# TRANSFORMERS COMMITTEE
# FALL 2019 MEETING

September 13, 2019

Dear Committee Members and Guests:

You and your spouse/companion are cordially invited to Columbus, Ohio, USA, to attend the Fall 2019 meeting of the IEEE PES Transformers Committee, October 27–31. We look forward to welcoming you to our city that was named one of its 52 Places to Visit in 2019 by The New York Times! Columbus is truly made unforgettable by its diversity and energetic blend of arts and culture. With a revitalized riverfront, booming downtown and an open-minded approach to life, business and ideas, the Buckeye State's capital has cultivated a unique environment of thriving communities, companies, institutions and entertainment that has led to it being one of the fastest-growing cities in the U.S. as well as a center of knowledge and innovation.

**HOTEL INFORMATION**: Our meeting will be held in downtown Columbus at the **Hyatt Regency**, 350 North High Street. Offering three on-site restaurants, fitness center, comfortable rooms and suites, the Hyatt Regency is within walking distance of Nationwide Arena and the trendy Arena District as well as just steps away from the Short North Arts District with its wide variety of shops, theatres and dining options. If outdoor exercise is your thing, check out the riverfront recreation trails along the Scioto River, just minutes away from the hotel.

Our discounted guestroom rate at the hotel starts at US$168 per night and includes complimentary wireless internet in guestrooms and hotel public space as well as complimentary fitness center access for all overnight guests. Visit the Committee's website for a link to reserve a room, or if you call the hotel, mention "IEEE Transformers" to receive the group rate. The cut-off date for the group rate is Friday, October 4, but we expect the hotel to sell out before this date.

**GETTING THERE**: The Hyatt Regency is located approximately 6 miles/10 km west of John Glenn Columbus International Airport (CMH). Taxi fare is approximately US$25 one way from the airport, and taxis are required to accept credit card payments. UBER and Lyft (US$14–US$18) are also approved for ridesharing at the John Glenn airport. Additionally, Columbus offers a unique service called COTA AirConnect, a direct bus service connecting Downtown and John Glenn International Airport. For only US$2.75 per ride, AirConnect will drop you off right across the street from the Hyatt Regency. See this web page for more information: www.cota.com/how-to-ride/airconnect Discounted self-parking in the hotel's contracted Chestnut Street Garage is US$16/car per night. Valet parking is also available at a discounted rate of US$26.40/car per night.

**MEETING REGISTRATION**: Register on-line at www.transformerscommittee.org for social events, tours and the meeting. Register by **Friday, October 4**, to receive a US$50 early registration discount. The on-line registration system will be disabled on Wednesday, October 23 to print name badges and finalize counts. The cost to register on-site is substantially higher than the advance registration price, and some events may not be available for on-site registration.

**WEATHER**: October temperatures in Columbus are typically comfortable during the day and cooler at night with only a small chance of precipitation (average high of 66°F/19°C and low of 43°F/6°C). Both our spouse/companion tours include outdoor activities, so we are hoping for these averages to play out on the high side! Dress for the meeting is business casual.

**SATURDAY EARLY BIRD EVENT**: If you arrive early, join us for a downtown Columbus food adventure! After experiencing local pre-dinner delights at North Market just blocks from the Hyatt Regency, the group will take a scenic, guided shuttle ride to a popular addition to the Short North restaurant scene, The Table, to indulge in a seasonal dinner menu. Following dinner, the group boards the shuttle back to the hotel with takeaway dessert bags featuring some of Columbus' best sweets. Attendance is limited – see flyer for details.

**SUNDAY EVENING WELCOME RECEPTION**: The reception will be held inside the Hyatt Regency's beautiful Regency Ballroom, featuring live music by Loose Cannon Acoustic Trio. Formed in 2012 by two AEP employees, Jodi Cannon and Jay Ingram, along with their good friend, Kent Robinson, Loose Cannon's music is inspired by folk, blues and classic rock singers and songwriters. The group will perform many original songs with some covers of their favorite artists. As always, plenty of tasty food and cash bars will also be available. Please indicate whether you will attend this reception during the meeting registration process.

**SPOUSE/COMPANION TOURS**: Monday's **Art & Animals** tour starts at the hotel with an interactive paint party that will have even the most non-artistic person proudly displaying her morning masterpiece. Afterwards, the group heads to the Columbus Zoo for lunch and an afternoon with over 7,000 animals representing more than 800 species before heading back to the hotel.

Tuesday is all about Columbus' **Historic Bricks & Gardens**. The day begins with a one-hour guided tour of the Franklin Park Conservatory, followed by self-exploration and lunch at the famous Schmidt's restaurant. The afternoon includes a guided tour of German Village, one of the world's premier historic restorations.

See flyers for details and register early as attendance is limited.

**TECHNICAL TOURS:** Tours of the Weidmann Electrical Grade Paper Mill in Urbana, Ohio, and the AEP Transmission Training Center are planned for Monday evening and Thursday afternoon, respectively. Register on-line for both these tours. Attendance is limited – see flyers for details.

**WEDNESDAY DINNER SOCIAL**: COSI, an acronym for Center of Science and Industry, is the nation's top science center featuring more than 300 interactive exhibits throughout themed exhibition areas. Guests will have time to experience multiple exhibits, hors d'oeuvres and cash bars before gathering in the Atrium for dinner. After dinner, ride the unicycle highrope, enjoy interactive science carts and explore the popular Dinosaurs exhibit. Attendance is limited – see flyer for dinner menu and details.

**ADDITIONAL MEETING INFORMATION**: Along with this invitation letter, additional meeting information can be downloaded from the Committee's website at www.transformerscommittee.org:

- Registration Fees Summary – Guide to review all fees before logging into the registration system
- Meeting Schedule and General Sessions Agenda – If any noteworthy changes are made, an updated schedule will be posted on the Committee's website a few days prior to the meeting

We are certain you will enjoy all of what Columbus has to offer and look forward to seeing you at the Fall 2019 meeting!

Best regards,

***Fred Friend & Mike Spurlock***

Fall 2019 Meeting Hosts
American Electric Power

AMERICAN ELECTRIC POWER®
BOUNDLESS ENERGY℠

# IEEE PES TRANSFORMERS COMMITTEE
## Fall 2019 Meeting
## Columbus, Ohio USA

### ~ Meeting Registration Fees Summary ~

– Register on-line with credit card at www.transformerscommittee.org on "Next Meeting" page; contact the Committee at tc-meetings@ieee.org if an alternate form of payment is necessary
– Each individual must register for meeting and pay appropriate registration fee to attend any social event or tour
– Print a receipt at the end of the registration process; paper receipts NOT provided at the meeting
– Refund provided only if request received by Wednesday, October 23 and valid once confirmation email received; US$25 service charge for a refund of entire registration or US$10 for a partial refund
– US Tax ID No. 13-1656633, Canadian Business No. 12563 4188, Euro Tax Registration No. EU826000081

| **REGISTRATION FEES AS SHOWN BELOW**<br>– all fees in US dollars<br>– all fees stated are per person | **On or Before October 4** | **After October 4, on or before October 23** | **On-site at Meeting** |
|---|---|---|---|
| **MEETING REGISTRATION** | | | |
| Attendee — IEEE member (will be verified with IEEE) | $310 | $360 | $460 |
| Attendee — non-IEEE member | $360 | $410 | $510 |
| Attendee — IEEE Life or Committee Emeritus (will be verified) | $110 | $160 | $260 |
| Spouse or Companion* and children age 12 and over | $110 | $160 | $260 |
| – Attendee registration fee includes Sunday night welcome reception, entry into meeting area, coffee breaks and four breakfasts (Mon, Tues, Wed, Thurs)<br>– Spouse/Companion registration fee includes Sunday night welcome reception, four breakfasts (Mon, Tues, Wed, Thurs) and ability to register for tours | | | |
| * Companion is a "significant other", boy/girlfriend, family member, who is attending for non-commercial reasons, i.e. not attending the technical meetings, etc. Spouses/Companions and children (age 12 and over) must be registered for the meeting with above meeting registration fees to attend any tour, social event and/or breakfasts. | | | |
| **LUNCHEONS** | | | |
| Monday Standards Development Luncheon<br>– All SC, WG, TF leaders are encouraged to attend<br>– Buffet lunch (no meal selection required) | $20 | $20 | $20 |
| Tuesday Awards Luncheon<br>– Meal selection required - indicate beef, chicken or vegetarian | $30 | $30 | $30 |
| **SOCIAL EVENTS (see flyers for details)** | | | |
| Sunday Night Welcome Reception:<br>Regency Ballroom – Hyatt Regency Columbus | included in registration fee; *please register in advance for headcount purposes* | | |
| Saturday Early Bird: Downtown Columbus Food Tour**<br>– Registration fee includes guided pre-dinner sampling at North Market, guided shuttle tour of downtown Columbus' Short North en route to dinner and takeaway dessert bag featuring some of Columbus' best sweets | $50 | $50 | $50 |
| Wednesday Evening Dinner Social: COSI**<br>– Enjoy two exciting exhibits, passed hors d'oeuvres and cash bars before enjoying a buffet dinner in the Atrium<br>– After dinner, ride the high wire unicycle, check out three interactive science carts and explore the popular Dinosaur exhibit | $90 | $90 | $90 |
| **SPOUSE/COMPANION TOURS (each tour includes lunch; see flyers for details)** | | | |
| Monday: Art & Animals** | $85 | $85 | $85 |
| Tuesday: Historic Bricks & Gardens** | $85 | $85 | $85 |
| **TECHNICAL TOURS** | | | |
| Monday Evening: Weidmann Electrical Grade Paper Mill** | $20 | $20 | $20 |
| Thursday Afternoon: AEP Transmission Training Center** | $20 | $20 | $20 |
| ** Attendance will be limited for Saturday early bird event, Wednesday evening social event, spouse/companion tours and technical tours due to space constraints, so register early! *On-site registration for these events only available if space allows.* | | | |

# IEEE PES TRANSFORMERS COMMITTEE

## Fall 2019 Meeting; Columbus, Ohio

## Agenda - General Sessions

---

**Chair:** Sue McNelly **Vice Chair:** Bruce Forsyth **Secretary:** Ed teNyenhuis
**Treasurer:** Paul Boman **Awards Chair/Past Chair:** Stephen Antosz **Standards Coordinator:** Jim Graham

---

### Opening Session - Monday, Oct 28: 8:00 am - 9:15 am

(Attendance recorded by RFID – attendance required to maintain Member status)

1. Welcome and Announcements ..... Sue McNelly
2. Meeting Minute ..... Tammy Behrens
3. Approval of Agenda ..... Sue McNelly
4. Approval of Minutes from Spring 2019 Meeting ..... Sue McNelly
5. Chair's Report & Administrative Subcommittee Report ..... Sue McNelly
6. Vice Chair's Report ..... Bruce Forsyth
7. Secretary's Report ..... Ed teNyenhuis
8. IEEE Senior Membership ..... Peter Balma
9. Treasurer's Report ..... Paul Boman
10. Standards Report ..... Jim Graham
11. Liaison Representative Reports
    - 11.1. CIGRE ..... Craig Swinderman
    - 11.2. IEC TC-14 ..... Christoph Ploetner
    - 11.3. Standards Coordinating Committee, SCC18 (NFPA Standards) ..... David Brender
    - 11.4. Standards Coordinating Committee, SCC4 (Electrical Insulation) ..... Evanne Wang
    - 11.5. ASTM ..... Tom Prevost
12. Approval of Transformer Committee Working Group P&P Individual Manual ..... Bruce Forsyth
13. Approval of Transformer Committee Working Group P&P Entity Manual ..... Bruce Forsyth
14. Hot Topics for the Upcoming Week ..... Subcommittee Chairs
15. New Business & Wrap-up ..... Sue McNelly
16. Adjournment

### Closing Session - Thursday, Oct 31: 11:00 am - 12:00 pm

1. Chair's Remarks and Announcements ..... Sue McNelly
2. Meetings Planning Subcommittee ..... Tammy Behrens
3. Reports from Technical Subcommittees (decisions made during the week)
    - 3.1. Standards ..... Jerry Murphy
    - 3.2. Subsurface Transformers & Network Protectors ..... George Payerle
    - 3.3. Bushings ..... Peter Zhao
    - 3.4. Dielectric Tests ..... Ajith Varghese
    - 3.5. Distribution Transformers ..... Ed Smith
    - 3.6. Dry Type Transformers ..... Casey Ballard
    - 3.7. HVDC Converter Transformers & Reactors ..... Ulf Radbrandt
    - 3.8. Instrument Transformers ..... Thomas Sizemore
    - 3.9. Insulating Fluids ..... David Wallach
    - 3.10. Insulation Life ..... Sheldon Kennedy
    - 3.11. Performance Characteristics ..... Craig Stiegemeier
    - 3.12. Power Transformers ..... Bill Griesacker
4. New Business (continued from Monday) and Wrap-up ..... Sue McNelly
5. Adjournment

# IEEE PES TRANSFORMERS COMMITTEE

9/19/2019

**FALL 2019 MEETING: OCTOBER 27 TO OCTOBER 31**

**Hyatt Regency Columbus Hotel; Columbus, Ohio USA**

-- Room locations designated as (1), (2), etc., indicate the "button to press" in the elevator.
For instance, a room on (1) is located on First Level, and a room on (2) is located on Second Level.

**KEY**

**Note:** A PC projector will be furnished in each meeting room. Arrive early to ensure equipment operates/syncs correctly.

**>** = activity continued into another session / from another session

**++** = not a Transformers Committee activity

**TBD** = To Be Determined

**TRACK LEGEND**

| | | | |
|---|---|---|---|
| Admin | Administrative SC | Ins Life | Insulation Life SC |
| Bush | Bushings SC | Instr TR | Instrument Transformers SC |
| DiTests | Dielectric Tests SC | Mtgs | Meetings Planning SC |
| Distr | Distribution Transformers SC | PCS | Performance Characteristics SC |
| Dry Type | Dry Type Transformers SC | Power | Power Transformers SC |
| HVDC | HVDC Converter Transfs. and Smoothing Reactors SC | STNP | Submersible Transf. & Network Protectors SC |
| IF | Insulating Fluids SC | Stds | Standards SC |

**STATUS LEGEND**

| | |
|---|---|
| N | New |
| I | In-Progress |
| NC | Near Completion |
| B | Ballot Stage |
| C | Complete |
| E | Entity |

## THURSDAY, OCTOBER 24

No Events Planned

## FRIDAY, OCTOBER 25

No Events Planned

## SATURDAY, OCTOBER 26

No Registration and no Meetings, Technical Tours, or Spouse/Companion Tours Planned

| TIME | ACTIVITY | TRACK | MTG CHAIR | STATUS | ROOM (FLOOR) |
|---|---|---|---|---|---|
| 5:45 PM – ??? | Early Bird Event: Downtown Columbus Food Adventure | Social | | | |

- Advance on-line registration required
- Meet in hotel lobby at 5:45 PM and walk to North Market as a group (0.3 mile / 8 minute walk)
- Enjoy a fun guided tour of Columbus' Short North with an emphasis on local food favorites
- Pre-dinner sampling at the North Market, dinner at The Table and takeaway dessert bag included
- Cash bars at all locations
- See flyer for details

## SUNDAY, OCTOBER 27

No Technical Tours or Spouse/Companion Events Planned

| TIME | ACTIVITY | TRACK | MTG CHAIR | STATUS | ROOM (FLOOR) |
|---|---|---|---|---|---|
| 8:00 AM – 5:00 PM | IEEE/IEC JWG on Station Service Voltage Transformer C57.13.8 | Instr TR | R. McTaggart | N | Marion (2) |
| 1:00 PM – 5:30 PM | Meeting Registration | | | | Franklin Foyer (2) |
| 2:00 PM – 5:30 PM | Administrative Subcommittee<br>- Closed meeting, by invitation only | Admin | S. McNelly | – | Fairfield (2) |
| 2:00 PM – 6:00 PM | NEMA Transformers<br>- Closed meeting, by invitation only | ++ | J. Stewart | – | Knox (2) |
| 6:00 PM – 8:00 PM | Welcome Reception | | | | Regency Ballroom (3) |

Renew old friendships and form new ones! This reception will be held inside the beautiful Regency Ballroom, so weather will not be an issue. Cash bars, plenty of fabulous food and live music by Loose Cannon Acoustic Trio (a local AEP band!) will be provided. Please indicate whether you will attend this reception during the meeting registration process. All registered attendees and spouses/companions are welcome to attend.

# IEEE PES TRANSFORMERS COMMITTEE

**FALL 2019 MEETING: OCTOBER 27 TO OCTOBER 31**

**Hyatt Regency Columbus Hotel; Columbus, Ohio USA**

## MONDAY, OCTOBER 28 - Monday Breaks Sponsored by The H-J Family of Companies **

No Social Events Planned

| TIME | ACTIVITY | TRACK | MTG CHAIR | STATUS | ROOM (FLOOR) |
|---|---|---|---|---|---|
| 7:00 AM – 5:00 PM | Meeting Registration | | | | Franklin Foyer (2) |
| 7:00 AM – 7:50 AM | Newcomers Orientation<br>- Breakfast meeting; arrive early!<br>- Newcomers and guests are encouraged to attend! | | B. Forsyth | – | Fairfield (2) |
| 7:00 AM – 7:50 AM | Distribution & STNP SC Leaders Coordination<br>- Closed breakfast meeting, by invitation only | Distr/STNP | E. Smith/G. Payerle | – | Knox (2) |
| 7:00 AM – 8:00 AM | Breakfast - Attendees (no spouses/companions please) | | | | Franklin (2) |
| 8:00 AM – 9:30 AM | Breakfast - Spouses/Companions (no meeting attendees please) | | | | Peppercorn (1) |
| 8:00 AM – 9:15 AM | Opening Session<br>- All registered meeting participants are encouraged to attend<br>- See separate document on website for meeting agenda<br>- *Attendance required to maintain Committee Member status* | | S. McNelly | – | Regency Ballroom (3) |
| 9:15 AM – 4:30 PM | Spouses/Companions Tour: Art & Animals<br>- Advance on-line registration required<br>- Day begins at the hotel with an interactive workshop led by a local artist; bus departs afterwards for lunch and zoo<br>- See flyer for details | Tour | | | |
| 9:15 AM – 9:30 AM | *Break (beverages only) - Sponsored by The H-J Family of Companies **| | | | *Franklin Foyer (2)* |
| 9:30 AM – 10:45 AM | WG Dry Type Reactors PC57.16 | Dry Type | A. Del Rio | I | Fairfield (2) |
| 9:30 AM – 10:45 AM | WG Guide of FRA for Liquid Filled Transf. C57.149 | PCS | C. Sweetser | I | Knox (2) |
| 9:30 AM – 10:45 AM | WG Partial Discharge Test - C57.113 | DiTests | A. Naderian | I | Marion (2) |
| 9:30 AM – 10:45 AM | WG Std Transf. Terminology C57.12.80 | Stds | C. Claiborne | I | Morrow (2) |
| 9:30 AM – 10:45 AM | WG Thermal Evaluation C57.100 | Ins Life | R. Wicks | I | Union AB (2) |
| 9:30 AM – 10:45 AM | TF Transf Efficiency & Loss Evaluation (DOE Activity) | Distr | P. Hopkinson | I | Union CDE (2) |
| 10:45 AM – 11:00 AM | *Break (beverages only) - Sponsored by The H-J Family of Companies **| | | | |
| 11:00 AM – 12:15 PM | WG Overhead Distr. Transf. C57.12.20 | Distr | A. Traut | I | Fairfield (2) |
| 11:00 AM – 12:15 PM | WG Control Cabinets PC57.148 | Power | J. Watson | I | Knox (2) |
| 11:00 AM – 12:15 PM | TF PC57.12.52 PAR Development | Dry Type | J. Tedesco | I | Marion (2) |
| 11:00 AM – 12:15 PM | WG Bushings Gen. Require. C57.19.00 | Bush | P. Zhao | I | Morrow (2) |
| 11:00 AM – 12:15 PM | WG Moisture in Insulation PC57.162 | Ins Life | T. Prevost | I | Union AB (2) |
| 11:00 AM – 12:15 PM | TF PCS Cont. Rev. to Test Code C57.12.90 | PCS | H. Sahin | – | Union CDE (2) |
| 12:15 PM – 1:30 PM | Standards Development Review Luncheon<br>Everyone is welcome to attend. All SC/WG/TF leaders are highly encouraged to attend. Doors open ~12:00 pm. Come early, get a good seat and start eating. Advance on-line registration required. Admission verified with RFID badge at the door. To listen to the presentation without eating lunch, arrive by 12:30 pm. | | | | Franklin (2) |
| 1:45 PM – 3:00 PM | WG 1-ph Padmount Dist Transf. C57.12.38 | Distr | A. Ghafourian | I | Fairfield (2) |
| 1:45 PM – 3:00 PM | WG Dry Type Gen. Requirements C57.12.01 | Dry Type | C. Ballard | I | Marion (2) |
| 1:45 PM – 3:00 PM | WG PC57.152 Guide for Field Testing | Stds | M. Ferreira | N | Morrow (2) |
| 1:45 PM – 3:00 PM | WG Transformer Impulse Test Guide PC57.98 | DiTests | T. Hochanh | I | Union AB (2) |
| 1:45 PM – 3:00 PM | TF Audible Sound Revision to Test Code | PCS | R. Girgis | – | Union CDE (2) |
| 1:45 PM – 3:00 PM | | | | | |
| 3:00 PM – 3:15 PM | *Break (beverages and treats) - Sponsored by The H-J Family of Companies **| | | | *Franklin Foyer (2)* |
| 3:15 PM – 4:30 PM | WG 3-ph Padmount Dist Transf. C57.12.34 | Distr | R. Stahara | I | Fairfield (2) |
| 3:15 PM – 4:30 PM | WG Transformer Monitoring C57.143 | Power | M. Spurlock | I | Knox (2) |
| 3:15 PM – 4:30 PM | TF IEEE-IEC Cross Reference | Stds | V. Mehrotra | – | Marion (2) |
| 3:15 PM – 4:30 PM | SC HVDC Converter Transfs & Smoothing Reactors | HVDC | U. Radbrandt | - | Morrow (2) |
| 3:15 PM – 4:30 PM | WG Bushing Applicat. Guide C57.19.100 | Bush | T. Spitzer | I | Union AB (2) |
| 3:15 PM – 4:30 PM | | | | | |
| 4:30 PM – 4:45 PM | *Break (beverages only) - Sponsored by The H-J Family of Companies **| | | | *Franklin Foyer (2)* |
| 4:45 PM – 6:00 PM | WG Sec. Network Protectors C57.12.44 | STNP | M. Faulkner | – | Fairfield (2) |
| 4:45 PM – 6:00 PM | TF Bushing Overload | Bush | M. Weisensee | NC | Marion (2) |
| 4:45 PM – 6:00 PM | TF Partial Discharge Tests for Class I Transformers | DiTests | D. Ayers | N | Morrow (2) |
| 4:45 PM – 6:00 PM | WG High Temp Liquid Transformers C57.154 | Ins Life | R. Marek | I | Union AB (2) |
| 4:45 PM – 6:00 PM | TF PCS Cont. Revisions to C57.12.00 | PCS | T. Ansari | – | Union CDE (2) |
| 4:45 PM – 6:00 PM | | | | | |
| 6:30 PM – 10:30 PM | Technical Tour: Weidmann Electrical Grade Paper Mill<br>Advance registration necessary. Space is limited! Admission confirmed with RFID badge at bus. Start loading bus at hotel's North Drop-Off Area (indicated on map) at ~6:15 PM and depart promptly at 6:30 PM. Return at ~10:30 PM. Dinner provided during bus ride to optimize time spent on-site. See website/flyer for more information. | Tech Tour | | | |

# IEEE PES TRANSFORMERS COMMITTEE

**FALL 2019 MEETING: OCTOBER 27 TO OCTOBER 31**

**Hyatt Regency Columbus Hotel; Columbus, Ohio USA**

## TUESDAY, OCTOBER 29 - Tuesday Breaks Sponsored by Central Moloney, Inc. **

No Technical Tours or Social Events Planned

| TIME | ACTIVITY | TRACK | MTG CHAIR | STATUS | ROOM (FLOOR) |
|---|---|---|---|---|---|
| 7:00 AM – 11:30 AM | Meeting Registration | | | | Franklin Foyer (2) |
| 7:00 AM – 7:50 AM | EL&P Delegation (End-users only please)<br>- Breakfast meeting; arrive early! | | J. Murphy | – | Madison (2) |
| 7:00 AM – 8:00 AM | Working Group Officer Training | | J. Graham | N | Union CDE (2) |
| 7:00 AM – 8:00 AM | Breakfast - Attendees (no spouses/companions please) | | | | Franklin (2) |
| 7:00 AM – 9:30 AM | Breakfast - Spouses/Companions (no meeting attendees please) | | | | Peppercorn (1) |
| 9:15 AM – 4:30 PM | Spouses/Companions Tour: Historic Bricks & Gardens<br>- Advance on-line registration required<br>- Bus departs 9:15 AM from hotel's North Drop-Off Area (indicated on map) and returns ~4:30 PM; includes lunch<br>- See flyer for details | Tour | | | |
| 8:00 AM – 9:15 AM | TF Temp Rise Test Procedures C57.12.90, Clause 11 | Ins Life | A. Varghese | I | Fairfield (2) |
| 8:00 AM – 9:15 AM | WG Encl Int C57.12.28, C57.12.29, C57.12.31, C57.12.32 | Distr | D. Mulkey | I | Knox (2) |
| 8:00 AM – 9:15 AM | WG Station Service Volt. Transf. C57.13.8 | Instr TR | D. Wallace | I | Marion (2) |
| 8:00 AM – 9:15 AM | WG Dry Type PD Detection PC57.124 | Dry Type | T. Prevost | I | Morrow (2) |
| 8:00 AM – 9:15 AM | TF on Winding Insulation PF | DiTests | D. Robalino | – | Union AB (2) |
| 8:00 AM – 9:15 AM | | | | | |
| 9:15 AM – 9:30 AM | *Break (beverages only) - Sponsored by Central Moloney, Inc. ** | | | | *Franklin Foyer (2)* |
| 9:30 AM – 10:45 AM | WG Low Frequency Test Guide PC57.168 | DiTests | D. Sauer | I | Fairfield (2) |
| 9:30 AM – 10:45 AM | WG Submersible Transf. C57.12.24 | STNP | G. Termini | I | Knox (2) |
| 9:30 AM – 10:45 AM | TF Instrument Transf. Accuracy | Instr TR | I. Ziger | N | Marion (2) |
| 9:30 AM – 10:45 AM | WG Temp Measurement PC57.165 | Ins Life | P. McClure | I | Morrow (2) |
| 9:30 AM – 10:45 AM | WG Condition Assessment Guide PC57.170 | Power | K. Mani | I | Union AB (2) |
| 9:30 AM – 10:45 AM | WG Shunt Reactors C57.21 | PCS | S. Som | I | Union CDE (2) |
| 10:45 AM – 11:00 AM | *Break (beverages only) - Sponsored by Central Moloney, Inc. ** | | | | *Franklin Foyer (2)* |
| 11:00 AM – 12:15 PM | WG Distrib. Transf. Bushings PC57.19.02 | Bush | E. Smith | I | Fairfield (2) |
| 11:00 AM – 12:15 PM | WG Liquid-immersed Sec. Network TRs C57.12.40 | STNP | D. Blew | N | Knox (2) |
| 11:00 AM – 12:15 PM | WG PLC Caps & CCVTs PC57.13.9 | Instr TR | Z. Roman | I | Marion (2) |
| 11:00 AM – 12:15 PM | WG HVDC Converter Neutral Devices Entity PC 57.32.10 | PCS | H. Zhang | N | Morrow (2) |
| 11:00 AM – 12:15 PM | WG Transportation Issues C57.150 | Power | G. Anderson | I | Union AB (2) |
| 11:00 AM – 12:15 PM | WG Semicond. Power Rectifier Transfs C57.18.10 | PCS | S. Kennedy | I | Union CDE (2) |
| 12:15 PM – 1:30 PM | Awards Luncheon<br>All meeting attendees are encouraged to attend to show appreciation and recognize accomplishments. Doors open ~12:00 pm. Come early, get a good seat and start eating. Advance on-line registration is required. Admission verified with RFID badge at the door. | | | | Franklin (2) |
| 1:45 PM – 3:00 PM | TF Cont. Revision to Low Frequency Tests | DiTests | B. Griesacker | – | Fairfield (2) |
| 1:45 PM – 3:00 PM | TF Bar Coding for Distr Transf. C57.12.35 | Distr | R. Chrysler | I | Knox (2) |
| 1:45 PM – 3:00 PM | WG Instrument Transf. Tests PC57.13.2 | Instr TR | T. Sizemore | I | Marion (2) |
| 1:45 PM – 3:00 PM | WG Therm Eval of Insul Systems, Dry Type C57.12.60 | Dry Type | R. Wicks | I | Morrow (2) |
| 1:45 PM – 3:00 PM | WG Determine Max Winding Temp Rise PC57.169 | Ins Life | S. Digby | N | Union AB (2) |
| 1:45 PM – 3:00 PM | WG Consolidation Insulating Fluid Guides PC57.166 | IF | T. Prevost | N | Union CDE (2) |
| 3:00 PM – 3:15 PM | *Break (beverages and pretzels) - Sponsored by Central Moloney, Inc. ** | | | | *Franklin Foyer (2)* |
| 3:15 PM – 4:30 PM | **Entity -** TF Freq Domain Spectroscopy of Bush. C57.12.200 | DiTests | P. Patel | E/N | Fairfield (2) |
| 3:15 PM – 4:30 PM | TF Effects of Corrosion on Transformers | STNP | W. Elliott | N | Knox (2) |
| 3:15 PM – 4:30 PM | WG Std Terminal Markings C57.12.70 | Stds | J. Varnell | I | Marion (2) |
| 3:15 PM – 4:30 PM | TF Volts per Hertz | Power | K. Yule | N | Morrow (2) |
| 3:15 PM – 4:30 PM | WG High-Temp Insulat. Materials, P1276 | Ins Life | R. Wicks | I | Union AB (2) |
| 3:15 PM – 4:30 PM | WG Sw Transients Ind by TR/Bkr Interaction PC57.142 | PCS | J. McBride | N | Union CDE (2) |
| 4:30 PM – 4:45 PM | *Break (beverages only) - Sponsored by Central Moloney, Inc. ** | | | | *Franklin Foyer (2)* |
| 4:45 PM – 6:00 PM | WG Dry Type Test Code C57.12.91 | Dry Type | D. Walker | I | Fairfield (2) |
| 4:45 PM – 6:00 PM | WG Guide for Monitoring Distr Transf PC57.167 | Distr | G. Hoffman | N | Knox (2) |
| 4:45 PM – 6:00 PM | TF Cont. Rev to Imp. Test - **WILL NOT MEET FALL 2019** | DiTests | P. Riffon | | |
| 4:45 PM – 6:00 PM | WG Loading Guide PC57.91 | Ins Life | D. Wallach | I | Union AB (2) |
| 4:45 PM – 6:00 PM | WG Short Circuit Withstand PC57.164 | PCS | S. Patel | I | Union CDE (2) |
| 4:45 PM – 6:00 PM | | | | | |

# IEEE PES TRANSFORMERS COMMITTEE

**FALL 2019 MEETING: OCTOBER 27 TO OCTOBER 31**

**Hyatt Regency Columbus Hotel; Columbus, Ohio USA**

## WEDNESDAY, OCTOBER 30 - Wednesday Breaks Sponsored by Baron USA **

No Registration and no Technical Tours or Spouse/Companion Events Planned

| TIME | ACTIVITY | TRACK | MTG CHAIR | STATUS | ROOM (FLOOR) |
|---|---|---|---|---|---|
| 7:00 AM – 8:00 AM | Breakfast - Attendees (no spouses/companions please) | | | | Franklin (2) |
| 7:00 AM – 8:00 AM | SC Meetings Planning<br>- Breakfast meeting; arrive early!<br>- All interested individuals welcome | Mtgs | T. Behrens | – | Marion (2) |
| 7:00 AM – 8:00 AM | IEC TC-14 Technical Advisory Group<br>- Breakfast meeting; arrive early!<br>- All interested individuals welcome | ++ | P. Hopkinson | – | Fairfield (2) |
| 8:00 AM – 9:30 AM | Breakfast - Spouses/Companions (no meeting attendees please) | | | | Peppercorn (1) |
| 8:00 AM – 9:15 AM | SC Instrument Transformers | Instr TR | R. McTaggart | – | Union AB (2) |
| 8:00 AM – 9:15 AM | SC Insulation Life | Ins Life | S. Kennedy | – | Union CDE (2) |
| 9:15 AM – 9:30 AM | *Break (beverages only) - Sponsored by Baron USA **| | | | *Franklin Foyer (2)* |
| 9:30 AM – 10:45 AM | SC Distribution Transformers | Distr | E. Smith | – | Union AB (2) |
| 9:30 AM – 10:45 AM | SC Bushings | Bush | P. Zhao | – | Union CDE (2) |
| 10:45 AM – 11:00 AM | *Break (beverages only) - Sponsored by Baron USA **| | | | *Franklin Foyer (2)* |
| 11:00 AM – 12:15 PM | SC Submersible Transf. & Network Protectors | STNP | G.Payerle | – | Union AB (2) |
| 11:00 AM – 12:15 PM | SC Dielectric Test | DiTests | A. Varghese | – | Union CDE (2) |
| 12:15 PM – 1:30 PM | *Lunch (on your own)* | | | | |
| 1:30 PM – 2:45 PM | SC Dry Type Transformers | Dry Type | C. Johnson | – | Union AB (2) |
| 1:30 PM – 2:45 PM | SC Power Transformers | Power | B. Griesacker | – | Union CDE (2) |
| 2:45 PM – 3:00 PM | *Break (beverages and treats) - Sponsored by Baron USA **| | | | *Franklin Foyer (2)* |
| 3:00 PM – 4:15 PM | SC Insulating Fluids | IF | D. Wallach | – | Union AB (2) |
| 3:00 PM – 4:15 PM | SC Performance Characteristics | PCS | C. Stiegemeier | – | Union CDE (2) |
| 4:15 PM – 4:30 PM | *Break (beverages only) - Sponsored by Baron USA **| | | | *Franklin Foyer (2)* |
| 4:30 PM – 5:45 PM | SC Standards | Stds | J. Murphy | – | Union AB (2) |
| 6:00 PM – 10:00 PM | COSI (Center of Science & Industry)<br>- Advance on-line registration required; admission confirmed with RFID name badge<br>- First shuttle bus departs Hyatt Regency at the North Drop-Off Area (indicated on the map) at 6:00 PM for COSI and will run every 15 minutes until 7 PM; first return shuttle departs COSI at 8:15 PM and will run approx. every 15 minutes until 10:00 PM<br>- Enjoy exhibits before dinner; after dinner, ride the unicycle highrope, experience science carts & explore the Dinosaurs exhibit.<br>- Hors d'oeuvres, buffet dinner and cash bars (credit cards accepted and ATM on-site); see flyer for details | Social | | | |

## THURSDAY, OCTOBER 31

No Meeting Registration, Spouse/Companion Tours, or Social Events Planned

| TIME | ACTIVITY | TRACK | MTG CHAIR | STATUS | ROOM (FLOOR) |
|---|---|---|---|---|---|
| 7:00 AM – 8:00 AM | Breakfast - Attendees (no spouses/companions please) | | | | Franklin (2) |
| 8:00 AM – 9:30 AM | Breakfast - Spouses/Companions (no meeting attendees please) | | | | Peppercorn (1) |
| 8:00 AM – 9:15 AM | Technical Presentation 1<br>"Tutorial on CIGRE Technical Brochure: Guidelines for Partial Discharge Detection Using Conventional (IEC 60270) and Unconventional Methods" by Jitka Fuhr and Janusz Szczechowski<br>- See flyer on website for details ** | Tutorial | | | Regency Ballroom (3) |
| 9:15 AM – 9:30 AM | *Break (beverages only)* | | | | *Regency Foyer (3)* |
| 9:30 AM – 10:45 AM | Technical Presentation 2<br>"Embedded Optical Sensing Systems for Distribution Transformer Monitoring" by Ajay Raghavan and Bradley Kittrell<br>- See flyer on website for details ** | Tutorial | | | Regency Ballroom (3) |
| 10:45 AM – 11:00 AM | *Break (beverages only)* | | | | *Regency Foyer (3)* |
| 11:00 AM – 12:00 PM | Closing Session<br>- All attendees are encouraged to attend<br>- See separate document on website for meeting agenda | | S. McNelly | | Regency Ballroom (3) |
| 12:00 PM | *Lunch (on your own)* | | | | |
| 1:00 PM – 4:30 PM | Technical Tour: AEP Transmission Training Center<br>Advance registration necessary. Space is limited to one bus! Admission confirmed with RFID badge at bus. Start loading bus at hotel's North Drop-Off Area (indicated on map) at ~12:45 PM and depart promptly at 1:00 PM. Return at ~4:30 PM. Box lunch provided on bus to optimize time spent on-site. See website/flyer for more information. | Tech Tour | | | |

*** Contact Ed Smith (edsmith@ieee.org) if you are interested in sponsoring a day of coffee breaks at a future meeting.**

**** Contact Tom Prevost (tprevost@ieee.org) if you are interested in making a technical presentation at a future meeting.**

## FRIDAY, NOVEMBER 1

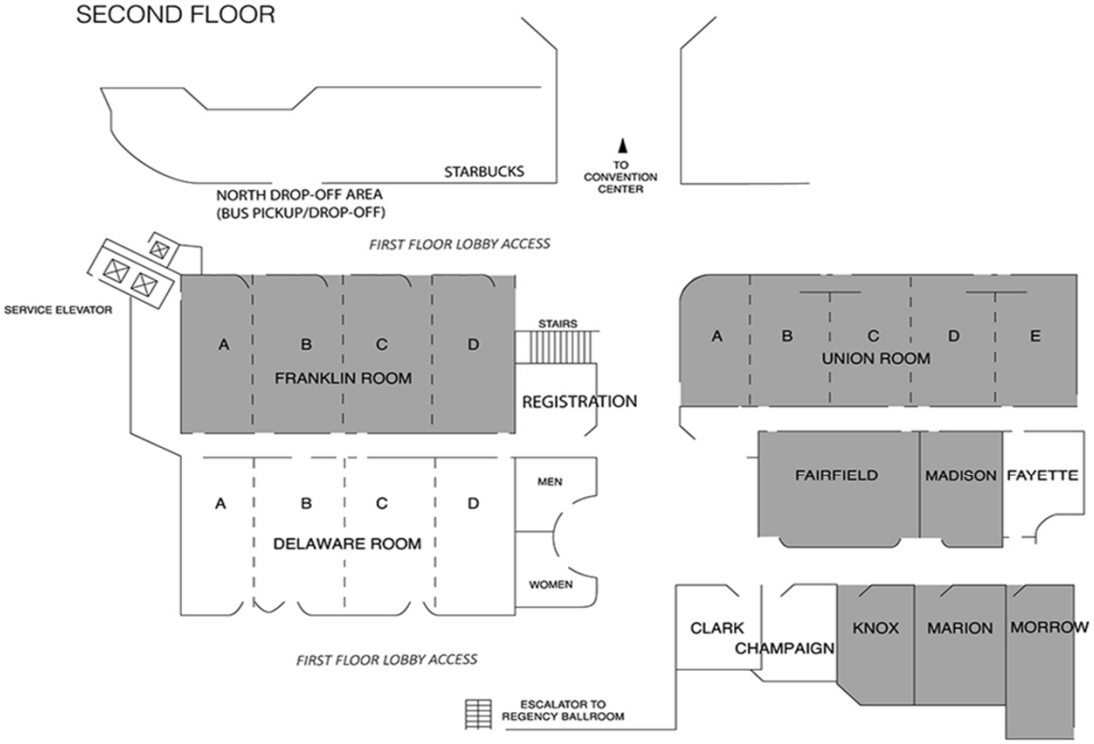
No Events Planned

### FUTURE COMMITTEE MEETINGS

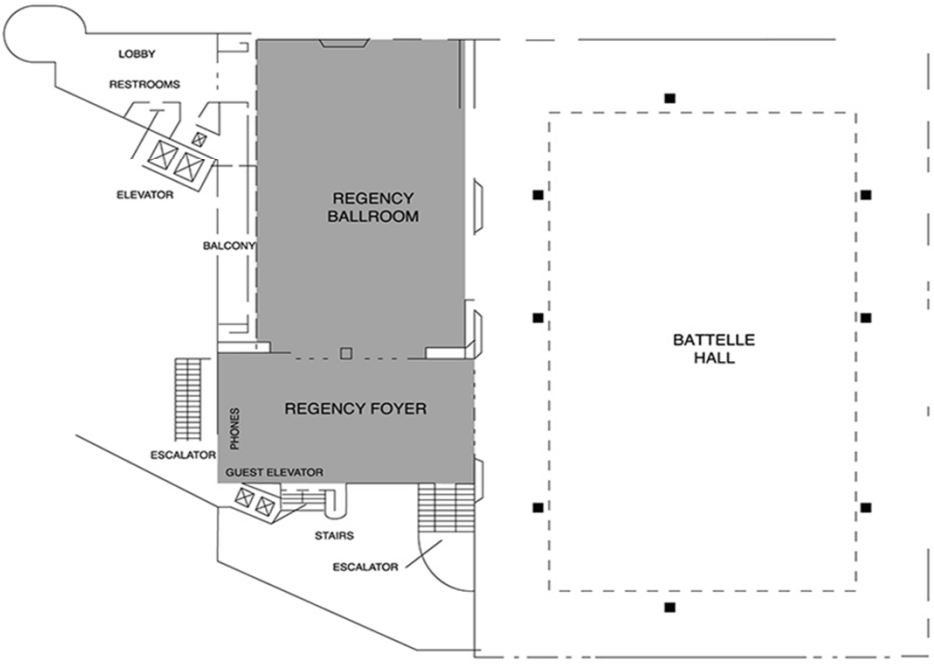
**Spring 2020:** Charlotte, North Carolina, March 22 – 26, 2020

**Fall 2020:** Kansas City, Missouri, October 18 – 22, 2020

MEETING ROOMS
SECOND FLOOR




REGENCY BALLROOM
THIRD FLOOR



# Page intentionally left blank

# IEEE PES TRANSFORMERS COMMITTEE

## SUBCOMMITTEE MEETING LIST

### FALL 2019 MEETING: OCTOBER 27 TO OCTOBER 31
### Hyatt Regency Columbus Hotel; Columbus, Ohio USA

| Date | Time Start | Time End | Session Title | Track | Chair | Room/Location |
|---|---|---|---|---|---|---|
| 10/27/2019 | 2:00 PM | 5:30 PM | Administrative Subcommittee<br>- Closed meeting, by invitation only | Admin | S. McNelly | Fairfield (2) |
| 10/28/2019 | 11:00 AM | 12:15 PM | WG Bushings Gen. Require. C57.19.00 | Bush | P. Zhao | Morrow (2) |
| 10/28/2019 | 3:15 PM | 4:30 PM | WG Bushing Applicat. Guide C57.19.100 | Bush | T. Spitzer | Union AB (2) |
| 10/28/2019 | 4:45 PM | 6:00 PM | TF Bushing Overload | Bush | M. Weisensee | Marion (2) |
| 10/29/2019 | 11:00 AM | 12:15 PM | WG Distrib. Transf. Bushings PC57.19.02 | Bush | E. Smith | Fairfield (2) |
| 10/30/2019 | 9:30 AM | 10:45 AM | SC Bushings | Bush | P. Zhao | Union CDE (2) |
| 10/28/2019 | 9:30 AM | 10:45 AM | TF Transf Efficiency & Loss Evaluation (DOE Activity) | Distr | P. Hopkinson | Union CDE (2) |
| 10/28/2019 | 11:00 AM | 12:15 PM | WG Overhead Distr. Transf. C57.12.20 | Distr | A. Traut | Fairfield (2) |
| 10/28/2019 | 1:45 PM | 3:00 PM | WG 1-ph Padmount Dist Transf. C57.12.38 | Distr | A. Ghafourian | Fairfield (2) |
| 10/28/2019 | 3:15 PM | 4:30 PM | WG 3-ph Padmount Dist Transf. C57.12.34 | Distr | R. Stahara | Fairfield (2) |
| 10/29/2019 | 8:00 AM | 9:15 AM | WG Encl Int C57.12.28, C57.12.29, C57.12.31, C57.12.32 | Distr | D. Mulkey | Knox (2) |
| 10/29/2019 | 1:45 PM | 3:00 PM | TF Bar Coding for Distr Transf. C57.12.35 | Distr | R. Chrysler | Knox (2) |
| 10/29/2019 | 4:45 PM | 6:00 PM | WG Guide for Monitoring Distr Transf PC57.167 | Distr | G. Hoffman | Knox (2) |
| 10/30/2019 | 9:30 AM | 10:45 AM | SC Distribution Transformers | Distr | E. Smith | Union AB (2) |
| 10/28/2019 | 7:00 AM | 7:50 AM | Distribution & STNP SC Leaders Coordination<br>- Closed breakfast meeting, by invitation only | Distr/STNP | E. Smith/G. Payer | Knox (2) |
| 10/28/2019 | 9:30 AM | 10:45 AM | WG Partial Discharge Test - C57.113 | DiTests | A. Naderian | Marion (2) |
| 10/28/2019 | 1:45 PM | 3:00 PM | WG Transformer Impulse Test Guide PC57.98 | DiTests | T. Hochanh | Union AB (2) |
| 10/28/2019 | 4:45 PM | 6:00 PM | TF Partial Discharge Tests for Class I Transformers | DiTests | D. Ayers | Morrow (2) |
| 10/29/2019 | 8:00 AM | 9:15 AM | TF on Winding Insulation PF | DiTests | D. Robalino | Union AB (2) |
| 10/29/2019 | 9:30 AM | 10:45 AM | WG Low Frequency Test Guide PC57.168 | DiTests | D. Sauer | Fairfield (2) |
| 10/29/2019 | 1:45 PM | 3:00 PM | TF Cont. Revision to Low Frequency Tests | DiTests | B. Griesacker | Fairfield (2) |
| 10/29/2019 | 3:15 PM | 4:30 PM | Entity - TF Freq Domain Spectroscopy of Bush. C57.12.200 | DiTests | P. Patel | Fairfield (2) |
| 10/29/2019 | 4:45 PM | 6:00 PM | TF Cont. Rev to Imp. Test - WILL NOT MEET FALL 2019 | DiTests | P. Riffon | |
| 10/30/2019 | 11:00 AM | 12:15 PM | SC Dielectric Test | DiTests | A. Varghese | Union CDE (2) |
| 10/28/2019 | 9:30 AM | 10:45 AM | WG Dry Type Reactors PC57.16 | Dry Type | A. Del Rio | Fairfield (2) |
| 10/28/2019 | 11:00 AM | 12:15 PM | TF PC57.12.52 PAR Development | Dry Type | J. Tedesco | Marion (2) |
| 10/28/2019 | 1:45 PM | 3:00 PM | WG Dry Type Gen. Requirements C57.12.01 | Dry Type | C. Ballard | Marion (2) |
| 10/29/2019 | 8:00 AM | 9:15 AM | WG Dry Type PD Detection PC57.124 | Dry Type | T. Prevost | Morrow (2) |
| 10/29/2019 | 1:45 PM | 3:00 PM | WG Therm Eval of Insul Systems, Dry Type C57.12.60 | Dry Type | R. Wicks | Morrow (2) |
| 10/29/2019 | 4:45 PM | 6:00 PM | WG Dry Type Test Code C57.12.91 | Dry Type | D. Walker | Fairfield (2) |
| 10/30/2019 | 1:30 PM | 2:45 PM | SC Dry Type Transformers | Dry Type | C. Johnson | Union AB (2) |
| 10/28/2019 | 3:15 PM | 4:30 PM | SC HVDC Converter Transfs & Smoothing Reactors | HVDC | U. Radbrandt | Morrow (2) |
| 10/29/2019 | 1:45 PM | 3:00 PM | WG Consolidation Insulating Fluid Guides PC57.166 | IF | T. Prevost | Union CDE (2) |
| 10/30/2019 | 3:00 PM | 4:15 PM | SC Insulating Fluids | IF | D. Wallach | Union AB (2) |
| 10/28/2019 | 9:30 AM | 10:45 AM | WG Thermal Evaluation C57.100 | Ins Life | R. Wicks | Union AB (2) |
| 10/28/2019 | 11:00 AM | 12:15 PM | WG Moisture in Insulation PC57.162 | Ins Life | T. Prevost | Union AB (2) |
| 10/28/2019 | 4:45 PM | 6:00 PM | WG High Temp Liquid Transformers C57.154 | Ins Life | R. Marek | Union AB (2) |
| 10/29/2019 | 8:00 AM | 9:15 AM | TF Temp Rise Test Procedures C57.12.90, Clause 11 | Ins Life | A. Varghese | Fairfield (2) |
| 10/29/2019 | 9:30 AM | 10:45 AM | WG Temp Measurement PC57.165 | Ins Life | P. McClure | Morrow (2) |
| 10/29/2019 | 1:45 PM | 3:00 PM | WG Determine Max Winding Temp Rise PC57.169 | Ins Life | S. Digby | Union AB (2) |
| 10/29/2019 | 3:15 PM | 4:30 PM | WG High-Temp Insulat. Materials, P1276 | Ins Life | R. Wicks | Union AB (2) |
| 10/29/2019 | 4:45 PM | 6:00 PM | WG Loading Guide PC57.91 | Ins Life | D. Wallach | Union AB (2) |
| 10/30/2019 | 8:00 AM | 9:15 AM | SC Insulation Life | Ins Life | S. Kennedy | Union CDE (2) |
| 10/29/2019 | 8:00 AM | 9:15 AM | WG Station Service Volt. Transf. C57.13.8 | Instr TR | D. Wallace | Marion (2) |
| 10/29/2019 | 9:30 AM | 10:45 AM | TF Instrument Transf. Accuracy | Instr TR | I. Ziger | Marion (2) |
| 10/29/2019 | 11:00 AM | 12:15 PM | WG PLC Caps & CCVTs PC57.13.9 | Instr TR | Z. Roman | Marion (2) |
| 10/29/2019 | 1:45 PM | 3:00 PM | WG Instrument Transf. Tests PC57.13.2 | Instr TR | T. Sizemore | Marion (2) |
| 10/30/2019 | 8:00 AM | 9:15 AM | SC Instrument Transformers | Instr TR | R. McTaggart | Union AB (2) |
| 10/30/2019 | 7:00 AM | 8:00 AM | SC Meetings Planning<br>- Breakfast meeting; arrive early!<br>- All interested individuals welcome | Mtgs | T. Behrens | Marion (2) |

# IEEE PES TRANSFORMERS COMMITTEE

## SUBCOMMITTEE MEETING LIST

### FALL 2019 MEETING: OCTOBER 27 TO OCTOBER 31
### Hyatt Regency Columbus Hotel; Columbus, Ohio USA

| Date | Time Start | Time End | Session Title | Track | Chair | Room/Location |
|---|---|---|---|---|---|---|
| 10/28/2019 | 9:30 AM | 10:45 AM | WG Guide of FRA for Liquid Filled Transf. C57.149 | PCS | C. Sweetser | Knox (2) |
| 10/28/2019 | 11:00 AM | 12:15 PM | TF PCS Cont. Rev. to Test Code C57.12.90 | PCS | H. Sahin | Union CDE (2) |
| 10/28/2019 | 1:45 PM | 3:00 PM | TF Audible Sound Revision to Test Code | PCS | R. Girgis | Union CDE (2) |
| 10/28/2019 | 4:45 PM | 6:00 PM | TF PCS Cont. Revisions to C57.12.00 | PCS | T. Ansari | Union CDE (2) |
| 10/29/2019 | 9:30 AM | 10:45 AM | WG Shunt Reactors C57.21 | PCS | S. Som | Union CDE (2) |
| 10/29/2019 | 11:00 AM | 12:15 PM | WG HVDC Converter Neutral Devices Entity PC 57.32.10 | PCS | H. Zhang | Morrow (2) |
| 10/29/2019 | 11:00 AM | 12:15 PM | WG Semicond. Power Rectifier Transfs C57.18.10 | PCS | S. Kennedy | Union CDE (2) |
| 10/29/2019 | 3:15 PM | 4:30 PM | WG Sw Transients Ind by TR/Bkr Interaction PC57.142 | PCS | J. McBride | Union CDE (2) |
| 10/29/2019 | 4:45 PM | 6:00 PM | WG Short Circuit Withstand PC57.164 | PCS | S. Patel | Union CDE (2) |
| 10/30/2019 | 3:00 PM | 4:15 PM | SC Performance Characteristics | PCS | C. Stiegemeier | Union CDE (2) |
| 10/28/2019 | 11:00 AM | 12:15 PM | WG Control Cabinets PC57.148 | Power | J. Watson | Knox (2) |
| 10/28/2019 | 3:15 PM | 4:30 PM | WG Transformer Monitoring C57.143 | Power | M. Spurlock | Knox (2) |
| 10/29/2019 | 9:30 AM | 10:45 AM | WG Condition Assessment Guide PC57.170 | Power | K. Mani | Union AB (2) |
| 10/29/2019 | 11:00 AM | 12:15 PM | WG Transportation Issues C57.150 | Power | G. Anderson | Union AB (2) |
| 10/29/2019 | 3:15 PM | 4:30 PM | TF Volts per Hertz | Power | K. Yule | Morrow (2) |
| 10/30/2019 | 1:30 PM | 2:45 PM | SC Power Transformers | Power | B. Griesacker | Union CDE (2) |
| 10/28/2019 | 9:30 AM | 10:45 AM | WG Std Transf. Terminology C57.12.80 | Stds | C. Claiborne | Morrow (2) |
| 10/28/2019 | 1:45 PM | 3:00 PM | WG PC57.152 Guide for Field Testing | Stds | M. Ferreira | Morrow (2) |
| 10/28/2019 | 3:15 PM | 4:30 PM | TF IEEE-IEC Cross Reference | Stds | V. Mehrotra | Marion (2) |
| 10/29/2019 | 3:15 PM | 4:30 PM | WG Std Terminal Markings C57.12.70 | Stds | J. Varnell | Marion (2) |
| 10/30/2019 | 4:30 PM | 5:45 PM | SC Standards | Stds | J. Murphy | Union AB (2) |
| 10/28/2019 | 4:45 PM | 6:00 PM | WG Sec. Network Protectors C57.12.44 | STNP | M. Faulkner | Fairfield (2) |
| 10/29/2019 | 9:30 AM | 10:45 AM | WG Submersible Transf. C57.12.24 | STNP | G. Termini | Knox (2) |
| 10/29/2019 | 11:00 AM | 12:15 PM | WG Liquid-immersed Sec. Network TRs C57.12.40 | STNP | D. Blew | Knox (2) |
| 10/29/2019 | 3:15 PM | 4:30 PM | TF Effects of Corrosion on Transformers | STNP | W. Elliott | Knox (2) |
| 10/30/2019 | 11:00 AM | 12:15 PM | SC Submersible Transf. & Network Protectors | STNP | G.Payerle | Union AB (2) |

# EARLY BIRD EVENT
## Saturday, October 26, 2019
## Downtown Columbus Food Adventure

The evening begins with a tour of the historic North Market by two local tour guides aka "food sherpas" who will lead our group through the evening. We will tour the building in two groups with a guide, learning Market history, meeting the makers and, of course, tasting the hand-crafted, artisanal food made by some of the vendors. Guests will have approximately 30 minutes to tour and an additional 15 minutes to explore the market on their own. www.northmarket.com

*Photo courtesy of Mike Beaumont*


After pre-dinner samplings, a shuttle bus will take our group down High Street through the Short North, discussing various landmarks along the way, the history and immigrant origins of the Short North as well as the anecdotes that make it such a vibrant arts district. This scenic tour will last 10–15 minutes, with our ultimate destination being The Table.

The Table is a popular addition to the Short North restaurant scene. With the motto 'fork responsibly,' the kitchen staff focuses on made-from-scratch, creative dishes highlighting local ingredients and farms. The atmosphere is laid back and comfortable. "The Table is French by nature, Columbus by nurture and modern-day Brooklyn in spirit." www.thetablecolumbus.com

Following dinner, the group will board the shuttle with takeaway dessert bags featuring some of Columbus' best sweets. Choose your drop-off point depending on how you plan to spend the rest of your evening!

**Itinerary** (times are approximate)

5:45 pm: Meet in Hyatt Regency main lobby and walk over to the North Market as a group (0.3 mile / 8 minute walk)

6:00 pm: Arrive at the North Market

6:45 pm: Board shuttle for The Table

7:00 pm: Arrive at The Table for a family style dinner* and cash bar (credit cards accepted)

8:00 pm: Board shuttle with takeaway dessert bags

8:10 pm: First drop-off – middle of the Short North for those wanting to continue the evening at any one of many fantastic establishments in the neighborhood (walkable back to the Hyatt Regency)

8:15 pm: Second drop-off – Hyatt Regency

* As The Table is hyper-seasonal, a final menu was not available to publish — consider that part of the "adventure"! Dietary restrictions will be accommodated; please indicate these when you register.

*Meeting hosted by*

AMERICAN ELECTRIC POWER
BOUNDLESS ENERGY℠

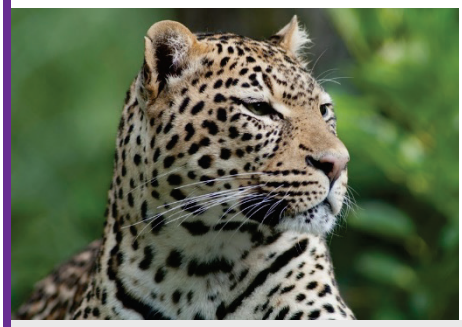
**Attendance is extremely limited…**
**sign-up when registering for the meeting!**

# SPOUSE/COMPANION TOUR
## Monday, October 28, 2019
## Art & Animals

Start your day without having to worry about missing the bus! Monday's events begin in the Hyatt Regency's Delaware Ballroom with a fun, guided paint session led by local artist Sarah D. www.sarahthehout.com Participants will receive step-by-step instructions on how to paint an underwater fish scene that you'll be proud to display when you get home!

Next, grab a snack as you board the bus for an exciting afternoon at the Columbus Zoo. Home to more than 7,000 animals representing over 800 species, exhibits are divided into regions of the world with the zoo currently managing eight such regions. www.columbuszoo.org

Upon arrival at the zoo, you will be escorted to The Water's Edge for a tasty taco bar buffet lunch, after which you can explore the zoo at your leisure. Additionally, participants will receive a Giraffe Encounter voucher which can be redeemed at 1:30 pm or 3:30 pm in the Heart of Africa exhibit, where you will have the opportunity to hand-feed giraffes.



***DRESS FOR THE WEATHER AND WEAR COMFORTABLE WALKING SHOES!***

### Lunch Menu: Taco Bar

*Please advise of any special dietary needs at registration.*

- Seasoned ground beef
- Shredded adobo chicken
- Hard and soft taco shells
- Diced tomatoes, black olives, sliced jalapeños, shredded lettuce, sour cream
- Cheddar cheese sauce
- Refried beans
- Mexican rice
- Tortilla chips
- Salsa, Pico de Gallo
- Assorted cookies
- Iced Tea or Lemonade

### Itinerary (times are approximate)

*~ Bottled water and snacks provided on bus ~*

| | |
|---|---|
| 9:15 am: | Arrive in the Hyatt Regency's Delaware Ballroom and grab your supplies for a paint party you won't soon forget! |
| 12:00 pm: | Depart on coach bus for the Columbus Zoo (bus pickup at hotel's North Drop-Off Area near Starbucks on the 2nd floor) |
| 12:30 pm: | Buffet lunch served at The Water's Edge |
| 1:00 pm: | Explore the zoo at your leisure |
| 4:00 pm: | Depart Columbus Zoo on coach bus |
| 4:30 pm: | Arrive back at hotel |

**Attendance is limited to one bus... REGISTER EARLY!**

*Meeting hosted by*

AMERICAN ELECTRIC POWER
BOUNDLESS ENERGY℠

# SPOUSE/COMPANION TOUR

## Tuesday, October 29, 2019

## Historic Bricks & Gardens

Rise and shine on Tuesday morning with the first stop on our tour being the bright and exotic Franklin Park Conservatory. Originally built in 1895 and listed in the National Register of Historic Places, today's conservatory is a horticultural and educational institution showcasing special exhibitions, Dale Chihuly artworks and exotic plant collections, including more than 400 plant species. Biomes representing global climate zones include Himalayan Mountains, Tropical Rainforest, Desert, and Pacific Island Water Garden. Additional plant collections include a Bonsai Courtyard, Showhouse with seasonal displays, orchids and tropical bonsai collections and Palm House with more than 40 species of palms. The conservatory is set within Franklin Park and surrounded by 90 acres of outdoor botanical gardens and green space. www.fpconservatory.org

### Traditional German Buffet Lunch

*Please advise of any special dietary needs at registration.*

- Fresh garden salad, rolls and butter
- Schmidt's own fresh pork bratwurst
- Famous smoked "Bahama Mama"
  *The Bahama Mama is a fully cooked, natural casing, hickory smoked sausage made from specially selected lean cuts of beef and pork, blended with our secret spice pack formulation; spice level is moderate so as not to hide the flavor of the quality cuts of beef and pork*
- Baked chicken
- German potato salad
- Hot sauerkraut with pork
- California mixed vegetables
- Chunky applesauce
- Mini cream puffs
- Coffee, hot tea and iced tea

Next up is the perfect location for a lunch stop on our way to German Village: Schmidt's. Featured on the first episode of popular TV series *Man vs. Food*, this German fare has been perfected over decades. www.schmidthaus.com

After lunch, step outside the restaurant and begin your guided tour of Columbus' German Village. Known as the city's most historic neighborhood and one of the world's premier historic restorations, German Village was settled in the early to mid-19th century by a large number of German immigrants who at one time comprised as much as one-third of the city's entire population. Added to the National Register of Historic Places on December 30, 1974, it became the list's largest privately funded preservation district and, in 2007, was made a Preserve America Community by the White House.

### Itinerary (times are approximate)

*~ Bottled water and snacks provided on bus AM and PM ~*

| | |
|---|---|
| 9:15 am: | Depart on coach bus from Hyatt Regency (bus pickup at hotel's North Drop-Off Area near Starbucks on the 2nd floor) |
| 9:30 am: | Begin guided tour of Franklin Park Conservatory |
| 10:30 am: | Explore Conservatory on own |
| 11:30 am: | Depart on coach bus for Schmidt's |
| 12:00 pm: | Lunch |
| 1:00 pm: | Begin guided historic German Village tour |
| 4:00 pm: | Depart German Village on bus |
| 4:30 pm: | Arrive back at hotel |

***WEAR COMFORTABLE WALKING SHOES!***

*Meeting hosted by*

AMERICAN ELECTRIC POWER

BOUNDLESS ENERGY℠

**Attendance is limited to one bus... REGISTER EARLY!**

# DINNER SOCIAL
# Wednesday, October 30, 2019
## Center of Science & Industry
## COSI

"Energy Explorers" exhibit

"Progress" exhibit

COSI, an acronym for Center of Science and Industry, is the nation's top science center with a museum and research center located in downtown Columbus. COSI was relocated to a 320,000 square foot state-of-the-art facility designed by Japanese architect Arata Isozaki along a bend in the Scioto River in the Franklinton neighborhood in 1999 and features more than 300 interactive exhibits throughout themed exhibition areas.


"Dinosaurs" exhibit

## Itinerary (times are approximate)

6:00 pm: First shuttle bus* departs Hyatt Regency from North Drop-Off Area; shuttle runs every 15 minutes from hotel to COSI, with last one leaving the Hyatt at 7:00 pm

6:15 pm: Enjoy "Progress" and "Energy Explorers" exhibits, passed hors d'oeuvres and cash bars; credit cards accepted and ATM on site

7:30 pm: Dinner buffet in the Atrium

8:00 pm: High wire unicycle rides, interactive science carts and "Dinosaurs" exhibit open to guests

8:15 pm: First shuttle bus* departs COSI for the Hyatt; shuttle runs continuously every 15 minutes

10:00 pm: Last shuttle departs COSI for Hyatt

## Buffet Dinner Menu

*Please advise of any special dietary needs at registration.*

- Classic Caesar salad with garlic croutons
- Roasted garlic mashed potatoes
- Roasted green beans
- Lemon herb chicken with thyme jus
- Sliced sirloin with gravy
- Eggplant parmesan
- Chef's selection of assorted petite desserts
- Lemonade, iced tea and water
- Freshly brewed regular coffee, decaffeinated coffee & assorted teas


* Shuttle bus transportation or ride sharing is recommended; however, parking is available in a lot located directly beneath COSI. Called the Scioto Peninsula Garage, the entrance is on Belle Street near the corner of Broad Street and Belle Street. Fee is $6/vehicle (NOT covered by registration fee).

*Meeting hosted by*

AMERICAN ELECTRIC POWER®
BOUNDLESS ENERGY℠

**Attendance is limited ... REGISTER EARLY!**

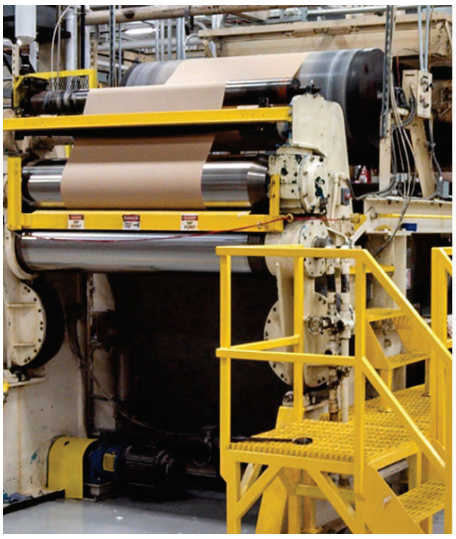
# WEIDMANN

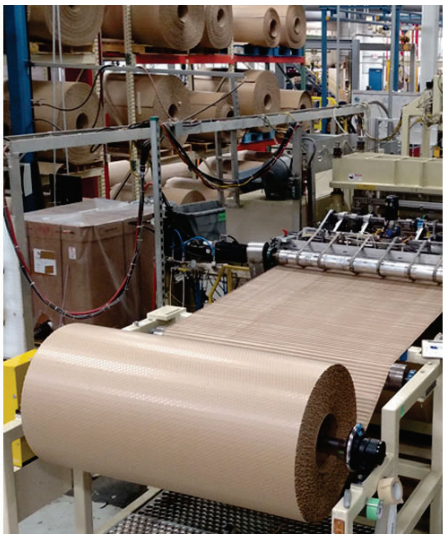
## Technical Tour – Monday, October 28, 2019

Weidmann Electrical Technology invites you to visit their state-of-the-art electrical grade paper mill and converting center in Urbana, Ohio. The highlight of this tour will be a seven cylinder paper machine which was designed by Weidmann engineers specifically to deliver electrical grade papers that serve the instrument, distribution and power transformer industry.

This machine differentiates Weidmann capabilities in that it can manufacture both thin grades of paper required for wrapping conductors used in power transformers and thicker grades of paper used in distribution transformers. This paper can be thermally upgraded using the Insuldur process.

Also included in the tour will be a visit to various converting operations that convert paper and pressboard (which is produced at the Weidmann pressboard mills in St. Johnsbury, Vermont) into specific materials for transformers including crepe paper, DPP and duct strip.






## Itinerary (times are approximate)

| | |
|---|---|
| 6:15 pm: | Board bus at Hyatt Regency from North Drop-Off Area |
| 6:30 pm: | Bus departs Hyatt Regency |
| 6:30 pm – 7:30 pm: | Enjoy a box dinner* while relaxing on the ride to the facility |
| 7:30 pm – 9:30 pm: | Tour the mill and converting center |
| 9:30 pm: | Bus leaves Urbana for the Hyatt Regency |
| 10:30 pm: | Arrive back at Hyatt Regency |

* Please advise of any special dietary needs at registration.

# TOUR IS OPEN TO ALL

(small fee will be charged to cover bus costs)

*Spouses/Companions are welcome.*

## Sign up on-line when you register for the meeting.

*Please note that Weidmann will provide a meal for this tour. If you register and your plans change, please inform IEEE staff ASAP, so Weidmann can adjust its counts for the caterer.*

# Technical Tour – Thursday, October 31, 2019

AEP invites you to visit their state-of-the-art learning facility designed specifically to provide technical and professional skills instruction for transmission line mechanics, station electricians and protection and control (P&C) technicians. Industry standard and customized training programs in each discipline provide dynamic learning opportunities at all skill levels through demonstration and hands-on learning.


The facility consists of a high bay training area with two sub-transmission bays, interconnecting overhead lines and a tapped distribution station with two feeder breakers. The lines and buses can be energized at 120V three-phase by simulation circuits. All high bay equipment on the circuits has associated protection and control equipment located in a control room. A 14-acre transmission line training area is located behind the building with line sections, including:

- 765kV with guyed V and self-supporting suspension towers
- 345kV with BOLD and self-supporting suspension towers
- 345kV energized line to conduct Bare Hand Training
- 138kV and 69kV with a variety of wood pole structures

## Itinerary (times are approximate)

12:45 pm: Board bus at Hyatt Regency's North Drop-Off Area
1:00 pm: Depart hotel with box lunch*
1:30 pm: Arrive at AEP training center
3:30 pm: Board bus for return to Hyatt Regency
4:15 pm: Arrive back at Hyatt Regency

** Please advise of any special dietary needs at registration.*

## Tour Requirements:

All tour guests are required to wear closed toe shoes with a defined heel. High heels, wedges or open toe shoes are not permissible. AEP will provide all guests with appropriate personal protective equipment (hard hats, safety glasses).

# TOUR IS OPEN TO ALL, BUT LIMITED TO ONE BUS

(small fee will be charged to cover bus costs)

*Spouses/Companions are welcome.*

## Sign up on-line when you register for the meeting.

*Please note that AEP will provide a meal for this tour. If you register and your plans change, please inform the IEEE staff ASAP, so AEP can adjust its counts for the caterer and not incur unnecessary costs.*

IEEE PES Transformers Committee
Fall 2019 Meeting
Columbus, Ohio USA

# Tutorial on CIGRE WG D1.29: Partial Discharges in Transformers

## — Technical Presentation —

**Thursday, October 31, 2019**

**By Jitka Fuhr and Janusz Szczechowski**

## 1. Abstract

The goal of the work of WG D1.29 was to summarize the progress in partial discharge (PD) measurements and evaluation of transformers taking a wide view.

PD measurements are among the most important diagnostic tool made for the reliable assessment of the condition of new or service aged HV components. The interpretation of PD results is still based upon the recorded amplitude of the apparent charge in pC or µV. A critical review confirms that the conventional measurement of this apparent charge at the bushings of a transformer, in particular, for PD sources hidden inside the insulation system (which are considered to be dangerous) and the measured value of this apparent charge do not sufficiently reflect the real risk of detected PD activity. Therefore, any detectable PD activity in a transformer during the factory acceptance test, especially at the nominal level of rated voltage, should be investigated and localized.

Transformer PD measurements can be used for multiple purposes. Off-line testing in a laboratory can be completed to determine a basis for quality assurance and acceptance testing (factory acceptance tests, or FAT) to reveal contamination, manufacturing errors or incorrect design. On-site PD diagnostic measurements (off-line or on-line site acceptance tests, or SAT) or on-line monitoring on new or service-aged transformers can serve as a condition assessment tool. For the purpose of this tutorial, the discussed interpretation and localization methods, as well as the suggested procedure for solution of PD problems in transformers, are valid for both FAT and SAT. The content of the tutorial is based on experience with PD measurements on transformers filled with mineral oil. The same procedures are expected to be applicable to transformers filled with alternative insulating fluids.

A number of practical case studies will be reviewed, where the testers had to go beyond IEC and IEEE requirements to arrive at a successful solution. Additionally, possible criteria for distinguishing between dangerous and less dangerous PD sources in power transformer oil-impregnated electrical insulation will be defined. Finally, despite the large number of practical examples of identified and localized PD defects, the unambiguous identification of dangerous PD sources in the electrical insulation system of power transformers remains a topic for further research.

## 2. Learning Objectives

This tutorial provides the following learning opportunities:

- Overview of PD measuring systems commercially available today
- Overview of the common PD source in the insulation system of transformers
- Overview of interpretation methods to distinguish between dangerous and less dangerous PD sources
- Overview of localization methods (electrical PD signals, acoustic and UHF signals)
- Recommended procedure for successful solution of PD problems

## 3. Learning Outcomes

By attending this tutorial, attendees will gain an understanding of the following:

- Benefits and limits of advanced PD measuring systems
- Basic knowledge about alternative PD measurements and evaluation methods
- Reliable analysis of PD results
- Efficient methods for localization of PD sources
- Procedure for solving the PD problem in the most efficient way

## 4. Presenters' Biographies

**Jitka Fuhr** has been an independent consultant since 2012 for her own company, AF Engineers + Consultants (AFEC) GmbH, based in Iseltwald, Switzerland. AFEC focuses on the areas of electrical power generation, e.g. generators, and high voltage (HV) power transmission and distribution equipment such as transformers and substations. As an expert in the solution of PD problems, she supports transformer factories worldwide. She published more than 50 publications in technical journals and presented at various international conferences. She is a co-author of the ABB book, Testing of Power Transformers. Jitka is a member of IEEE (M'04) and CIGRE. She contributed as the convenor of the CIGRE working group WG D1.29 "PD measurement on transformers," which published its results in the CIGRE Technical Brochure TB 676 in February 2017. Jitka received her master's degree in electrical engineering at Technical University Fridericana Karlsruhe (Germany) and her PhD at Technical University Darmstadt (Germany) in 1974 and 1985, respectively.

**Janusz Szczechowski** has worked for ABB's Transformers Group since 2007 and is currently located in the ABB Technology Center in Raleigh, North Carolina USA. From 2003 until 2007, he was working as a member of the research staff at the Schering Institute (Leibniz University Hannover/Germany). He authored and co-authored several international papers and ABB internal technical instructions and standards with a focus on high voltage testing and PD measurements as well as the implementation of the new acquisition Ultra High Frequency (UHF) method. He worked on the design, project execution and manufacturing of the first ABB high voltage mobile test system based on a frequency converter with Insulated Gate Bipolar Transistor (IGBT) technology. Janusz received his master's degree in electrical engineering in 2002 from the Poznan University of Technology (Poland) with a focus on high voltage technology.

IEEE PES Transformers Committee
Fall 2019 Meeting
Columbus, Ohio USA

# Tutorial on Embedded Optical Sensing Systems for Distribution Transformer Monitoring

**— Technical Presentation —**
**Thursday, October 31, 2019**

**By Bradley Kittrell, Ajay Raghavan and Malcolm Smith**

## 1. Abstract

Traditional utility monitoring systems do not provide real-time visibility into the condition of transformers or accurate performance measurements. This has resulted in the use of lagging indicators, such as oil sample analysis, typically requiring expensive field visits, grid outages and laboratory sample testing. This tutorial reviews the use of optical sensing systems for managing transformers and improving grid resiliency and safety. These sensing systems allow direct internal monitoring of critical transformer components. Versatility covering different monitoring parameters of interest in embedded configurations for new transformers and a retrofittable configuration for older transformers is achieved by applying "hair thin," multiplexed fiber optic and other low profile optical sensors in combination with a high resolution optical readout and advanced analytics. This technology could enable utility professionals to gain information they can use to better plan for maintenance/management and improve grid performance, which would, in turn, accommodate DERs and other evolving grid market dynamics

Under an initiative funded by the Department of Energy Office of Electricity, PARC, GE and Con Edison built, tested and qualified commercial network transformers with embedded optical sensing systems. The parameters monitored were validated across a range of scenarios with lab instruments typically used for qualification testing. An ongoing field trial to demonstrate the robustness of the technology for remote monitoring through the industrial internet under demanding grid deployment conditions in New York City is showing promise toward scale-up of the technology.

This tutorial will provide an overview of the typical pain points in managing transformers and parameters for monitoring. We will also cover requirements for highly constrained installations that require a larger capacity and flexible rating while fitting into a tight space. The unique capabilities of optical sensing systems and a low-cost approach to interpreting the sensor signals in transformers for predictive maintenance will be covered. The presenters will discuss the sensors' compatibility in the transformer environment, validation testing per IEEE standards that enabled the solution to be implemented in field-deployable commercial transformers, initial results from the field deployment and the technology's potential to provide systematic alerts for unsafe/unexpected events.

## 2. Learning Objectives

This tutorial provides the following learning opportunities:

- Review the pain points for transformer management and traditional approaches to monitoring

- Understand how optical sensing can enable innovative, non-invasive monitoring capabilities, enabling proactive maintenance in a cost-effective and reliable manner
- Review examples of detection capabilities and validation in laboratory tests and field-deployed network transformers
- Learn how advanced analytics and the industrial internet can be leveraged for remote monitoring and predictive maintenance

## 3. Learning Outcomes

By attending this tutorial, attendees will gain an understanding of the following:

- Capabilities of optical sensing systems and their potential for field-deployable internal transformer monitoring
- Application of advanced analytics to enable predictive maintenance from embedded sensors
- Options for monitoring transformer and grid asset fleets that can enable proactive maintenance and improve long-term planning

## 4. Presenters' Biographies

**Bradley Kittrell** is an engineering supervisor in the Distribution Engineering Equipment Group for Consolidated Edison of New York. He manages the application of analytics to the operation of Consolidated Edison's fleet of network transformers and provides guidance on its application of network transformer operation and maintenance. Bradley has an MBA from the University of Carolina at Chapel Hill and a BS in Electrical Engineering from the University at Buffalo. He has worked for Consolidated Edison for the past five years.

**Dr. Ajay Raghavan** is the strategic execution director and manages the Analytics for Condition Evaluation of Systems (ACES) area within the System Sciences Lab at the Palo Alto Research Center (PARC, a Xerox Company). The ACES team focuses on developing cutting-edge analytics and sensing technologies for reliable, safe and optimal life cycle management of critical systems in the energy, transportation, aerospace, defense and manufacturing sectors in partnership with major industry clients. Ajay has served as a principal investigator on major cross-disciplinary projects between PARC and industry partners, such as Con Edison, GE, LG Chem, GM, VicTrack and VicRoads to develop and transition fiber optic sensing-based health monitoring systems for distribution transformers, electric vehicle batteries and bridge structures. He has 16 pending patents granted and 30+ pending patents and published two book chapters and 40+ papers in leading journals and conferences that have garnered 2000+ citations. He received NSF Fellowship and "Best Paper" awards at IEEE International Conference on Prognostics and Health Management and the Prognostics and Health Management Society conference. Dr. Raghavan obtained his MS and PhD degrees in Aerospace Engineering at the University of Michigan-Ann Arbor. He has a bachelor's degree in mechanical engineering from the Indian Institute of Technology Bombay.

**Malcolm Smith** is a senior engineer–network transformers and voltage regulators at General Electric's transformer manufacturing/testing facility in Shreveport, Louisiana, and is an established leader on transformer design and testing and sensor validation procedures. He previously served as an engineering manager and product leader in the network transformers business over a 17-year career at GE Renewable Energy. Malcolm holds a BS in Mechanical Engineering from Northrup Institute of Technology and is currently a licensed, registered professional mechanical engineer in the states of Washington and California.