Clark, Alabama Power
Use of Voltage and Current Sensors for Distribution Power Quality Monitoring
Charles Perry, EPRI

Fault Location and Characterization
Chair: Chris Melhorn, EPRI
Using Waveshape Analysis for Fault Location and Condition Base Maintenance in Distribution Systems
Mario Tremblay and Steve Czech, IREQ, Hydro-Québec
Beyond Mid-Grid: Predicting Failures Before They Occur and Responding Intelligently When They Do
Carl L. Benner and Don Russell, Texas A&M University
TVA’s Fault Analysis Research
James Rossman, Tennessee Valley Authority

MORNING BREAK

PQ Technologies and Tools
Chair: Gaetan Ethier, Hydro Québec
Tool for Real Time Application of EPRI Research to Solve Customer PQ Issues
Melinda Norris, Southern Company
AC “Ice Cube” Relays Applied for Improved Power Quality
Mark Stephens, EPRI
Power Quality Assessment using Hybrid Simulation Approach: Conversion of Frequency-domain Response into an Equivalent in Time-domain Electric Circuit Mode
Xavier Yang, Électricité de France

Smart Distribution Management System
Chair: Tom Weaver, American Electric Power
Implementing New Configurable Bolt-On Self Healing Technology with an Existing Distribution Management System (DMS)
Peter Stenborg, Cooper Power Systems
DMS Application at BC Hydro
Cheong Siew, BC Hydro (Invited)
Decentralized DA in Smart Grid: Distribution Substation Automation
Jiyuan Fan, PhD, GE Energy T&D

LUNCH: 12:00 PM - 1:15 PM

PQ Phenomena
Chair: Doug Dorr, EPRI
Test Results from the EPRI Lenox Swimming Pool and Contact Voltage Test Structure
Doug Dorr, EPRI
Light Flicker - Application of IEEE 1453 Michael Chandler, Salt River Project
High Power 400VDC Power Supply (Rectifier) Performance Evaluation and its Impact on the DC Data Centers
Baskar Vairamohan, EPRI

Smart Distribution Demonstration Updates
Chair: Doug Houseman, Enernex (Invited)
Southern California Edison’s Smart Grid Demonstrations
Bob Yinger, Southern California Edison
Hydro-Québec’s Smart Distribution Zone
Christian Perreault and Chad Abbey, IREQ, Hydro-Québec
EPRI Smart Grid Demonstration Project
Mark McGranaghan, EPRI

AFTERNOON BREAK: 3:00 PM - 3:30 PM

Closing Plenary
Chair: Denis Chartrand, Hydro Québec
Dynamic Fault Location - Responding to Changing Grids: Using PQ Data for Fault Location and Characterization
Chris Melhorn, EPRI
NIST Priority Action Plans – The Pathway to Smart Grid Interoperability
George Arnold, NIST (Invited)
PQ Benchmarking in the Age of the Smart Grid
Bill Howe, EPRI

KINDLE RAFFLE!
Post-Conference Workshops

On June 17th following the conference, EPRI has organized two workshops. The first will be focused on Voltage Optimization and using the Distribution System as a resource to achieve energy savings and/or peak demand reduction as part of a comprehensive energy efficiency strategy. This important workshop will discuss increasing interest, potential benefits and issues associated with Voltage Optimization (a.k.a. Conservation Voltage Regulation) and the challenges of integrating voltage & var control strategies in today’s distribution systems. The workshop will include utility case studies, examples & future plans for deploying advanced smart distribution systems and advanced metering infrastructure (AMI) for improved Volt-Var control.

A second workshop will focus on distribution and transmission power quality to review the preliminary results of the Grid-IQ framework for predicting and modeling future power quality levels on utility networks. In addition, this workshop will update and provide preliminary findings from the TPQ/DPQ III benchmarking project.

Exhibition

Companies offering innovative products and services that enhance and improve electric power reliability, power quality, operating costs, and system performance are invited to participate in the 2010 PQ and Smart Distribution Conference. The exhibition showcases leading-edge Power Quality and Smart Distribution technology solutions and services.

Exhibitors will receive either 1 or 2 complementary passes depending on the size of booth they choose to purchase. A full-size booth purchase will receive 2 complementary exhibitor passes. Tabletop-size booth will receive 1 complementary exhibitor pass.


CEU Credits

The conference is planning to offer 1.6 continuing education units (16 professional development hours). The cost is $10 per applicant and will be collected at the conference prior to the closing session.

Accommodations

Fairmont Le Château Frontenac  
1 rue des Carrieres  
Québec City QC G1R 4P5, Canada  
Reservations: 1-866-540-4460

Web site: http://www.fairmont.com/frontenac/

EPRI Group Rate: $199 Canadian Dollars (CAD) single/double  
Group Code: “EPRI PQA Conference”

Cutoff Date for Group Rate: April 16, 2010

Reservations made on or after April 10, 2010 will be $249 CAD single/double. For those who want to experience more of Québec City, this rate is valid three days before and after the conference based on availabilities.

To make your reservations online, please click here

Restaurant Aux Anciens Canadiens, In the heart of Old-Québec

Quebec, a unique living experience, Aux Anciens Canadiens, an unforgettable eating experience. Discover the hospitality so treasured by the Québécois expressed in its purest tradition. Authentic Québécois cuisine using local products. Five beautiful dining rooms on two levels, each with a different theme reminiscent of the cozy charm of the ancestral residence. The historic Maison Jacquet, one of the largest houses in upper-town in its day and the oldest in Québec, was built in 1675-76.

Its thick walls, solid joints, marvelous wainscoting and recessed cupboards are characteristic of the houses constructed during that period.

Trio Nouvelle-France

Relive and enjoy the Nouvelle-France era with our musical and costumed trio. Their sometime festive sometime soft music will certainly charm you as it did years ago with Nobles and Governors who wanted to entertain their guests.
Event Registration

For more information or to register for this event, please visit MyPQ.epri.com, and click “Attendees and Exhibitors Sign-Up Now!” in the PQA/Smart Distribution 2010 information area. Alternately, you can navigate directly to the conference registration page by clicking here.

If this is your first time using the new EPRI conference registration Cvent system, you will be asked to create a new, free account. If you experience any difficulties registering for PQ and Smart Distribution 2010, please contact Lisa Wolfenbarger at 865.218.8026 or lwolfenbarger@epri.com.

Those who register on or before May 1st, 2010 will be placed in a drawing to win an 8GB IPOD Touch! The winner’s name will be drawn during the opening reception on Monday, June 14th.

Technical information regarding the conference

Please contact:
Mark Stephens, EPRI
Phone: 865.218.8022
Email: mstephens@epri.com

Registration, Exhibit, and Logistical information

Please contact:
Lisa Wolfenbarger, EPRI
Phone: 865.218.8026
Email: lwolfenbarger@epri.com

Conference Fee Information

Register early for a chance to win an 8GB IPOD Touch!

<table>
<thead>
<tr>
<th>Pre-Conference Workshop and Tutorials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Transportation and the Grid</td>
</tr>
<tr>
<td>Open Distribution Simulations System Workshop</td>
</tr>
<tr>
<td>Voltage Dip Immunity of Equipment Used in Installations: CIGRE/CIRED/UIE C4.110 Tutorial</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conference Registration</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPRI Funder of Programs 1, 124, 128, 161, 8, and 172B</td>
</tr>
<tr>
<td>Non-Funders/EPRI Member Attendance Fee</td>
</tr>
<tr>
<td>Others Attendance Fee</td>
</tr>
<tr>
<td>Speakers</td>
</tr>
<tr>
<td>1 Day Pass - Exhibit Only</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Post-Conference Workshops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Optimization Workshop</td>
</tr>
<tr>
<td>Distribution and Transmission Power Quality Workshop</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exhibitor Registration</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 x 10 Exhibitor Booth Package, which includes pipe and drape, one 6-foot table, two chairs, signage, one electrical outlet and TWO full conference registrations.</td>
</tr>
<tr>
<td>Tabletop Exhibitor Booth Package, which includes one 6-foot draped table, two chairs, one electrical outlet and ONE full conference registration.</td>
</tr>
</tbody>
</table>

A Little About Québec City

There’s nothing ordinary about Québec City. Here, four centuries of history are interwoven into the fabric of a modern city renowned for its artful, European-style living and unique culture rooted in French, British, and Aboriginal traditions. Here, nature marks the passage of the seasons and winter’s snows leave their imprint on the local lifestyle and character.