GAS INSULATED SUBSTATIONS
Regulations, Operations & Maintenance

February 20-21, 2019
Hilton Garden Inn Seattle Downtown
Seattle, WA

EUCI is authorized by IACET to offer 0.8 CEUs for the conference and 0.4 CEUs for each workshop

PRE-CONFERENCE WORKSHOP
GIS 101: An Introduction
Best Practices and Considerations
WEDNESDAY, FEBRUARY 20, 2019

POST-CONFERENCE WORKSHOP
GIS Commissioning:
Best Practices and Considerations
FRIDAY, FEBRUARY 22, 2019

Featuring Denny & Union Substation Site Visits
WEDNESDAY, FEBRUARY 20, 2019

HOST UTILITY
Seattle City Light

SPONSORS

ABB
MITSUBISHI ELECTRIC
Changes for the Better

Burke Electric
Power Generation, Substations & High Voltage Distribution

DILO

SIEMENS
Ingenuity for Life
OVERVIEW

Faced with increasing demands for reliability, improved aesthetics and security, the adoption of gas insulated substations (GIS) by North American utilities is rapidly increasing. Companies also elect to use GIS because of the increased load and limited space present in the urban areas. Often, building new substations or increasing capacity is difficult because land is either not available or is prohibitively expensive. This conference will address regulatory, technical and business considerations for GIS. It will review GIS technology and detail current design trends and maintenance solutions for gas insulated substations. Utilizing both technical presentations and case studies from leading utilities, attendees will be provided with a sound understanding of GIS capability as well as real-world examples involved in selecting and constructing GIS substations.

In addition, experts will cover technical and commercial capabilities, review greenhouse gas issues, illustrate how to replace aging infrastructure with GIS, and review considerations for selecting GIS. They will discuss various special challenges involved in GIS, including SF6 leak detection, GIS commissioning, constraints, and challenges from an engineering perspective.

This event will conclude with a tour of Seattle City Light’s Denny and Union substations. Hard hat and sturdy shoes required for tour.

LEARNING OUTCOMES

- Discuss Hydro One using 230kV SF6 Gas Insulated Bus first on temporary basis at one project site and then as permanent installation at another project site
- Review GIS safety considerations
- Explain how a utility/manufacturer partnership can improve SF6-emission reduction
- Participate in a GIS hot topics Q&A panel
- Discuss partial discharge detection in GIS
- Describe GIS design, application and expansion
- Review Dominion Energy’s current and future GIS projects
- Explain how GIS contributes to enhanced substation reliability
- Explore Seattle City Light’s Denny and Union substations

WHO SHOULD ATTEND

- Distribution executives and managers
- Substation and distribution engineers
- Project managers involved in substation design, modification, and installation
- Utility asset managers
- Construction firms involved in GIS projects
- Transmission and distribution planners
- Utility environmental managers

“This event provided a comprehensive overview of key topics in planning and executing GIS projects, with very informative insight from three main OEMs with US installations.”

Director of Projects, Alpha Three

REGISTER TODAY! CALL 303-770-8800 OR VISIT WWW.EUCI.COM
AGENDA

WEDNESDAY, FEBRUARY 20, 2019

12:30 – 1:00 pm  Registration

1:0 – 1:15 pm  Welcoming Remarks
   Seattle City Light

1:15 – 2:00 pm  Hydro One Case Study: Using 230kV SF₆ Gas Insulated Bus First on Temporary Basis and then as Permanent Installation
   • Bruce A Nuclear Generating Station Switchyard Project: Scope consists of replacing seventeen 230kV Air Blast type and Oil type circuit breakers with SF₆ type circuit breakers and reconfiguring Hydro One owned 230kV air insulated switchyard
   • To obtain isolation necessary for safe replacement of breakers, four main buses need to be split on temporary basis
   • Four temporary by-passes needed to be installed at four main buses, to enable:
     o un-interrupted power supply to Bruce Power Nuclear Generating Station auxiliary power transformers; connected to these four main buses, and
     o un-interrupted power flow to and from switchyard
   • Original plan was to use 230kV XLPE cables for by-passes: Due to ampacity required (3000A), two cables per phase 2500mm² each, installed in cable trays in vertical configuration; would be required
   • Installing such cable by-passes would present a major technical challenge due to space constrains; removing them would require cutting them into pieces and discarding
   • Richview TS Switchyard Project: Scope consists of replacing twenty seven 230kV Air Blast type and Oil type circuit breakers with SF₆ type circuit breakers and replacing three line exits air insulated strain bus with rigid bus
   • Replacing line exits strain bus with rigid bus requires building temporary by-passes for two of the line exits
   • The total length of three-line exit buses at Richview TS is approximately the same as four by-passes at Bruce A
   • Solution for technical challenges at Bruce A switchyard: Instead of using XLPE cables, use SF₆ Gas Insulated Buses, sections of which can be made in various lengths, hence easier to install & remove
   • Solution for Richview TS: Instead of installing air insulated rigid bus, install SF₆ Gas Insulated Buses, once no longer needed at Bruce A. Installation of temporary by-passes for two of the lines no longer required
   • Considering that XLPE cables could not be re-used anymore, Hydro One is saving in excess of CAD $4M between two projects by using SF₆ Gas Insulated Buses at both sites
   Vladimir Curguz, Project Manager- Project Delivery, Construction Services, Hydro One Networks Inc.

2:00 – 2:45 pm  GIS and Digital Substation
   With the development of the grid and integration of renewable power sources like large windfarms demands are rising for highly reliable Substation operation, planning of outages and assurance of asset health. This session will explain what is a digital Substation, address benefits, design and technology of the digital Substation concept including topics such as:
   • Digital Substation Applications, Benefits and Technology
   • Testing and maintenance of Digital Substation
   • Experience from utilities Digital Substation Implementation
   Thomas Schulz, Manager- North American Gas Insulated Substations, ABB

2:45 – 3:00 pm  Afternoon Break

REGISTER TODAY! CALL 303-770-8800 OR VISIT WWW.EUCI.COM
WEDNESDAY, FEBRUARY 20, 2019 (CONTINUED)

3:00 – 3:45 pm  Sustainable GIS Service & Environmental Practices: How a Utility/Manufacturer Partnership Can Improve SF6 Emission Reduction
- SF6 Characteristics
- Current environmental standards – Local & Federal
- What Seattle City Light is doing to contribute to lowering SF6 emissions
- How DILO is working with Seattle City Light to assist in their efforts
- Processes that all SF6 users can adopt to do their part

  Chris Barrett, Regional Manager - U.S. Midwest & West Coast Regions, DILO
  Kiyomi Morris, Associate Environmental Analyst - Environment, Land, and Licensing Business Unit, Seattle City Light

3:45 – 5:15 pm  GIS Hot Topics Q&A Panel
This panel presents an opportunity to pose your GIS questions to industry experts. Panelists include:

Moderator: Renan Pedersen, Substation Engineer, POWER Engineers
Joe Orth, Principal Electrical Engineer - Technical Lead, Seattle City Light
Mitsubishi
Thomas Schulz, Manager - North American Gas Insulated Substations, ABB
Chris Barrett, Regional Manager - U.S. Midwest & West Coast Regions, DILO
Pat Ervin, Business Development, Linxon

5:30 – 6:30 pm  Networking Reception

THURSDAY, FEBRUARY 21, 2019

7:30 – 8:00 am  Continental Breakfast

8:00 – 8:45 am  PG&E Case Study: Blue GIS, Drivers and implementation
- Overview of current and up-coming regulations on SF6
- PG&E path to lowering SF6 content on GIS
- Clean Air, Blue GIS chosen for Livermore site
- Siemens Clean Air GIS offering: 8VN1

  Tom Rak, Manager of Standards Engineering, PG&E
  Gilles Barthes, Sales & Marketing Manager HV GIS North America, Siemens

8:45 – 9:30 am  Partial Discharge Detection in GIS
This session will cover interesting concepts such as
- Direct Coupling IEC method
- Ultra-High Frequency method
- Acoustic assessment

  Sean Parsi, Principal Electrical Engineer, Kinectrics

9:30 – 10:15 am  GIS Design, Application and Expansion
- GIS design
- How utilities are applying GIS
- GIS applications in various regions
- Expansion of GIS

  Patrick Abruzzese, GIS Product Line Manager, Mitsubishi Electric Power Products, Inc.
### AGENDA

**THURSDAY, FEBRUARY 21, 2019 (CONTINUED)**

<table>
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<tr>
<th>Time</th>
<th>Session</th>
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<tr>
<td>10:15 – 10:45 am</td>
<td>Networking Break</td>
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| 10:45 – 11:30 am | **Dominion Energy Case Study**  
- Why Dominion Energy considers GIS  
- GIS history at Dominion Energy  
- Lessons learned  
- Operating and maintenance experience with GIS  
- Future GIS projects  
  
  *Dave Mitchell, Consultant, Dominion Energy* |
| 11:30 am – 12:15 pm | **GIS for Enhanced Substation Reliability**  
- Prepare, prevent, respond and recover  
- Naturally caused physical threats  
- Human-caused physical threats  
- Know the threats, vulnerabilities and impacts  
- Gas insulated substation designs as an effective method to protect a substation  
  
  *Renan Pedersen, Substation Engineer, POWER Engineers* |
| 12:15 – 1:00 pm | Group Luncheon                                                                                |
| 1:00 – 2:00 pm | **Seattle City Light Substation Case Study: Denny Substation**  
- Business drivers that lead to the design  
- Construction  
- Commissioning of GIS and site  
- Public outreach  
- Lessons learned  
  
  *Joe Orth, Principal Electrical Engineer- Technical Lead, Seattle City Light  
  Rajinder Rai, Principal Substation Engineer, Seattle City Light* |
| 2:00 – 5:30 pm | **Denny & Union Substation Site Visits**  
Hard hat and sturdy shoes required for tour. |
| 5:30 pm       | Conference Adjourns                                                                          |

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"A great exposure to the real life engineering and operations issues and considerations for GIS."

Stations Engineering Manager, FPL

"It’s great to bring utilities and vendors together to discuss best practices and lessons learned."

Project Manager, Alabama Power Company

"Very good technical content."

Instrument and Control Supervisor, New York Power Authority
PRE-CONFERENCE WORKSHOP

GIS 101: An Introduction
Best Practices and Considerations

WEDNESDAY, FEBRUARY 20, 2019

8:00 – 8:30 am  Registration & Continental Breakfast
8:30 am – 12:00 pm  Workshop Timing

OVERVIEW

This workshop will provide an overview of gas insulated substations (GIS). It will begin with a description of the fundamental characteristics of GIS, including a comparison of AIS vs. GIS, details of GIS designs, and a review of the business case for GIS. The speakers will discuss reliability and system planning implications for gas insulated substations. They will compare substation safety and security using AIS vs. GIS. Attendees will learn GIS maintenance basics and review SF6 gas management strategies and techniques. They will leave the workshop with an understanding of potential services for maximizing GIS life and learn how to monitor GIS conditions. The workshop will also describe medium voltage GIS and review the differences between medium voltage GIS and high voltage GIS. We will conclude with a Q&A session to cover any remaining questions.

LEARNING OUTCOMES

• Describe fundamental characteristics of GIS
• Discuss GIS designs
• Compare AIS and GIS
• Review the business case for GIS
• Explain GIS from a turnkey perspective
• Assess reliability and system planning implications for GIS
• Describe substation safety and security using AIS vs. GIS
• Discuss GIS maintenance
• Review SF6 gas management strategies and techniques
• Explain proactive services for maximizing GIS life
• Address GIS condition monitoring
• Describe medium voltage GIS
• Review the differences between medium voltage GIS and high voltage GIS

WHO SHOULD ATTEND

• Distribution executives and managers
• Substation and distribution engineers
• Project managers involved in substation design, modification, and installation
• Utility asset managers
• Construction firms involved in GIS projects
• Transmission and distribution planners
• Utility environmental managers
• Anyone wanting to learn more about the basics of gas insulated substations
**PRE-CONFERENCE WORKSHOP AGENDA**

**WEDNESDAY, FEBRUARY 20, 2019**

8:00 – 8:30 am  
Registration and Continental Breakfast

8:30 am – 12:00 pm  
Workshop Timing

**High Voltage GIS**

- Fundamental characteristics of GIS
  - Early GIS Designs
  - Current three in one and single phase GIS designs
  - Comparison of AIS and GIS
  - AIS/GIS interface
  - GIS engineering and layout considerations
- The business case for GIS
- Turnkey perspective
- Grid hardening with GIS
  - Reliability and system planning implications
  - Enhanced safety and substation security
- GIS Maintenance
  - SF6 gas management strategies and techniques
  - Proactive service for maximizing GIS life
  - Maintenance, refurbishment and expansions
  - Position monitoring and camera systems
  - GIS condition monitoring
- Latest GIS technology evolutions and innovations
  - Compact GIS technology

**Medium Voltage GIS 15 – 42 kV**

- Technology overview
  - Rating and Applications
  - Engineering considerations
  - Technology developments

Questions

Conclusion

“A very practical conference with frank and open discussions.”

VP Business Development, MJ Electric
PRE-CONFERENCE WORKSHOP INSTRUCTORS

Shakir Wilson
**Business Development Manager- Grid Integration, ABB**

Shakir is the Business Development Manager for ABB’s grid integration business in the US. In his role, Shakir uses ABB’s system design experience and access to advanced range of products to support clients anywhere along their project cycle, from initial development to execution strategy and pricing. Shakir holds an electrical engineering degree from Rensselaer Polytechnic Institute and has 13+ years’ experience in the EPC business between 15kV – 500kV. He has held positions from project engineering, owner’s engineer, commissioning engineer, director of procurement, estimator, director of commercial operations. He has created traditional and unique system solutions within different procurement models to help customers leverage ABB solutions and address challenges in many different applications such as substations, renewable energy (wind and solar), data centers, heavy industrial facilities, offshore wind farms, steel plants, fabrication facilities and many others.

Dustin Prescott
**Market Director- Grid Integration, ABB**

Dustin is the market director for ABB’s grid integration business in the US. In his role, Dustin is dedicated to leveraging ABB’s technology and solutions to enable customers to address the ever-evolving grid challenges and meet their goals for modernization, reliability and sustainability. Dustin holds a mechanical engineering degree and MBA from North Carolina State University. He has been with ABB for over 10 years where he has held various positions from factory support, front end sales and business development. He has led project pursuits to help customers leverage ABB solutions to address challenges in many different applications such as utility substations, combined cycle power plants, heavy industrial facilities, offshore production platforms, petro-chemical facilities and many others.

Thomas Schulz
**Manager - North American Gas Insulated Substations, ABB**

Thomas graduated with a Masters Degree in Electrical Engineering from HTWK in Leipzig/Germany in 1996 specializing in Power Technology. He has been with ABB since 1999. As a project manager for airport projects in Kazakhstan, Uzbekistan and Kyrgyzstan he was responsible for the project handling for airport specific facilities and control as well as the power supply transmission lines and high voltage substation equipment.

Today Thomas Schulz is the ABB GIS Manager for North America. In this function he is responsible for the marketing and sales of the GIS from conceptual design to all technical and commercial aspects of the GIS.
POST-CONFERENCE WORKSHOP

GIS Commissioning:
Best Practices and Considerations

FRIDAY, FEBRUARY 22, 2019

8:00 – 8:30 am  Registration and Continental Breakfast

8:30 am – 12:00 pm  Workshop Timing

OVERVIEW

This workshop will provide a brief introduction to the GIS commissioning process. The instructor will begin with a review of GIS commissioning basics and an overview of GIS field assembly. He will describe gas-related inspections, circuit breaker inspections, disconnect/ground switch checks, and contact resistant measurement. He will discuss how to conduct instrument transformer checks. Attendees will leave with an understanding of cable commissioning, grounding concerns and practices, and local controls and interlocking commissioning. The workshop will include a brief overview of operations and maintenance practices and will conclude with a review of safety and environmental considerations.

LEARNING OUTCOMES

• Review GIS commissioning basics
• Discuss GIS applications
• Explain brief overview GIS field assembly
• Describe gas-related inspections
• Assess circuit breaker inspections
• Address disconnect/ground switch checks
• Review contact resistant measurement
• Explain AC withstand and Partial Discharge measurements
• Discuss cable commissioning and grounding concerns and practices
• Describe instrument transformer checks
• Assess local controls and interlocking commissioning
• Describe a brief overview of operation and maintenance practices
• Review safety and environmental considerations

WHO SHOULD ATTEND

• Distribution executives and managers
• Substation and distribution engineers
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• Utility asset managers
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• Transmission and distribution planners
• Utility environmental managers
POST-CONFERENCE WORKSHOP AGENDA

FRIDAY, FEBRUARY 22, 2019,

8:00 – 8:30 am  Registration & Continental Breakfast

8:30 am – 12:00 pm  Workshop Timing

- GIS commissioning basics
- GIS applications
- Brief overview of GIS field assembly
- Commissioning
  - Inspections
    - Gas related inspections
    - Circuit breaker inspections
  - Disconnect/Ground switch checks
    - Process
    - FAQs
  - Contact resistance measurement
    - Setup
    - Circuit configuration
    - Merits
    - Interpretation
  - AC withstand and Partial Discharge measurements
    - Setup schemes
    - Partial discharge overview
    - Measurement techniques
    - Interpretation
  - Cable commissioning and grounding concerns and practices
    - Cable and GIS interface overview
    - GIS and cable commissioning requirements
  - Instrument transformer checks
    - Unique injection and access requirements
    - VT hipot/PD test concerns
  - Local controls and interlocking commissioning
    - Control circuitry overview
    - Automation vs hardware control
    - Mechanical and electrical interlock requirements
  - Brief overview of operation and maintenance practices
  - Safety and environmental considerations

POST-CONFERENCE WORKSHOP INSTRUCTOR

Sean Parsi
Electrical Engineer, Kinectors

Sean Parsi is an electrical engineer with Kinectors (previously Ontario Hydro Research Division). In his current role, he is primarily focused on delivering engineering, field or laboratory technical services in commissioning, condition assessment or forensic studies of energy management products, with specializations in Gas Insulated Switchgear (GIS) and underground extruded cables and accessories. His area of research is condition assessment based on online & offline Partial Discharge (PD) measurement techniques on various types of switchgear including MV, HV GIS and MV metal-clad. He is currently a contributing member of IEEE-PES-Substations-GIS subcommittee and IEEE-PES-Switchgear- switchgear assemblies subcommittee. Sean was previously employed by Areva/Alstom T&D where he managed and completed over 50 GIS construction and commissioning projects in 21 countries and 5 continents.
INSTRUCTIONAL METHODS

Case studies, PowerPoint presentations, group discussion, and a site visit will be used in this event.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

Participants must sign in/out each day and be in attendance for the entirety of the conference for continuing education credit.

IACET CREDITS

EUCI has been accredited as an Authorized Provider by the International Association for Continuing Education and Training (IACET). In obtaining this accreditation, EUCI has demonstrated that it complies with the ANSI/IACET Standard which is recognized internationally as a standard of good practice. As a result of their Authorized Provider status, EUCI is authorized to offer IACET CEUs for its programs that qualify under the ANSI/IACET Standard.

EUCI is authorized by IACET to offer 0.8 CEUs for the conference and 0.4 CEUs for each workshop.

REGISTER 3, SEND THE 4TH FREE

Any organization wishing to send multiple attendees to this event may send 1 FREE for every 3 delegates registered. Please note that all registrations must be made at the same time to qualify.

EVENT LOCATION

The event is located at the Hilton Garden Inn Seattle Downtown, 1821 Boren Avenue Seattle, WA 98101. A room block has been reserved for the nights of February 19-22, 2019. Room rates are US $139. Call 1-206-566-5243 or click here for reservations. Mention the EUCI event to get the group rate. The cutoff date to receive the group rate is January 29, 2019 but as there are a limited number of rooms available at this rate, the room block may close sooner. Please make your reservations early.

SPONSORSHIP OPPORTUNITIES

Do you want to drive new business through this event’s powerful audience? Becoming a sponsor or exhibitor is an excellent opportunity to raise your profile before a manageably sized group of executives who make the key purchasing decisions for their businesses. There is a wide range of sponsorship opportunities available that can be customized to fit your budget and marketing objectives, including: Platinum, gold, or VIP sponsor, Reception host, Networking break host, Tabletop exhibit, Workshop sponsor, Lanyard sponsor, Luncheon host and Breakfast host.

Please contact Erin Burba at eburba@euci.com or 720-988-1260 for more information.
REGISTRATION INFORMATION

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EVENT LOCATION

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Please select

GAS INSULATED SUBSTATIONS CONFERENCE AND BOTH WORKSHOPS

GAS INSULATED SUBSTATIONS CONFERENCE AND ONE WORKSHOP

PRE-CONFERENCE WORKSHOP: WEDNESDAY, FEBRUARY 20, 2019: US $1795
EARLY BIRD ON OR BEFORE FEBRUARY 1, 2019: US $1595

POST-CONFERENCE WORKSHOP: FRIDAY, FEBRUARY 22, 2019: US $1795
EARLY BIRD ON OR BEFORE FEBRUARY 1, 2019: US $1595

GAS INSULATED SUBSTATIONS CONFERENCE ONLY: FEBRUARY 20-21, 2019
US $1395, EARLY BIRD ON OR BEFORE FEBRUARY 1, 2019: US $1195

YES, I WOULD LIKE TO ATTEND THE OPTIONAL TOUR
DENNY & UNION SUBSTATION SITE VISITS
THURSDAY, FEBRUARY 21, 2019: US $50

I’M SORRY I CANNOT ATTEND, BUT PLEASE EMAIL ME A LINK TO THE CONFERENCE PROCEEDINGS FOR US $395

How did you hear about this event? (direct e-mail, colleague, speaker(s), etc.)

Print Name
Job Title

Company

What name do you prefer on your name badge?

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City State/Province Zip/Postal Code Country

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List any dietary or accessibility needs here

CREDIT CARD INFORMATION

Name on Card
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Exp. Date
Security Code (last 3 digits on the back of Visa and MC or 4 digits on front of AmEx)

Billing Address
Billing City
Billing Zip Code/Postal Code

Enclosed is a check for $ to cover registrations.

Substitutions & Cancellations
Your registration may be transferred to a member of your organization up to 24 hours in advance of the event. Cancellations must be received on or before January 18, 2019 in order to be refunded and will be subject to a US $195.00 processing fee per registrant. No refunds will be made after this date. Cancellations received after this date will create a credit of the tuition (less processing fee) good toward any other EUCI event. This credit will be good for six months from the cancellation date. In the event of non-attendance, all registration fees will be forfeited. In case of course cancellation, EUCI’s liability is limited to refund of the event registration fee only. For more information regarding administrative policies, such as complaints and refunds, please contact our offices at 303-770-8800. EUCI reserves the right to alter this program without prior notice.