55th Annual

Minnesota Power Systems Conference

FINAL PROGRAM

November 12–14, 2019

Saint Paul RiverCentre
175 W Kellogg Boulevard, Saint Paul, Minnesota

ccaps.umn.edu/mnpowersystems

In Cooperation with:
IEEE Twin Cities PES/IAS

To view PowerPoints on your electronic devices, go to ccaps.umn.edu/MIPSYCON-PPT

College of Continuing & Professional Studies

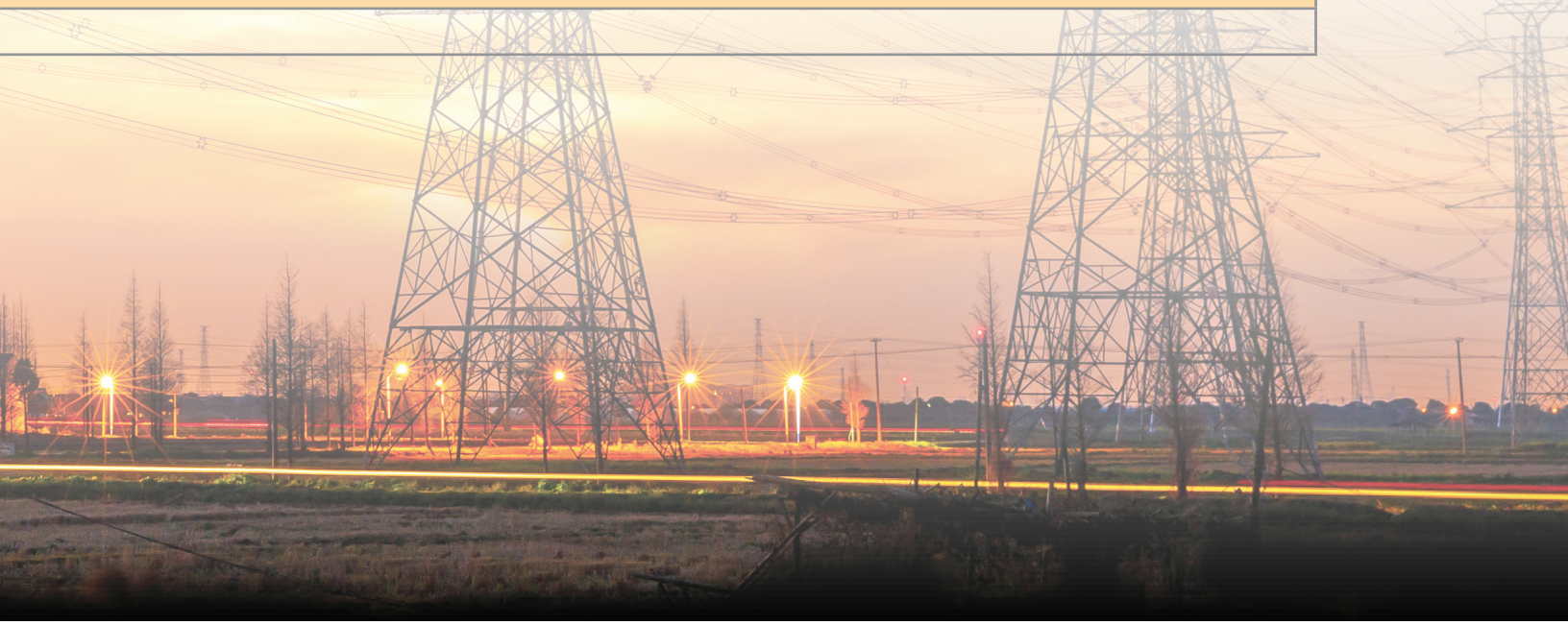
University of Minnesota

Program at a Glance

Tuesday, November 12, 2019

7:00 a.m.	**Registration and Continental Breakfast**	
General Session–Grand Ballroom		
8:00	**Welcome and Opening Remarks**	
8:15	**Electric Utility Futures: Perspective from the Prairie**	
9:00	**The Integration of Customer, Smart Grid, and Operations**	
9:45	**Break**	
10:15	**2019 Polar Vortex: Looking Back and Planning for the Future**	
11:00	**Engineering Ethics**	
Noon	**Lunch**	
	Substation Room 1	**Safety/Security** Ballroom A
1:00 p.m.	**Cold Weather Circuit Breaker Performance**	**Understanding the New IEEE 1584-2018 Guide for Performing Arc-Flash Hazard Calculations and the 2017 NEC Arc Energy Reduction Articles**
1:45	**Importance of Transformer Condition Assessments in Extending the Life of Transformer Assets, Including DGA and Oil Quality Analysis**	**Personal Safety Story: Coal Dust Explosion Survivor**
2:30	**Break**	
3:00	**Transformer Evaluation, Inspection, Design, and Installation—Utility Perspective**	**Using Intelligent Lighting to Enhance Perimeter Security**
3:45	**Resistivity Testing of Substation Surfacing Stone: Lessons Learned**	**All About Eve: Comparing DNP3 Secure Authentication with Standard Security Technologies for SCADA Communications**
4:30	**Exhibitor Reception (4:30–7:00 p.m.)**–Exhibit Hall Lower Level	
7:00	**Adjourn**	

Distribution Room 4	Relaying I Ballroom E
Deploying an Advanced Distribution Management System	**IEC 61850 Digital Substation Design Tutorial for Novices**
Improving System Line Hardening Using Ductile Iron Poles	**The Useful Life of Microprocessor-Based Relays: A Data-Driven Approach**
Distribution STATCOMs for Improving Power Quality, Deferring Capital, and Expanding Hosting Capacity	**Complying with NERC PRC-027: Planning, Preparation, and Implementation Strategies for Utilities**
SCADA and AMI Data Meet to Improve Distribution Planning	**A Creative Line Differential Protection Scheme for the Hudson River Crossing Section of a 345kV Transmission Line**



Program at a Glance

Wednesday, November 13, 2019

7:30 a.m.	Registration and Continental Breakfast	
	Distribution Automation/Communications Ballroom A	**Project Management** Room 1
8:30	Navigating Grid Modernization	Past, Present, and Future of Manitoba's Bipole III Project
9:15	Using Analytics in Underground Distribution Networks for Situational Awareness and Fault Prediction	Big Stone South to Ellendale: Collaborative Relationships Build Project Success
10:00	Break	
10:30	Addressing Analog Leased Line Obsolescence by Preserving Protection Channel Performance over Ethernet	Denny Substation: Not Your Grandfather's Substation
11:15	Advanced Distribution Automation Application with Mis-coordination Correction Algorithm Based on Neural Network	Keys for a Successful Factory Acceptance Test (FAT)
Noon	Lunch	
	Civil-Structural Ballroom E	**Transmission** Room 4
1:00 p.m.	Innovative Ways to Shore Up Deteriorating Network Vaults	Transmission Line Conductor Size Selection
1:45	GNTL Corridor Geotechnical Challenges	Emerging High Transmission Voltages and Their Mitigation
2:30	Break	
3:00	The Myth of Aging Pole and Tower Infrastructure: Constructed Quality Is Critically More Important to Long-Term Structural Reliability and Performance	Geomagnetic Disturbance Impacts and Analysis Within MISO
3:45	Case Study: Substation Foundation Replacement Utilizing Helical Piles	Transmission Lessons Learned from the Decarbonization of Minnesota's North Shore
4:30	Adjourn	

Thursday, November 14, 2019

7:30 a.m.	Registration and Continental Breakfast	
	Tutorial I Ballroom E	**Tutorial II** Room 4
8:30	Engineering Career Development	Matching Generators to Power Systems
10:00	Break	
10:30	Engineering Career Development	Matching Generators to Power Systems
Noon	Adjourn	

Generation Ballroom E	Emerging Technologies Room 4
Project Tundra: Carbon Capture in ND	**Managing Electric Vehicle (EV) Charging Stations on the Grid**
ALLETE Clean Energy Wind Project Refurbishment	**Modeling Renewables as IBR Penetration Rises**
Solar Plus Storage: From Concept to Implementation	**Panel Session: Integrating High Levels of Renewable Resources**
Stabilizing the Bulk Power System with a Combination of Virtual and Physical Batteries	**Residential Battery Storage Systems: An Installation and Operations Case Study**

Relaying II Ballroom A	Metering Room 1
Low Impedance Differential Protection: New Challenges and Advanced Solutions	**Big Data: Driving Value-Added Solutions Through the Convergence of Advance Metering Infrastructure, Geographic Information Systems, and Distribution Reliability Systems**
Exploring IEEE C37.246-2017 Guide for Protection Systems of Transmission-to-Generation Interconnections	**Rate Analysis Utilizing Meter Data**
Evaluating Overhead Line Reclosing Sequences Based on Transformer Through-Fault Exposure	**Smart Meters Go Beyond AMI**
Case Study: Analysis of 138/13.8kV Transformer Differential Misoperation Points to Faulty CT	**Beyond AMI: Using AMI Data to Solve Problems Before They Become Problems**

Tutorial III Ballroom A/B	Tutorial IV Room 1
Transmission Grid Evolution: Past, Present, Future	**Power Quality 102: Advanced Topics and Case Studies**
Transmission Grid Evolution: Past, Present, Future	**Power Quality 102: Advanced Topics and Case Studies**

Program Schedule

Tuesday, November 12, 2019

GENERAL SESSION–Grand Ballroom

8:00 a.m.–noon

Moderator: *Jay Morris*

Co-Moderators: *Al Haman, Larry Brusseau, Will Lovelace*

Welcome and Opening Remarks

Jay Morris, Grid Solutions

Electric Utility Futures: Perspective from the Prairie

Paul Sukut, Basin Electric Power Cooperative

The Upper Midwest has a rich history of overcoming challenges and improving lives. Mr. Sukut will share the story of Basin Electric, including past highlights, present challenges, and a perspective on the future electric utility industry. – *Fundamental*

The Integration of Customer, Smart Grid, and Operations

Michael Gersack, Xcel Energy

The future is bright for the utility that can execute on the strategy that ensures a balanced approach of customer experience, smart grid technology and operational excellence. Starting with a well-designed customer strategy, how can a utility reinvent itself to "compete" as a regulated entity. – *Fundamental*

2019 Polar Vortex: Looking Back and Planning for the Future

Julie Pierce, Minnesota Power; *Brian Tulloh,* MISO

The 2019 Polar Vortex brought record setting weather to the upper Midwest. Power systems were stressed to levels not seen in over a decade. MISO and Minnesota Power will highlight the insights gained from both the Regional and Utility perspectives. – *Fundamental*

Engineering Ethics

Kate Golden, Mortenson

When performing professional services, engineers must not only possess and maintain high levels of technical expertise and competence, but also must adhere to the highest principles of ethical conduct. This session will use case examples to explore ethical standards expected of engineers. – *Intermediate*

CONCURRENT SESSIONS

1:00–4:30 p.m.

SUBSTATION–Room 1

Moderator: *Steve Mohs*

Co-Moderators: *Michael Marz, Mike Jensen*

Cold Weather Circuit Breaker Performance

Kenneth Benoit, Minnesota Power; *Kasey Borboa,* Minnkota Power Cooperative, Inc.

The Polar Vortex of January 2019 brought historic low temperatures to a large part of the country. This presentation will explore two utilities practices, operational experiences, and lessons learned from this event relating to circuit breakers. – *Fundamental*

Importance of Transformer Condition Assessments in Extending the Life of Transformer Assets, Including DGA and Oil Quality Analysis

Bill Herron, SPX Transformer Solutions

Condition assessments of your transformer fleet prior to experiencing issues can lead to life extension opportunities that help owners avoid unplanned outages. This presentation will outline DGA diagnostic methods as well as analysis methods of determining oil quality as a lead into recommended actions to extend the life of the transformer based on these results. – *Intermediate*

Transformer Evaluation, Inspection, Design, and Installation—Utility Perspective

Susan McNelly, Xcel Energy

This presentation will give an overview of the bid evaluation, drawing and design review, typical inspection/witness points, and the energization release processes used by Xcel Energy for power transformers and oil-filled reactors. – *Fundamental*

Resistivity Testing of Substation Surfacing Stone: Lessons Learned

John Edlebeck, Coleman Engineering Company

After a standardized resistivity test method was presented in IEEE Transactions in 2013, there are notable lessons learned after testing yardstone samples from sites throughout the country. – *Fundamental*

SAFETY/SECURITY–Ballroom A

Moderator: *Bethlyn Cummings*

Co-Moderators: *Larry Brusseau, Ryan Bergeron*

Understanding the New IEEE 1584-2018 Guide for Performing Arc-Flash Hazard Calculations and the 2017 NEC Arc Energy Reduction Articles

Ryan Bergeron, IEEE Twin Cities PES/IAS

Presentation on demonstrating the effects of the new IEEE 1584 Guide for Performing 15kV and below Arc Flash Hazard Calculations and the 2017 NEC (National Electrical Code) Arc Energy Reduction Articles. – *Intermediate*

Personal Safety Story: Coal Dust Explosion Survivor

Joe Fredrickson, Minnesota Power

You will hear the story about a combustible dust explosion I was in, the effects on my family and friends, and the struggles I still experience today. But I did survive. – *Fundamental*

Using Intelligent Lighting to Enhance Perimeter Security

Anthony Hackett, Senstar Inc.

Intelligent security lighting can leverage developments in perimeter intrusion detection and video analytic technologies to improve deterrence, detection, and assessment capabilities. This session will explain this concept and provide practical examples of how different systems can be integrated to work as a cohesive solution. – *Fundamental*

All About Eve: Comparing DNP3 Secure Authentication with Standard Security Technologies for SCADA Communications

Brian Waldron, Schweitzer Engineering Laboratories, Inc.

This presentation evaluates, compares, and contrasts VPN and secure protocol methods for securing SCADA communications for both legacy and modern automation implementations. – *Intermediate*

DISTRIBUTION–Room 4

Moderator: *Greg Owen*

Co-Moderators: *Jay Morris, Brianna Swenson*

Deploying an Advanced Distribution Management System

Joe LaCasse, Xcel Energy

Xcel Energy has implemented an Advanced Distribution Management System (ADMS) in its Public Service Company service territory of Colorado. It is actively deploying the ADMS in its Northern States Power and Southwest Public Service Company territories. This presentation will provide a lessons-learned perspective on the deployment of an ADMS and on what is enabled by implementing ADMS in the manner chosen by Xcel Energy. – *Intermediate*

Improving System Line Hardening Using Ductile Iron Poles

Marc Dray, McWane Poles

Ductile Iron Poles can be used to harden distribution systems by increasing resiliency during major wind and ice storms. This presentation describes examples of hardening applications in Oklahoma and the Florida Keys. – *Fundamental*

Distribution STATCOMs for Improving Power Quality, Deferring Capital, and Expanding Hosting Capacity

Matt Pugh, AMSC; *Fred Johnston,* Alliant Energy

Distribution STATCOMs to dynamically stabilize voltage on distribution circuits have many applications. Benefits include increasing DER hosting capacity and asset life, while deferring capital expenses over thousands of miles of distribution. – *Intermediate*

SCADA and AMI Data Meet to Improve Distribution Planning

Al Haman, STAR Energy Services

AMI and SCADA data are being used to develop more accurate models for distribution planning. Data sources, preparation and usage in modeling software will be discussed along with comparison with traditional engineering methods. – *Intermediate*

RELAYING I–Ballroom E

Moderator: *Dave Bisel*

Co-Moderators: *Doug Brown, Mike Ebert*

IEC 61850 Digital Substation Design Tutorial for Novices

Harsh Vardhan, GE Grid Solutions

This paper describes the step-by-step approach used by National Grid for designing the architecture, selecting different components, and testing the system for a fully digital substation project. By describing the process National Grid has worked through, this paper is intended to be used as a foundation for other utilities to approach IEC 61850-based digital substation design. – *Fundamental*

The Useful Life of Microprocessor-Based Relays: A Data-Driven Approach

Derrick Haas, Schweitzer Engineering Laboratories, Inc.

As the service life of microprocessor-based relays exceeds multiple decades, questions regarding when and how to strategically replace these relays are increasing. This paper defines terms associated with the reliability of protective relays, provides field-observed life cycle reliability data, and suggests replacement strategies. – *Intermediate*

Complying with NERC PRC-027: Planning, Preparation, and Implementation Strategies for Utilities

Ashok Gopalakrishnan, Siemens

This paper presents practical recommendations and strategies to help industry stakeholders prepare for compliance with the NERC PRC-027-1 standard for coordinated operation of protection systems during faults. – *Intermediate*

A Creative Line Differential Protection Scheme for the Hudson River Crossing Section of a 345kV Transmission Line

Mike Kockott, ABB, Inc.

Transmission line splits into six 3-phase cables for the Hudson River crossing. New scheme to replace old to meet all requirements (faulted cable/phase identification) while using existing infrastructure (the existing CT secondary copper wires as the digital communications interface). – *Intermediate*

EXHIBITOR RECEPTION–Exhibit Hall (Lower Level)

4:30–7:00 p.m.

Wednesday, November 13, 2019

CONCURRENT SESSIONS

8:30 a.m.–noon

DISTRIBUTION AUTOMATION/ COMMUNICATIONS–Ballroom A

Moderator: *Dan Nordell*

Co-Moderators: *Jay Morris, Mike Ebert*

Navigating Grid Modernization

Josh Guck, Ulteig; *Eric Clement,* Minnesota Power

Grid Modernization can sound overwhelming for many utilities. This presentation will provide insight into the current state of distribution systems and how a utility can get started modernizing its grid. – *Intermediate*

Using Analytics in Underground Distribution Networks for Situational Awareness and Fault Prediction

George Bjelovuk, Siemens

Data gathered from significant levels of monitoring in complex underground secondary network distribution systems become overwhelming to operators to correlate, analyze, and develop action plans. The presentation will discuss developing a decision support solution using situational awareness and predictive analytics. – *Intermediate*

Addressing Analog Leased Line Obsolescence by Preserving Protection Channel Performance over Ethernet

Paul Robertson, Schweitzer Engineering Laboratories, Inc.

This case study shows the results of a field trial performed by Consumers Energy to migrate relay tele-protection circuits from analog to Ethernet leased communication circuits using Virtual Synchronous Networking (VSN) technology. – *Advanced*

Advanced Distribution Automation Application with Mis-coordination Correction Algorithm Based on Neural Network

Alexandr Stinskiy, Siemens

This paper discusses a distribution automation application with advanced fault isolation and restoration capabilities. This functionality is designed to improve performance and reliability for a grid with multiple distributed energy resources. – *Intermediate*

PROJECT MANAGEMENT–Room 1

Moderator: *Brianna Swenson*

Co-Moderators: *Jesse Tomford, Bethlyn Cummings*

Past, Present, and Future of Manitoba's Bipole III Project

David Jacobson, Manitoba Hydro

This presentation will talk about the journey Manitoba Hydro is taking regarding Bipole III and will provide answers to questions like: Why is Bipole III needed? What kinds of innovative technologies are incorporated in the design? Where might we go with Bipole III in the future? – *Fundamental*

Big Stone South to Ellendale: Collaborative Relationships Build Project Success

Al Koeckeritz, Otter Tail Power Company; *Brian Hunker,* HDR Engineering, Inc.

The Big Stone South to Ellendale project had a unique environmental and cultural landscape and land use along the route. This presentation discusses lessons to assist project proponents in managing timelines on multiagency projects. – *Fundamental*

Denny Substation: Not Your Grandfather's Substation

Joe Orth, POWER Engineers, Inc.

Building electrical infrastructure in a dense urban environment is an increasingly difficult challenge. Through extensive planning and public engagement, Seattle City Light balanced technical needs with community desires for the Denny Substation project. – *Advanced*

Keys for a Successful Factory Acceptance Test (FAT)

David Calitz, Siemens; *Brady Nesvold,* Xcel Energy

FATs are a crucial step in the project management process for key equipment (transformers, breakers, etc). This topic will be presented from both the owner's and supplier's perspectives. Why do owners want FATs, what are they looking for, why are they often difficult, and what are the owner's experiences, both good and bad? What do suppliers recommend for effective FATs, what drives them crazy, what are the supplier's experiences, both good and bad? – *Fundamental*

GENERATION–Ballroom E

Moderator*: Scott Hoberg*

Co-Moderators: *Mike Steckelberg, Mike Crane*

Project Tundra: Carbon Capture in ND

Gerry Pfau, Minnkota Power Cooperative, Inc.

With a likely carbon limited future, we need a carbon solution for our existing coal-based generating stations. Project Tundra aims to capture CO2 from a North Dakota lignite-fired power plant. – *Intermediate*

ALLETE Clean Energy Wind Project Refurbishment

Kris Spenningsby and Chris Aepelbacher, ALLETE Clean Energy

This presentation will discuss the strategy, complexity, and benefits behind refurbishing ALLETE Clean Energy's 104 MW Lake Benton I Wind Project, located in Lake Benton, MN. – *Fundamental*

Solar Plus Storage: From Concept to Implementation

Tom Guttormson, Connexus Energy

This presentation will walk through the deployment of 10MW solar plus 15MW storage portfolio installation at Connexus Energy, including concept business strategy and key technical considerations to interconnect with the distribution grid. – *Advanced*

Stabilizing the Bulk Power System with a Combination of Virtual and Physical Batteries

Charles Grunewald, Blattner Energy (Retired); *Dale Osborn,* Osborn LLC

Balancing wind/solar generation with storage and interruptible (SI) loads for a predictable virtual battery can help stabilize future bulk power systems. Also discussed will be how balanced SI loads can improve battery economy by 50%. – *Intermediate*

EMERGING TECHNOLOGIES–Room 4

Moderator: *Pete Malamen*

Co-Moderators: *Michael Marz, Will Lovelace*

Managing Electric Vehicle (EV) Charging Stations on the Grid

Anders Thulin, Siemens

EV programs are on the minds of most electric utilities, including rate structures, types of EV charging stations, and managing the increased loads on the grid. This topic will share some of the grid impact considerations, with an eye toward how utilities can help drive the industry and the grid impact sustainably. – *Fundamental*

Modeling Renewables as IBR Penetration Rises

Andrew Isaacs, Electranix

New screening approaches and study techniques are emerging for required renewable interconnection EMT analysis. Strategies to verify the quality of both EMT and stability models and potential limits to renewable penetration are discussed. – *Intermediate*

Panel Session: Integrating High Levels of Renewable Resources

Drew Siebenaler, Xcel Energy; *Bob Krueger,* American Transmission Company; *Nihal Mohan,* MISO; *Douglas Brown,* Siemens

Renewable resources are reaching levels that raise planning and operational concerns. This panel discusses how these concerns are being addressed today and are expected to be addressed in the future. – *Fundamental*

Residential Battery Storage Systems: An Installation and Operations Case Study

Anthony Kassa, STAR Energy Services

Session will discuss a residential battery storage pilot project to study the installation, operation and overall feasibility of residential batteries in today's utility world. – *Fundamental*

CONCURRENT SESSIONS

1:00–4:30 p.m.

CIVIL-STRUCTURAL–Ballroom E

Moderator: *Mike Jensen*

Co-Moderators: *Bethlyn Cummings, Jesse Tomford*

Innovative Ways to Shore Up Deteriorating Network Vaults

Brian Hitz, Laminated Wood Systems

Aging network vaults present hazards to workers and increase the potential for electrical failures. Replacement of vaults are a huge financial and operational burden. ComEd is applying innovative adjustable vault reinforcement techniques to address this issue. This presentation will review the challenges and solutions realized. – *Fundamental*

GNTL Corridor Geotechnical Challenges

Brent Norris, POWER Engineers, Inc.

An overview of the geologic challenges encountered along the project alignment, including anticipated geotechnical design parameters, design parameter derivation per soil layer, and application to helical pile design. – *Advanced*

The Myth of Aging Pole and Tower Infrastructure: Constructed Quality Is Critically More Important to Long-Term Structural Reliability and Performance

Zachary Oliphant, Exo Group LLC

We often relate structural reliability of our pole and tower infrastructure to "age." Our research often finds that a far better predictor of long-term structural reliability and the desired structural performance is the initial quality of poles/towers being fabricated and the quality of the installation. Several examples will be presented. – *Fundamental*

Case Study: Substation Foundation Replacement Utilizing Helical Piles

Jordan Guck, Ulteig; *Brendan Cohen,* Xcel Energy

Several foundations for a 69kV box structure were in severe need of repair or replacement due to concrete deterioration and poor soil conditions. This led to a solution incorporating helical piles. – *Intermediate*

TRANSMISSION–Room 4

Moderator: *Mike Steckelberg*

Co-Moderators: *Will Lovelace, Doug Brown*

Transmission Line Conductor Size Selection

DH Kim, Matthew Lind, and Sarah Simpson, Burns & McDonnell

This presentation provides an overview of the conductor sizing and conductor rating methodologies, a discussion of key variables in the equation, and a few examples to highlight these concepts. – *Intermediate*

Emerging High Transmission Voltages and Their Mitigation

Charles Lawrence, American Transmission Company

High transmission voltages may not be accurately simulated in planning assessments due to inaccurate minimum load assumptions. Underlying causes of high voltages, improved simulation methods, and potential mitigation techniques are described using case studies. – *Intermediate*

Geomagnetic Disturbance Impacts and Analysis Within MISO

Justin Michlig and Hilary Brown, MISO

MISO will share the results of the analysis, to date, regarding the potential thermal and harmonic impacts in the electric power system associated with geomagnetically induced currents. – *Intermediate*

Transmission Lessons Learned from the Decarbonization of Minnesota's North Shore

Christian Winter, Minnesota Power

The closure of local baseload coal generators in northeastern Minnesota has driven a series of transmission improvements since 2015. Key lessons learned along with specific issues and solutions will be presented. – *Fundamental*

RELAYING II–Ballroom A

Moderator: *Ryan Bergeron*

Co-Moderators: *Dave Bisel, Denny Branca*

Low Impedance Differential Protection: New Challenges and Advanced Solutions

Nuwan Perera, ERLPhase Power Technologies, Ltd.

Busbar and transformer protection relays typically implement low-impedance percentage differential principle using dual-slope characteristics. These relays may misoperate in response to CT saturation during close-in external faults and subsidence current present after clearing external faults. This paper evaluates an enhanced bus differential relay that uses different principles to distinguish between external and internal faults to enhance the security of differential protection. – *Intermediate*

Exploring IEEE C37.246-2017 Guide for Protection Systems of Transmission-to-Generation Interconnections

Alla Deronja, American Transmission Company

This presentation summarizes new IEEE C37.246-2017 Guide for Protection Systems of Transmission-to-Generation Interconnections. The guide documents accepted protection practices and covers the protection system applications at these interconnections. – *Intermediate*

Evaluating Overhead Line Reclosing Sequences Based on Transformer Through-Fault Exposure

Ed Atienza and Chris Kelley, Schweitzer Engineering Laboratories, Inc.

This paper demonstrates using the transformer through-fault capability curves of IEEE C57.109 to evaluate the through-fault damage of various reclosing sequences on an example distribution transformer. – *Intermediate*

Case Study: Analysis of 138/13.8kV Transformer Differential Misoperation Points to Faulty CT

JC Theron, GE Grid Solutions

This presentation describes transformer percentage differential: some history, development and refinements, and basic setting calculations. Additional security features are also presented. A case study of an actual incorrect operation during an external fault is presented in more detail including full analysis and testing concluding what caused the operation and what can be done to mitigate such operations. – *Intermediate*

METERING–Room 1

Moderator: *Dan Nordell*

Co-Moderators: *Tom Guttormson, Greg Owen*

Many utilities have installed or are installing Advanced Meter Infrastructure (AMI) systems. These systems are capable of providing a rich set of information and control capabilities to allow better planning and management of the electricity grid. This session will explore opportunities for analytics, edge intelligence, and advanced control made possible by AMI systems. Several different utility and vendor perspectives are presented.

Big Data: Driving Value-Added Solutions Through the Convergence of Advance Metering Infrastructure, Geographic Information Systems, and Distribution Reliability Systems

Daniel Gunderson, Eric Clement, Brandon Keinath, Minnesota Power

Rate Analysis Utilizing Meter Data

James Pucula, WattsWorth Analysis Inc.; *Bryan Ehrlich,* Utilismart Corporation

Smart Meters Go Beyond AMI

Kevin Fennell, Landis+Gyr

Beyond AMI: Using AMI Data to Solve Problems Before They Become Problems

Craig Turner, Dakota Electric Association

Thursday, November 14, 2019

CONCURRENT SESSIONS

8:30 a.m.–noon

TUTORIAL I–Ballroom E

Moderator: *Denny Branca*

Co-Moderators: *Mike Jensen, Brianna Swenson*

Engineering Career Development

Mike Jensen, Xcel Energy; *Denny Branca,* ElectroTech; *Brianna Swenson,* Alliant Energy; *Cassie Polman*, Ulteig; *Nathan Germolus*, *Tanner Voss, and Teresa Donhaiser,* NV5

This is an interactive session to assist power industry engineers in their career development. The tutorial will include a panel of veteran engineers/managers sharing their experiences, tools to help career planning, tips for preparing for the PE exam and audience participation. – *Fundamental*

TUTORIAL II–Room 4

Moderator: *Larry Brusseau*

Co-Moderators: *Dave Bisel, Doug Brown*

Matching Generators to Power Systems

Allen Windhorn, Nidec

This tutorial will cover several topics that will be of interest to persons who specify or commission synchronous generator sets, or design power systems incorporating them. Topics will include enclosures, cooling methods, reactances, fault currents, harmonic and leading power factor loads, impact of grid codes on generator design, synchronization and paralleling, generator and exciter models, and synchronous condensers. – *Fundamental*

TUTORIAL III–Ballroom A/B

Moderator: *Mike Steckelberg*

Co-Moderators: *Jesse Tomford, Greg Owen*

Transmission Grid Evolution: Past, Present, Future

Aaron Bloom, NextEra Analytics; *Josh Novacheck,* National Renewable Energy Laboratory; *David Kempf,* Great River Energy; *Mark Lauby,* NERC; *James McCalley,* Iowa State University

This tutorial describes 100+ years of electric transmission system evolution, from early isolated systems to today's integrated regional networks, along with a vision of future national and continental grids. – *Advanced*

TUTORIAL IV–Room 1

Moderator: *Michael Marz*

Co-Moderators: *Pete Malamen, Scott Hoberg*

Power Quality 102: Advanced Topics and Case Studies

Chris Mullins, Power Monitors, Inc.

Advanced power quality topics and case studies will be explored. Topics include IEEE 519 compliance, voltage unbalances from phase shifts, voltage fluctuation effects on LED lighting, traffic signal PQ issues, and VFD vs traditional motors. – *Intermediate*

GENERAL INFORMATION

POWERPOINTS

To follow along with the PowerPoints that speakers have given us permission to view, go to ccaps.umn.edu/MIPSYCON-PPT

WI-FI INFORMATION

Saint Paul RiverCentre's public Wi-Fi network is called "RC_FreeWifi" and can be accessed in all areas of the facility. Connect to the network, then review and accept the terms to join.

2020 CALL FOR PROPOSALS

Inspired by the topics at this year's event? Please consider submitting a presentation proposal for the 2020 conference! The call for proposals will open in December 2019 via the conference website ccaps.umn.edu/mnpowersystems

EXHIBITOR RECEPTION

The exhibitor reception will be held on Tuesday, November 12, 4:30–7:00 p.m. Conference attendees are invited to attend this reception to view the exhibits, meet the exhibitors, and enjoy some hors d'oeuvres and a cash bar.

CONTINUING EDUCATION UNITS (CEUs)

Participants who attend the entire conference will receive 1.5 University of Minnesota College of Continuing and Professional Studies CEUs. Participants who attend only Tuesday and Wednesday will receive 1.2 CEUs. One CEU is defined as 10 contact hours of participation in an organized continuing education experience. A CEU certificate will be sent to each participant after the conference. A permanent record of CEUs earned will be maintained by the University of Minnesota Office of Admissions and Record Transcript Unit.

PRESENTATION TECHNICAL CLASSIFICATION

Each presentation has been given a technical depth rating to allow participants to judge the appropriateness of the presentation for their needs and interests.

ADDITIONAL INFORMATION

Visit the conference website for additional information on:

- 2020 call for presentations
- conference papers and PowerPoint presentations

ccaps.umn.edu/mnpowersystems

Disability accommodations will be provided upon request. This publication is available in alternative formats upon request. Call 612-624-4972.

The University of Minnesota shall provide equal access to and opportunity in its programs, facilities, and employment without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression.

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2019 MIPSYCON PLANNING COMMITTEE

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IEEE Twin Cities PES/IAS

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STAR Energy Services

Scott Hoberg
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Mike Jensen
Xcel Energy

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Minnkota Power Cooperative, Inc.

Pete Malamen
Consulting Engineers Group (CEG)

Michael Marz
American Transmission Company

Ned Mohan
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GE Grid Solutions

Dan Nordell
Xcel Energy

Greg Owen
Capital Electric Cooperative

Mike Steckelberg
Great River Energy

Neil Stiller
Rochester Public Utilities

Brianna Swenson
Alliant Energy

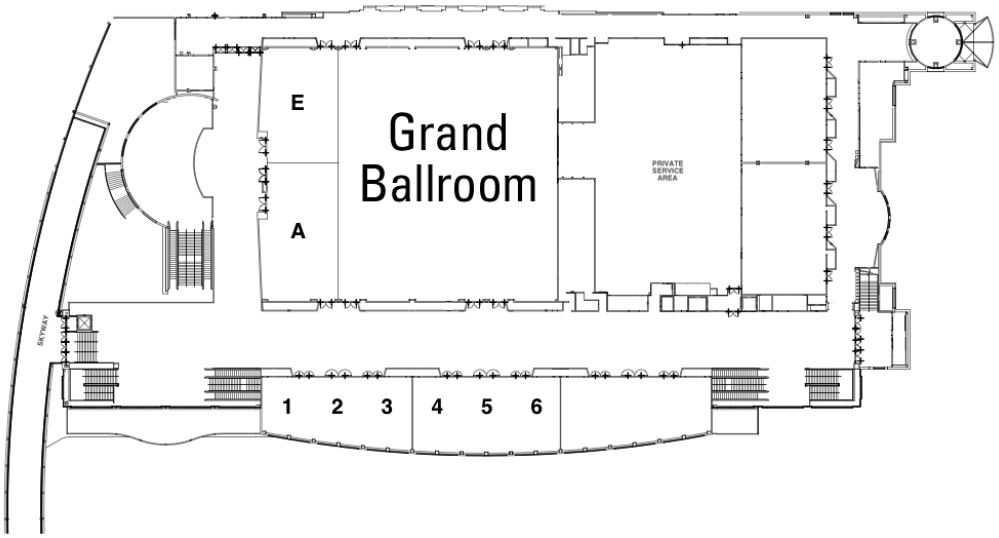
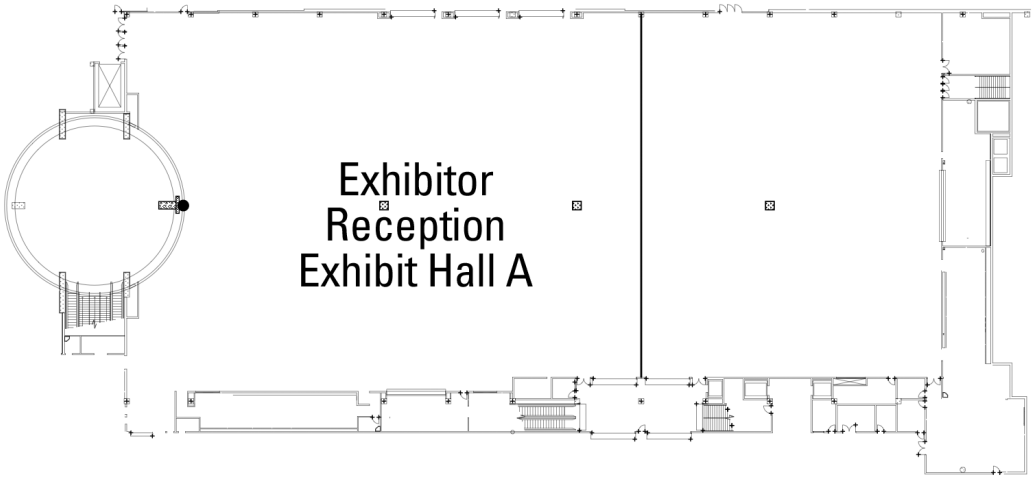
Jesse Tomford
Otter Tail Power

*Planning Committee Chair

NOTES

SAINT PAUL RIVERCENTRE MAPS

Main Level



Lower Level