

A photograph of the Chicago skyline at night, with numerous skyscrapers illuminated against a dark blue sky. The city lights are reflected in the water of a river in the foreground. The scene is viewed from a slightly elevated perspective, showing a walkway and some greenery in the lower left corner.

GRID of the FUTURE SYMPOSIUM

October 11-13, 2015
Westin Michigan Avenue Hotel
Chicago, IL, USA 60611

Future Events

2016 CIGRE USNC Grid of the Future Symposium

October 30 – November 1, 2016
and the

2016 CIGRE International Colloquium on Power System Planning Techniques and Standards

November 2-3, 2016

Both will be held in Philadelphia, Pennsylvania

2016 CIGRE USNC Annual Meeting

July 18, 2016

Boston, Massachusetts

Coincident with IEEE PES General Meeting

Paris – CIGRE Session 46

August 21-26, 2016



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AEP TRANSMISSION

Grid of the Future Symposium 2015

Sunday, October 11

11:00am - 5:00pm
Great Lakes Foyer

CIGRE Registration

Tutorials

1:00pm - 5:00pm
Erie

Electric Grid Resiliency Modeling

Dr. Emanuel Bernabeu - PJM Interconnection, Dr. Yilu Liu - Oak Ridge National Laboratory/University of Tennessee (Knoxville), Kyle Thomas - Dominion Virginia Power

1:00pm - 5:00pm
Huron A

Design and Implementation of Microgrid in Modern Power Systems

Wanda Reder, Saeed Kamalinia, Paul Pabst and Michael Higginson - S&C Electric Company

1:00pm - 5:00pm
Huron B & C

Journey to Build the Utility of the Future at ComEd

Isaac Akridge, Daniel Brotzman, Michael Moy, Jane Park, Timothy Webster, Bart Enright and Shay Bahramirad - Commonwealth Edison

1:00pm - 5:00pm
Ontario

The Synchrophasor Starter Kit

Bob Cummings and Dr. Ryan Quint - North American Electric Reliability Corp, Dr. Matthew Gardner and Dr. Kevin Jones - Dominion Virginia Power, Tony Johnson - Southern California Edison, Jim McNierney - NYISO, Dr. Farnoosh Rahmatian - Quanta Technology, Alison Silverstein - North American Synchrophasor Initiative

3:00pm - 5:00pm
Washington Park 1

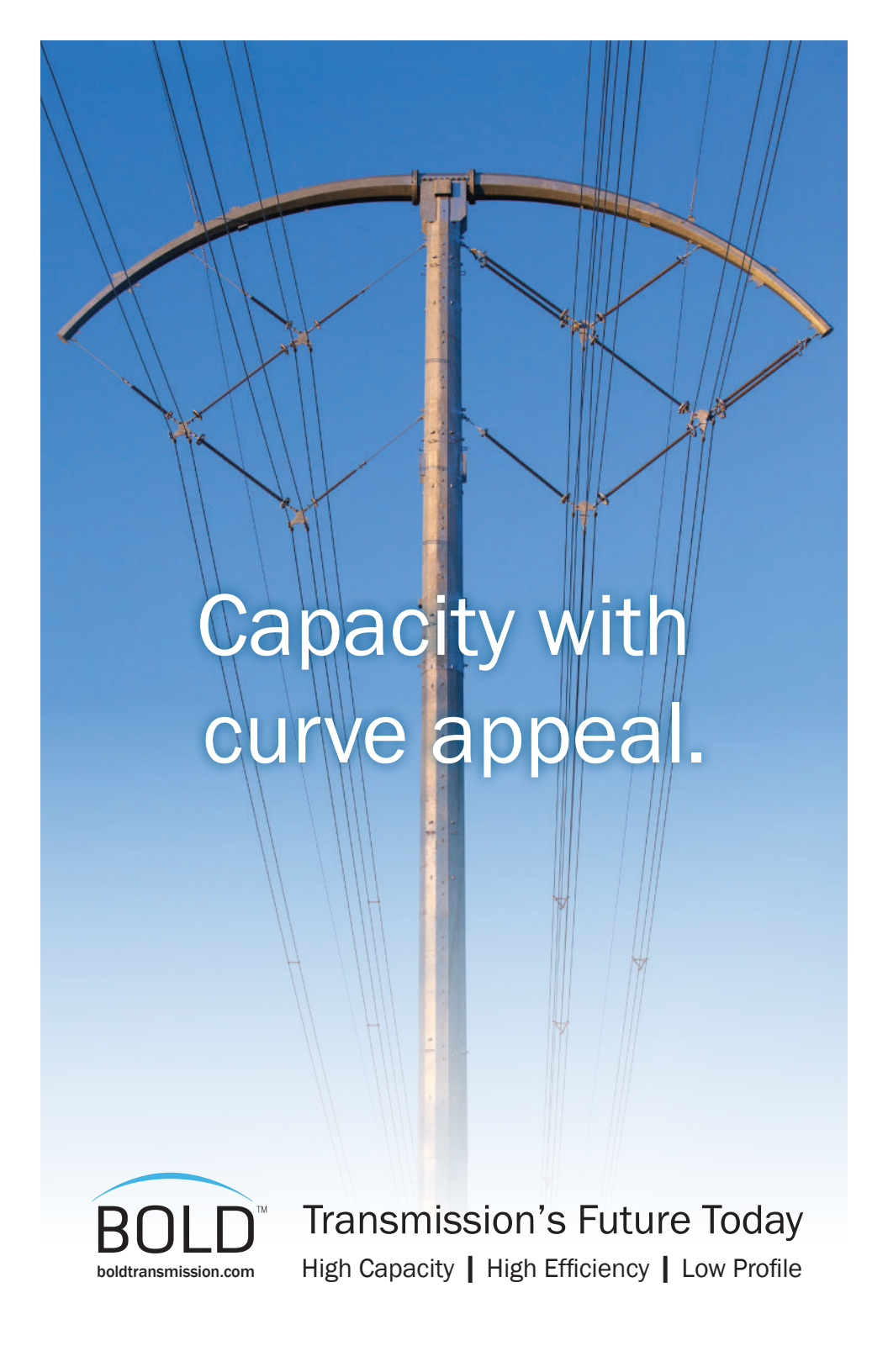
Building Capacity for Leading Change

Stewart Ramsay - Vanry & Associates

5:30pm - 7:30pm
Chicago Ballroom

Opening Reception

*Name listed on all paper presentations is the presenter; papers on USB list all authors.



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Grid of the Future Symposium 2015

Monday, October 12

7:00am - 5:00pm Great Lakes Foyer	CIGRE Registration
7:00am - 7:45am Michigan Ballroom	Breakfast Buffet
7:45am - 8:00am Great Lakes West	Welcome and Introduction Mike Heyeck - President of CIGRE USNC
8:00am - 8:30am Great Lakes West	Keynote Speech Terrence Donnelly - Executive Vice President and Chief Operating Officer, Commonwealth Edison
8:30am - 9:45am Great Lakes West	Panel Session 1: Resiliency in the Grid of the Future Moderator: Dave Roop - Dominion Virginia Power Scott Adams - ATC, Ed Devarona - Florida Power & Light, Mark McVey - Dominion Virginia Power
9:45am - 10:00am Great Lakes Foyer	Morning Break

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Grid of the Future Symposium 2015

Monday, October 12

Paper Session 1A - Distribution Technical Track

Integrating Distributed Generation with Grid Session

Moderator: Shay Bahramirad - Commonwealth Edison Company

<p>10:00am - 11:30am Great Lakes West</p>	<p>Targeted Deployment of Solar Generation using Advanced Inverters J. Valenzuela - National Grid</p>
	<p>Assessing Feeder Hosting Capacity for Distributed Generation Integration D. Apostolopoulou - Commonwealth Edison Company</p>
	<p>Analysis and Mitigation of Harmonic Currents and Instability due to Clustered Distributed Generation on the Low Voltage Network E. Shoubaki - The University of North Carolina at Charlotte (UNCC)</p>
	<p>ISO New England Net Load Analysis with High Penetration Distributed PV J. Black - ISO New England</p>

Paper Session 1B - System Analysis, Grid Control and Reliability Technical Track

Advanced System Control, Modeling and Analytics Session

Moderator: Jeff Palermo - PJP Consulting

<p>10:00am - 11:30am Great Lakes East</p>	<p>STATCOM Application to Address Grid Stability and Reliability: Part II D.J. Shoup - Mitsubishi Electric Power Products, Inc. (MEPPI)</p>
	<p>A Case Study on the Use of D-FACTS Devices to Support Construction of New Transmission Facilities C. Thomas - Smart Wires Inc.</p>
	<p>Importance of DC-DC Transformation in Grids of the Future L. Barthold - iMod Inc.</p>



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Grid of the Future Symposium 2015

Monday, October 12

**Paper Session 1C - Advanced Technologies and Asset Management Technical Track
Asset Health and Management in the Smart Grid Session
Moderator: Rich Crowdis - Black & Veatch**

10:00am - 11:30am Ontario & Erie	Power Transformers: Health Condition and Asset Management Actions D. Angell - Doble Engineering
	Virtual Wide Area Power Quality Monitoring System for AEP Transmission using Energy Meters P. Kansal - American Electric Power (AEP)
	Determining Crossing Conductor Clearance Using Line-Mounted LiDAR J.C. McCall - Lindsey Manufacturing

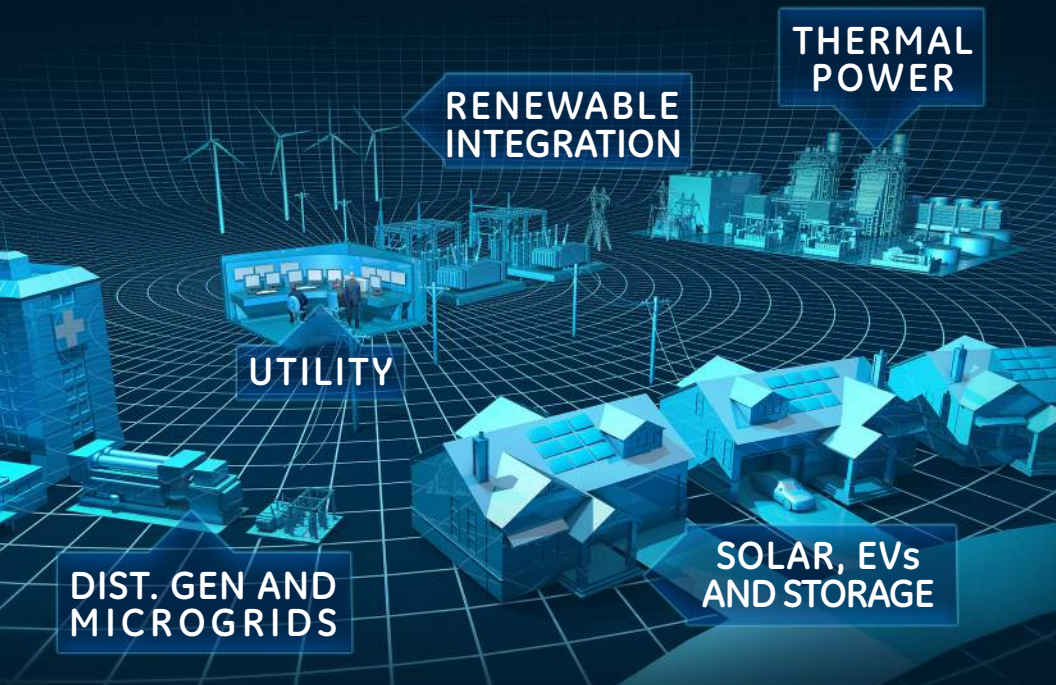
**Paper Session 1D - System Analysis, Grid Control and Reliability Technical Track
Advanced Monitoring Session
Moderator: Bruce English - GE Energy Management**

10:00am - 11:30am Huron B & C	Synchronous Machine-Based Multi-Converter System with Online Interaction Monitoring Function I. Cvetkovic - Virginia Tech
	Harmonic Issues of AEP Welsh HVDC System B. Malek - American Electric Power (AEP)
	Mackinac Back-to-Back Voltage Source Converter HVDC Interaction with Power Line Carrier and Automatic Meter Reading Communications M.B. Marz - American Transmission Company LLC (ATC)



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Grid of the Future Symposium 2015

Monday, October 12

11:30am - 1:00pm
Michigan Ballroom

Lunch Buffet hosted by Genscape

11:30am - 1:00pm
Huron A

CIGRE USNC Executive Committee Lunch

1:00pm - 2:15pm
Great Lakes West

CIGRE Young Member Presentation Competition
Moderated by Jessica Lau - ISO New England

Paper Session 2A - Distribution Technical Track
Distribution Planning Session

Moderator: Chris Root - Vermont Electric Power Company (VELCO)

2:15pm - 3:45pm
Great Lakes West

Geographic Information System (GIS) Based Evaluation of a Utility Service Territory for Public Purpose Microgrid Installations

H. Pierce - Commonwealth Edison Company

Coordinating Worldwide Distribution Planning Model Development via an Open Source Modeling Platform

R. Dugan - Electric Power Research Institute (EPRI)

Advanced Fuse - Saving Techniques

T. Rousan - Ameren Illinois

Interruption Costs for Different Lateral Protection Strategies

X. Chen - S&C Electric Company

Paper Session 2B: System Analysis, Grid Control and Reliability Technical Track
Benefits of Data Analysis Session

Moderator: Tom Tobin - S&C Electric Company

2:15pm - 3:45pm
Great Lakes East

Using Synchro-phasor System Data for Establishing Operating Range for Operators Guidance and Detection and Analysis of Significant Events

B. Bhargava - Electric Power Group (EPG)

Baselining PMU Data to Find Patterns and Anomalies

B.G. Amidan - Pacific Northwest National Laboratory (PNNL)

Data Quality Considerations for Waveform Analytics

J. Wischkaemper - Texas A&M University



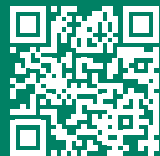
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Grid of the Future Symposium 2015

Monday, October 12

Paper Session 2C - Advanced Technologies and Asset Management Technical Track

Planning the Future Grid Session

Moderator: Rick Bush - T&D World Magazine

**2:15pm - 3:45pm
Ontario & Erie**

Proposed Eastern Interconnection and Western Electricity Coordinating Council Seams Study

J. Caspary - Southwest Power Pool

The Nanogrid Collective: a Means of Integrating Thousands of Individual Customers into System Operations and Markets

P.J. Palermo - PJP Consulting

Adoption of Smart Grid Technologies: Results of a Survey of U.S. Electric Utilities

J. Dedrick - Syracuse University

Smart Virtual Power Plants for the Future Electric Grid - Realization and Benefits

E. Shoubaki - The University of North Carolina at Charlotte (UNCC)

Paper Session 2D - System Analysis, Grid Control and Reliability Technical Track

Grid Flexibility, Reinforcement and Life Extension Session

Moderator: Jessica Lau - ISO New England

**2:15pm - 3:45pm
Huron B & C**

Flexibility in Wind Power Interconnection Utilizing Scalable Power Flow Control

P. Jennings - Smart Wires Inc.

Transmission Grid Reinforcement with Embedded VSC-HVDC

J. Danielsson - ABB

Refurbishment and Life Extension of Existing Facilities in Vermont

J. Burroughs - Vermont Electric Power Company (VELCO)

Investigation and Correction of Phase Shift Delays in Power Hardware in Loop Real-Time Digital Simulation Testing of Power Electronic Converters

M. Davari - Quanta Technology

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Grid of the Future Symposium 2015

Monday, October 12

3:45pm - 4:00pm
Great Lakes Foyer

Afternoon Break

Paper Session 3A - System Analysis, Grid Control and Reliability Technical Track
IEC 61850 Inoperability Session
Moderator: Theo Laughner - Tennessee Valley Authority (TVA)

4:00pm - 5:30pm
Great Lakes West

Performance Evaluation of Phasor Measurement Units for Digital Substations (PMU with IEC 61850 sampled values)
 H. Vardhan - Alstom Grid

Standards Are Not Enough! Challenges of 61850 Interoperability
 J. Atkins - SUBNET Solutions, Inc.

Lessons Learned Implementing an IEC 61850-based Microgrid Power-Management System
 K.A. Gray - POWER Engineers, Inc.

Paper Session 3B -System Analysis, Grid Control and Reliability Technical Track
Benefits of Grid Planning Session
Moderator: Chris Mertz - Dominion Virginia Power

4:00pm - 5:30pm
Great Lakes East

Transmission Planning in a Dynamic Environment
 T. Goodwin - Oncor Electric Delivery

Increased Reliability of EHV Systems through Station Switchable Spare Transformer and Shunt Reactor Design and Operation
 C.L. Belknap & O.A. Miller - American Electric Power (AEP)

The Vermont Weather Analytics Center Project: Electricity, Weather and Accelerating the Renewable Grid
 C.E. Root - Vermont Electric Power Company (VELCO)

Development and Implementation of Composite Load Model in WECC
 D. Kosterev - Bonneville Power Administration (BPA)

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Grid of the Future Symposium 2015

Monday, October 12

**Paper Session 3C - System Analysis, Grid Control and Reliability Technical Track
ICT and Cyber Security Applications Session
Moderator: Dave Roop - Dominion Virginia Power**

4:00pm - 5:30pm Ontario & Erie	On the Need for Robust Decentralized Coordination to Support Emerging Decentralized Monitoring and Controls Applications in Electric Power Grid P. Banerjee - Washington State University
	Methodology for Evaluation and Selection of Wireless Communication Systems for Smart Grid Applications R. Sharma - S&C Electric Company
	Development of Cyber-Aware Energy Management System Applications Y. Sun - Pacific Northwest National Laboratory (PNNL)
	Threat Intelligence Management (TIM) Transmission Security Operations Center (TSOC) B.L. Gaines - FirstEnergy

**Paper Session 3D - System Analysis, Grid Control and Reliability Technical Track
Policy and Market Impacts Session
Moderator: Abouzar Rahmati - SunEdison**

4:00pm - 5:30pm Huron B & C	Model Price Responsive Demand in PJM Wholesale Market Y. Xiao - Alstom Grid
	The Relationship of Primary, Secondary and Tertiary Regulation / Dispatch under High Wind Penetration F. Farzan - DNV GL
	Quantifying Pollution Impact from New Generation and Demand-Side Management J. Lau - ISO New England
5:30pm	Adjourn
6:30pm - 9:30pm	NGN General Meeting and Dinner (Invite Only)

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Grid of the Future Symposium 2015

Tuesday, October 13

7:00am - 4:30pm Great Lakes Foyer	CIGRE Registration
7:00am - 7:45am Michigan Ballroom	Breakfast Buffet
7:00am - 7:45am Grant Park	NGN Breakfast Buffet (Invite Only) Cheryl Maletich, Vice President of Distribution System Operations - Commonwealth Edison
7:45am - 8:15am Great Lakes West	Keynote Speech Michael Edmonds - President US Business, S&C Electric Company
8:15am - 9:30am Great Lakes West	Panel Session 2: Game Changing Transmission Technologies Moderator: Mark McGranaghan - Electric Power Research Institute (EPRI) Robert Bradish - AEP, Joe Svachula - Commonwealth Edison, Sanjay Bose - Consolidated Edison, Dexter Lewis - Southern Company
9:30am - 10:45am Great Lakes West	Panel Session 3: Game Changing Distribution Technologies Moderator: Chris Root - Vermont Electric Power Company (VELCO) Shay Bahramirad - Commonwealth Edison, Pat Hogan - Pacific Gas & Electric Company, Chris Kelly - National Grid
10:45am - 11:00am Great Lakes Foyer	Morning Break

Grid of the Future Symposium 2015

Tuesday, October 13

**Paper Session 4A - Advanced Technologies and Asset Management Technical Track
New Techniques in Protection Session
Moderator: Josh Snodgrass - Duke Energy**

11:00am - 12:30pm Great Lakes West	A Wave Shape Based Algorithm for Fast CT Saturation Detection A. Rahmati - SunEdison
	A New Subsynchronous Oscillation (SSO) Relay for Renewable Generation and Series Compensated Transmission Systems Y. Gong - American Electric Power (AEP)
	Setting-less Protection: Laboratory Experiments and Field Trials A.P. Meliopoulos - Georgia Institute of Technology
	Tolerance-Based Time-Current Coordination M. Meisinger - S&C Electric Company

**Paper Session 4B - System Analysis, Grid Control and Reliability Technical Track
Grid Analysis and Assessment Session
Moderator: Stewart Ramsay - Vanry & Associates, Inc.**

11:00am - 12:30pm Great Lakes East	Analysis of the Effects of a Flexible Ramping Ancillary Service Product on Power System Operations I. Krad - National Renewable Energy Laboratory (NREL)
	Online Dynamic Assessment of Transmission Ratings for Transmission Constraint Management in Power System and Market Operations K.W. Cheung - Alstom Grid, Inc.
	Dynamic Line Rating as a Means to Enhance Transmission Grid Resilience J.C. McCall - Lindsey Manufacturing

Grid of the Future Symposium 2015

Tuesday, October 13

Paper Session 4C - Distribution Technical Track

Simulation, Analysis, Control and Commissioning Session

Moderator: Mark McGranaghan - Electric Power Research Institute (EPRI)

11:00am - 12:30pm
Great Lakes West

DMS Simulation Toolkit for the Grid of the Future

A. Birchfield - University of Illinois at Urbana-Champaign (UIUC)

State Estimation in Distribution Systems

L. Garcia-Garcia - Commonwealth Edison Company

Harmonic Distortion Control and Reactive Power Compensation in a Large Wind Mill Generation Plant

J.C. Das - Power System Studies, Inc.

National Grid's Approach to Commissioning of Smart Grid Pilot Devices

J. Valenzuela - National Grid

Paper Session 4D - System Analysis, Grid Control and Reliability Technical Track

ICT Applied to the Networks of the Future Session

Moderator: Johan Enslin - The University of North Carolina at Charlotte (UNCC)

11:00am - 12:30pm
Great Lakes East

A Future Oriented Data Platform for the Electric Power Grids

T. Xia - Dominion Virginia Power

Electric Utilities IT and OT Convergence

J. Wirtz - Black & Veatch

From Deterministic Machine to Probabilistic System

S.P. Murphy - PingThings, Inc.

Regenerative Braking in Mass Transit

N. Kasza - Commonwealth Edison Company

12:30pm - 1:30pm
Michigan Ballroom

Lunch Buffet

Grid of the Future Symposium 2015

Tuesday, October 13

**Paper Session 5A - System Analysis, Grid Control and Reliability Technical Track
Synchrophasor Applications Session**

Moderator: Damir Novosel - Quanta Technology, LLC

1:30pm - 3:00pm
Great Lakes West

Investigation of PMU Data Loading Performance - Hurdles and Potential Improvements
N. Nishikawa - Hitachi America, Ltd.

Synchrophasor Implementation Experience and Integration Challenges in Indian Grid
C. Kumar - POSOCO

Challenges and Lessons Learned from the Design and Implementation of an IEC61850-90-5 Synchrophasor System
M. Adamiak - GE Energy Management

**Paper Session 5B - System Analysis, Grid Control and Reliability Technical Track
New Technologies Session**

Moderator: Jason MacLeod - Burns & McDonnell

1:30pm - 3:00pm
Great Lakes East

Investigating Power System Primary and Secondary Reserve Interaction under High Wind Power Penetration Using Frequency Response Model
J. Tan - National Renewable Energy Laboratory (NREL)

Modeling and Simulation of Battery Energy Storage Systems for Grid Frequency Regulation
X. Xu - S&C Electric Company

Automated Fault Location
T. Laughner - Tennessee Valley Authority (TVA)

Grid of the Future Symposium 2015

Tuesday, October 13

**Paper Session 5C - System Analysis, Grid Control and Reliability Technical Track
High Voltage Equipment for Emerging Power System Conditions Session
Moderator: Mandy Olson - Burns & McDonnell**

1:30pm - 3:00pm
Ontario & Erie

Demonstration of Measurement Derived Model-Based Adaptive Wide-Area Damping Controller on Hardware Testbed

E. Farantatos - Electric Power Research Institute (EPRI)

Synchronous Condenser Conversions at FirstEnergy Eastlake Plant

C.R. Slattery - FirstEnergy Corporation

Eversource's Selection of Synchronous Condenser Technology at Saco Valley

P. Marken - GE Energy Management

**Paper Session 5D - System Analysis, Grid Control and Reliability Technical Track
Power Systems Performance Models and Numerical Analysis Session
Moderator: John McDonald - GE Energy Management**

1:30pm - 3:00pm
Huron B & C

AEP's 765kV Transmission Line Model Validation for Short Circuit and System Studies

T. Yang - American Electric Power (AEP)

Real Time Phasor Data Processing using Complex Number Analysis Methods

R.A. de Callafon - University of California at San Diego (UCSD)

Novel Simulation Method to Quantify Induced Voltage & Current between Parallel or Partially Parallel Proximity AC Transmission Circuits

X. Wu - American Electric Power (AEP)

Effects of GIC Neutral Blocking Devices (NBDs) on Transmission Lines Protection Performance and Potential for Resonance

A. Karrar - University of Tennessee at Chattanooga (UTC)

3:00pm - 3:15pm
Great Lakes Foyer

Afternoon Break

3:15pm - 4:30pm
Great Lakes West

**Panel Session 4 - Super Session with NASPI
Moderators: Alison Silverstein - NASPI and Damir Novosel - Quanta Technology**

Dave Roop - Dominion Virginia Power, Richard Shaheen - BPA, Phil Crissup - OGE

4:30pm

Adjourn

