UNDERGROUND TRANSMISSION 2017: New Projects and O&M challenges

January 30-31, 2017
Denver Marriott City Center
Denver, CO

PRE-CONFERENCE WORKSHOP
Underground Transmission 101
MONDAY, JANUARY 30, 2017

SPONSORS
OVERVIEW

Underground transmission lines are a very small percentage of the transmission grid across the country, yet they are more complicated and time consuming in design, construction, repair, and maintenance. Utilities and transmission owners are dealing with municipalities and a public that does not want to see new transmission lines and are suggesting moving them underground, but this move is a daunting task full of risks and challenges that the utilities must make all stakeholders aware of. With transmission lines that are already underground, operations and maintenance of those lines comes with its own challenges while emergency or planned repair work can be exponentially more complicated with longer outage times.

This conference will provide utilities, transmission owners, and all parties' involved, detailed information from lessons learned and the experience of others whom have taken on these challenges before. Some of the topics that will be discussed will explain the risks involved with going underground and the challenges of new construction as well as existing underground lines being repaired, replaced and approaches to maintenance plans for underground projects.

LEARNING OUTCOMES

- Review Arizona Public Service’s principles and methods with designing an underground transmission line
- Review the challenges faced and learn from the solutions implemented by Dominion at their Littlecreek-Burton 115kV transmission project
- Assess PSE&G’s 345 kV Bergen Linden Corridor Underground Project and the challenges faced with installing 20 miles of 345 kV XLPE cable through Newark
- Explore the components of Duke Energy’s underground maintenance program for pipe type cables
- Engage in a discussion on the use of underground cables in a temporary set up to support construction and emergency restoration at Dominion
- Engage in a panel discussion on lines being repaired, replaced or expanded and the challenges these projects face
- Explore the lessons learned by Southern California Edison on unique operational Conditions Associated with Underground – Overhead High Voltage Circuit
- Listen to an introduction to superconducting materials used for underground cable installations, cable configurations for AC and DC applications
- Review field methods of testing and measuring the parameters required to ensure proper operation of HV cables
- List the different types and purposes of factory tests as compared to the tests performed once the line is energized

“"This is a great opportunity for everyone who is interested in underground transmission lines and related issues. Clearly a snapshot of the industry at this moment. Attend with limited knowledge and be able to understand the industry vision and wide range practices around the world.”"

Sr. Transmission Lines Engineer, AltaLink

“Worth the money and time!”

Manager of Business Development, WAC
MONDAY, JANUARY 30, 2017

1:00 – 1:30 pm  Registration

1:30 – 1:40 pm  Welcome and Opening Comments

1:40 – 2:25 pm  Underground Transmission Engineering - Principles and Methods for Design
The principles and methods involved with designing an underground transmission line are vast, complex and interrelated at the same time. This presentation will cover the major components of the process and lessons learned during them while framing it all in real projects.
- Route alternatives (choosing public right-of-way or private property)
- Available space in an existing corridor (construction and ampacity implications)
- Determining what is actually underground (utility maps versus full Subsurface Utility Engineering SUE Investigations)
- Early conflict resolution with the use of 3D mapping
- Geotech and geotherm considerations
- Cable pulling tension and side-wall bearing pressure calculations
- Determination and design aspects of manholes (quantity and placement)
- Cable bonding schemes
- Manhole clamping schemes (managing thermal mechanical stresses away from the joints)
- Ampacity calculation variables (the implications of assumptions versus the increased certainty with testing subsurface materials)

Ryan Adams, P.E., Senior Engineer, Arizona Public Service

2:25 – 3:05 pm  Dominion’s Littlecreek-Burton 115kV Underground Installation
This case study of an underground installation will review the challenges faced and met by Dominion on this recently completed project.
- Substation to Transition/Riser Structure located in right of way OH/UG termination points
- Single circuit one cable per phase
- 3500 kcmil XLPE conductor
- 3,880 HDD and fused conduit pullback under Lake Whitehurst manhole to manhole
- Approximately 8.5 months for completion including civil, conduit, cable, splicing and terminal installation
- Energized early September 2016

Matthew Rudd, Electric Transmission Engineering, Dominion Technical Solutions, Inc.

3:05 – 3:35 pm  Networking Break

3:35 pm  – 4:15 pm  PSE&G 345 kV Bergen Linden Corridor Underground Project
The Bergen-Linden Corridor Upgrade Project (BLC) is a 345kV transmission system through New Jersey. The project is replacing an existing 138kV line with a double circuit 345kV transmission system overhead and underground. This presentation will discuss the challenges faced with installing 20 miles of 345 kV XLPE cable through Newark as part of the overall transmission project.

Dennis E. Johnson, Senior Project Engineer, Power Engineers, Inc.
PSE&G Presenter (invited)

4:15 – 5:00 pm  The Creation of Duke Energy’s Underground Maintenance Program
This presentation will explore the process and components of Duke Energy’s underground maintenance program for pipe type cables, both HPFF and HPGF, for facilities across a geographic area of four states.

Dan Chapoton, PE, Lead Engineer, Transmission Line Equipment, Transmission Equipment Engineering Unit, Duke Energy

5:00 pm – 6:00 pm  Networking Reception
AGENDA

TUESDAY, JANUARY 31, 2017

8:00 – 8:30 am  Continental Breakfast, Sponsored by Dewberry

8:30 – 9:15 am  Temporary Underground Cable Solutions: Supporting Construction and Emergency Restoration
This discussion will cover the use of underground cables in a temporary set up to support construction and emergency restoration. These “jumpers” can be used inside substations, in right-of-ways, in conjunction with mobile units and on any overhead transmission line. Our discussion will cover the basis for design, testing procedures, techniques for use and several jobs/situations where they were used.

Bobby Rich, Engineer, Dominion
Stephen Taylor, Engineer, Dominion

9:15 – 10:15 am  Unique Operational Conditions Associated with Underground – Overhead High Voltage Circuit
This presentation will discuss the lessons learned on an underground project during commissioning and testing including the reclosing, line patrol, and validation that a fault condition is not on the underground portion of the line in this underground and overhead project.

James A. Sheftal – Senior Project Manager, Southern California Edison
Roman Vazquez III – Senior Project Engineer, Southern California Edison
Hunly Chy – Senior Transmission Engineer, Southern California Edison

10:15 – 10:45 am  Networking Break

10:45 – 11:45 am  Operation and Testing of Underground High Voltage Cables
Underground high voltage cables are subject to different factory tests before and after manufacturing is complete and once the line is energized. As a cable manufacturer, several customer experiences with factory and on-site testing will be discussed and reviewed.

Eric Beauguite, Cable Design Engineer, Nexans

11:45 am – 12:45 pm  Group Luncheon, Sponsored by

“The EUCI UG conference is a great tool to introduce new UG affiliates to the field as well as expand the knowledge of the most senior affiliates.”

Transmission Engineer, Dominion Power

“This event provides insight into underground transmission relevance in the industry and the challenges faced in today’s market.”

Director of Contracts, Elecnor Hawkeye
12:45 – 1:45 pm  
**Extended Commissioning Testing of HV Cables - Beyond AC Withstand Voltage Test with PD**

Ground continuity as well coordination of the SVL’s rating and sheath potential induced during faults play important role for the safety of the public and workers. In addition, failures can be caused by improper coordination of the SVL’s. Even though there is guidance on how to calculate the sheath potential, in some cases these calculations are inaccurate. The best method to verify the results is through measurement. Calculated sequence impedance can also differ from actual field measurements and hence may be inaccurate as well. Field methods to test and measure the parameters required to ensure proper operation will be presented and discussed.

*Boguslaw Bochenski, Senior Engineer, Underground Cable Testing, Kinectrics*

1:45 – 2:30 pm  
**Superconducting Cable Systems**

The presentation will include an introduction to superconducting materials used for underground cable installations, cable configurations for AC and DC applications, and the cryogenic and controls systems required. The presentation will also include a discussion on the type of projects currently being considered around the world as well as the project drivers.

*Dennis O’Reilly, Senior Manager, Sargent & Lundy LLC*

2:30 – 3:00 pm  
**Networking Break**

3:00 – 4:30 pm  
**Challenges in Underground Operation & Maintenance**

With transmission lines that are already underground, operations and maintenance of those lines comes with its own challenges while emergency or planned repair work can be exponentially more complicated with longer outage times. This panel discussion will discuss lines being repaired, replaced or expanded and the challenges these projects face.

*Moderator: Ryan Adams, P.E., Senior Engineer, Arizona Public Service*  
*Martin Henriksen, Technical Director, Nexans*  
*Boguslaw Bochenski, Senior Engineer, Underground Cable Testing, Kinectrics*  
*Dennis E. Johnson, Senior Project Engineer, Power Engineers, Inc.*  
*Dennis O’Reilly, Senior Manager, Sargent & Lundy LLC*

4:30 pm  
**Conference Adjourns**

“A great conference that introduces attendees to other professionals in the field.”

Project Engineer, Electrical Consultants Inc.
PRE-CONFERENCE WORKSHOP

Underground Transmission 101

MONDAY, JANUARY 30, 2017

8:00 – 8:30 am  Registration

8:30 am – 12:30 pm  Workshop Timing

Lunch on Your Own

OVERVIEW

Underground transmission is a costly and complicated option for transmission projects. This workshop will provide an in-depth overview of underground systems, technology, construction, and installation. This is the ideal workshop for engineers new to underground transmission projects, regulatory staff that needs an overview to evaluate project options and vendors and contractors that support utilities as they build new transmission.

LEARNING OUTCOMES

• Review underground transmission technology and systems
• Examine the basics of underground design and construction
• Discuss the design of extruded dielectric cable systems
• Discuss the design of high-pressure fluid-filled cable systems

AGENDA

• Underground Transmission: An Overview
  o Technology
  o Drivers
• Basic Underground Design and Construction Considerations
  o Preliminary Design Issues
  o Route Selection
  o Detail Design Issues
  o Other Design Considerations
  o Installation Methods
• Extruded Dielectric Cable System Design
  o Cable Design
  o Trench Design
  o Grounding/Bonding Design
  o Structure Designs
  o Other Design Considerations
• High-Pressure Fluid-Filled Cable System Design
  o Cable Design
  o Trench Design
  o Cathodic Protection
  o Hydraulic System Design
  o Structure Designs
INSTRUCTORS

Dennis Johnson
Senior Project Engineer, POWER Engineers

Dennis Johnson has more than 20 years of experience in the design and construction of underground transmission and distribution systems. He served as a design and project engineer on numerous underground transmission projects at voltages ranging from 69 kV to 345 kV. Mr. Johnson is an active voting member of the IEEE Insulated Conductors Committee (ICC). He is a member of various ICC subcommittees that are developing guides and standards for high voltage underground cable systems.

Todd Goyette
Senior Project Engineer, POWER Engineers

Todd Goyette joined POWER Engineers in November of 2012 and is a senior project engineer in their underground transmission group. He has extensive experience in all aspects of high voltage and extra high voltage underground transmission projects including design, permitting & licensing, construction and operation & maintenance. He has experience with self-contained fluid filled, high pressure fluid filled, high pressure gas filled and extruded dielectric cable systems. Prior to joining POWER, Todd worked for National Grid, a large investor based utility, for 18 years performing similar functions. He is a skilled presenter on the topic of underground cables and serves on several working group committees for the IEEE Insulated Conductors Committee. He holds a Bachelor of Science and Master of Science degree in Electrical Engineering from Worcester Polytechnic Institute and is a registered Professional Engineer in Massachusetts.

“Since I am still fairly new to the power cable world this conference is the best introduction and offers the chance to get in-depth perspectives from utilities and manufacturers.”

Business Development Manager, ABB
INSTRUCTIONAL METHODS

This conference will use case studies and PowerPoint presentations.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

Participants must sign in/out each day and be in attendance for the entirety of the conference to be eligible 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 1.0 CEUs for the conference and 0.4 CEUs for workshop

EVENT LOCATION

A room block has been reserved at the Denver Marriott City Center, 1701 California Street, Denver, CO 80202 for the nights of January 29-30, 2017. Room rates are US $189 plus applicable tax. Call 1-303-297-1300 for reservations and mention the EUCI event to get the group rate. The cutoff date to receive the group rate is January 9, 2017 but as there are a limited number of rooms available at this rate, the room block may close sooner. Please make your reservations early.

REGISTER 3, SEND THE 4TH FREE

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

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
- Breakfast host

Please contact Keith Clark at kclark@euci.com or 720-988-1238 for more information.
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ENERGIZE WEEKLY

EUCI’s Energize Weekly e-mail newsletter compiles and reports on the latest news and trends in the energy industry. Newsletter recipients also receive a different, complimentary conference presentation every week on a relevant industry topic. The presentations are selected from a massive library of more than 1,000 current presentations that EUCI has gathered during its 29 years organizing conferences.

Sign me up for Energize Weekly

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 December 30, 2016 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 conference 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.