IEEE Power and Energy Society
Entity Annual Report

2024

Entity: Switchgear Committee
Website: http://www.ewh.ieee.org/soc/pes/switchgear/
Chair: Doug Edwards
Vice-Chair: Donnie Swing
Secretary: John Webb
Immediate Past Chair: Keith Flowers

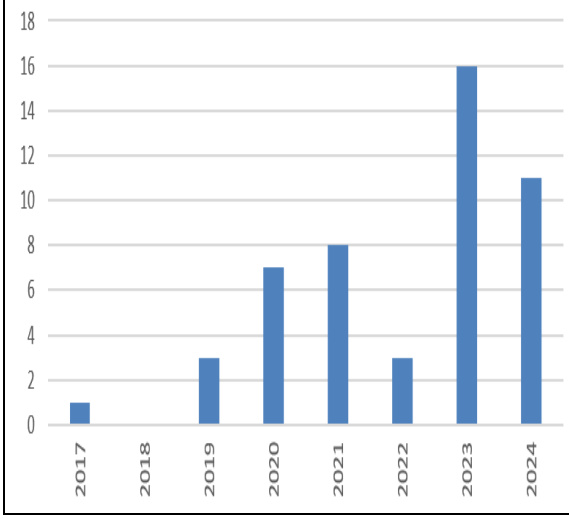
1. Significant Accomplishments

Standards Activities

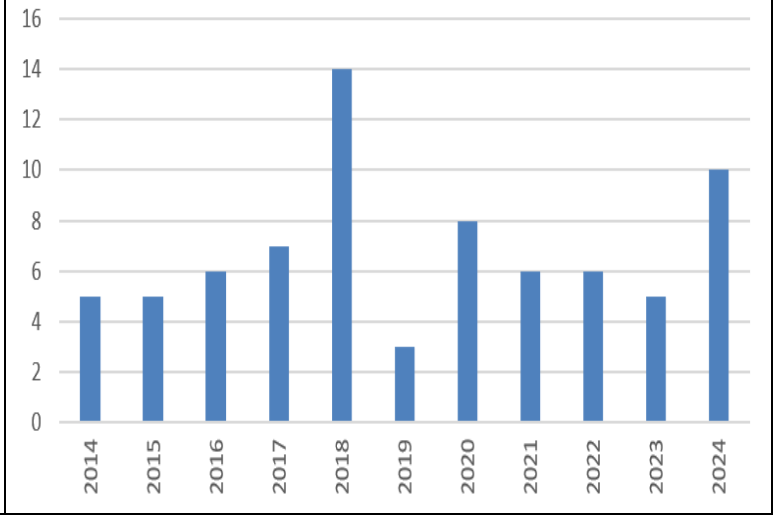
Working Groups are completing revisions of various standards. In 2018, IEEE SA revised its policy to no longer allow for the option of "Reaffirmation," thus requiring 10-year revision/maintenance cycles." This change increased the number of standards requiring revision and a peak in the due dates. The Switchgear Committee is working to level-out the workload for revision of standards.

Approvals by IEEE SA (through NesCom and RevCom) are going well.

IEEE SA (through NesCom) Approvals (number per year – past 8 years)



IEEE SA (through RevCom) Approvals (number per year – past 11 years)



Working Group Activity Statistics

The Switchgear Committee has:

- 85 active standards
- 39 active WGs, PAR study groups, or task force groups preliminary to formation of WGs.
- Individual versus Entity WGs – there are:
  - 35 PARs on Individual basis
  - 4 PARs on Entity basis.

The list of active WGs fluctuates, with WGs disbanded as their projects are completed, and with new WGs forming on a continuing basis.

PES External PAR Management (EPM) Statistics

In 2024, the PES Technical Council EPM:

- Four (4) projects (7% of the projects reviewed by the EPM) were determined to be within the scope of the Switchgear committee. All four (4) were assigned to the Switchgear Committee for oversight and, if there are PARs as "primary" Standards Committee. The planned actions associated with the projects are:
  - One (1) project should be handled as a new PAR.
  - Three (3) projects should be rolled into existing IEEE standards.
    - P0200, Recommended Practice for Consideration of Gender Equity and Social Inclusion (GESI) in Low Carbon Energy Transition was referred to non-PES standard IEEE Std 3400.
    - The other two (2) projects should be rolled into existing standards PES Switchgear standards.

Four (4) Entity PARs are active. There has been limited activities by all four (4) of the WGs.

Keith Flowers, as Switchgear Standards Coordinator, represents the Switchgear Committee and Substations Committee within EPM. His term will continue for six years (through 2027).

<u>Switchgear External Project Approval Group (EPAG)</u>

The Switchgear Committee EPAG, supporting the PES EPM, reviews projects coming from outside of the Switchgear Committee (primarily projects proposed for Entity PARs).

Process details were created for EPAG in 2022 and have proven to work effectively.

Highlights of the EPAG structure and processes are:

- The EPAG is overseen by the Administrative Subcommittee.
- The EPAG membership consist of:
  - The Standards Coordinator who serves as Chair of EPAG.
  - The Subcommittee Chairs (or their proxy) serve as voting members.
  - The Committee Chair, Vice-Chair, Secretary, and Immediate Past-Chair serve as ex-officio members.
- The meetings are open meetings, free to be attended by any interested Committee member.
- EPAG decisions are communicated to PES Tech Council EPM or to the submitter (as appropriate).

Governance Documents
The Switchgear Wording Group Policies and Procedures (WG P&P) Individual Basis was Deemed Without Issue by IEEE SA AudCom on July 23, 2024. This review and approval was in accordance with the AudCom Conventions which requires a WG P&P be reviewed within six (6) months of approval of the Standards Committee P&P which had been approved in late 2023.

Management System
In preparation for pending rollout of Member Planet, the Switchgear Committee has:

- ~75% of members have created profiles in Member Planet
- Substructure details have been provided to the PES Member Planet integration team.

The Switchgear Committee is currently (prior to Member Planet being available) managing registration and attendance tracking as follows:

- Conference registrations are managed via CVENT in conjunction with IEEE Conference, Events, and Experiences (CEE).
- Meeting attendance is managed by various systems (e.g. Excel, IEEE myProject, or IMeetCentral) by the preference of the officers of the group/sub-group.

Financial
The Switchgear Committee continues to maintain a sound financial condition.

The Switchgear Committee plans, executes, and finances conferences with assistance by IEEE CEE and IEEE Legal for hotel contract negotiation. CEE cost is significant at ~25% of registration income. This expense will continue pending PES roll-out of Member Planet.

Revenue comes from registration fees charged to attendees and from support from corporations and individuals. Corporate supporters are recognized for their contributions. However, marketing and commercial activities are not permitted during our conferences. Expenses are those related to conferences (catering, audio/visual, social events, and similar).

Basic registration costs have been maintained since the fall of 2023.

The Treasurer maintains the IEEE financial reports and as needed reports issues to the Committee officers. The Committee has enough financial reserves to handle upcoming conference commitments.

The Switchgear Committee offers complementary registration (waives all registration fees) for:

- Honorary Members
- Student Member attendees of the Committee conferences.

IEEE Annual Audit for 2024 was successfully executed with no findings.

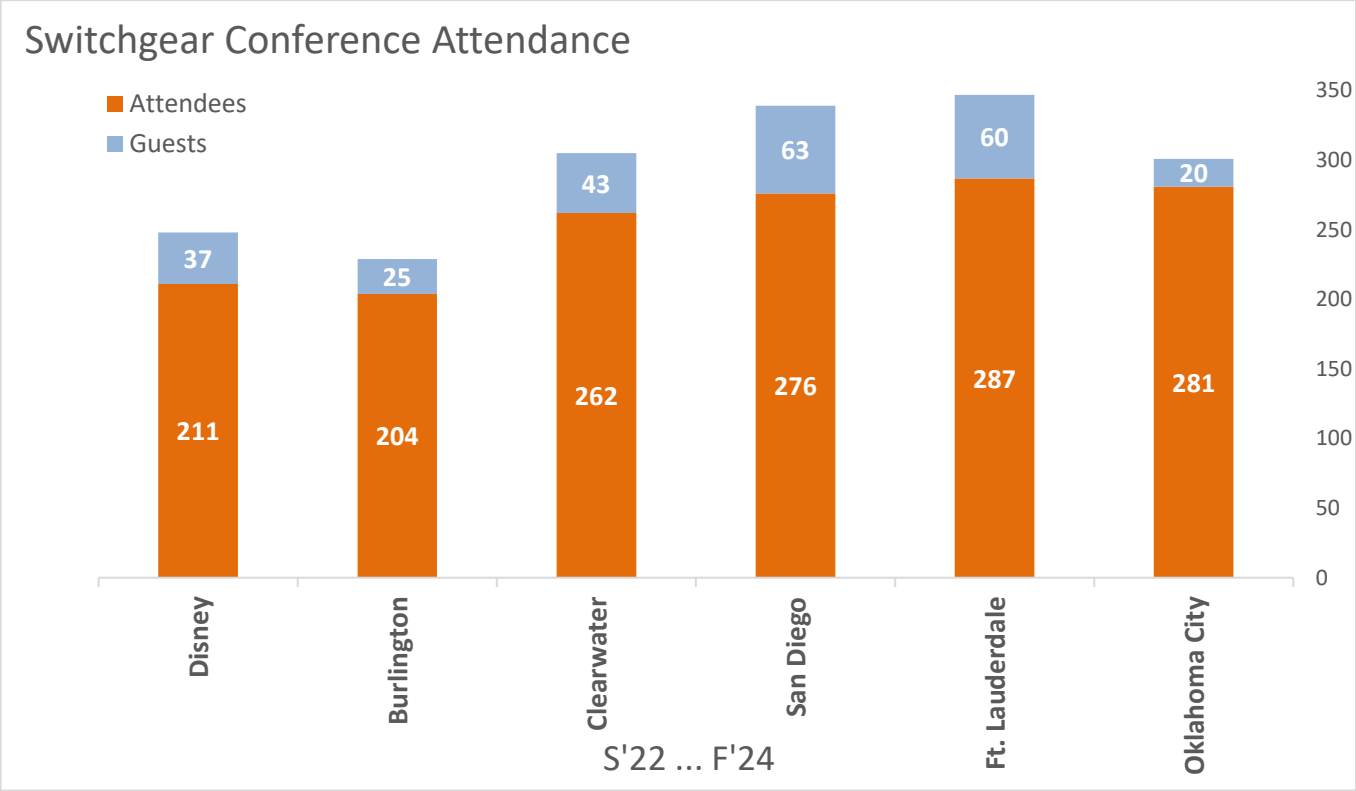
Conference Cancellation Insurance
To mitigate the financial risks associated with cancelled conferences, the topic of Conference Cancellation was raised with IEEE PES staff. A request was made to have Standards Committee meetings classified as “Conferences” which allows for Conference Cancellation insurance. PES

approved providing Conference Cancellation insurance coverage for all PES Standards Committee conferences.

Conference Attendance

The Switchgear Committee holds two (2) in-person conferences each year in the Spring and Fall. Attendance at these conferences continues on an upward trend rising from around 110 participants in 2003 to our highest attendance ever in the Spring of 2024 with 347 individuals.

Both the 2024 Spring and Fall conferences had 40 first-time attendees.



The increase in attendance and first-time attendees is attributed to:

- Appealing conference locations
- Appealing social events and tourism opportunities
- Diversifying locations to attract local individuals who might not otherwise be able to justify the travel costs for attendance
- Providing opportunities for active participation to all conference attendees regardless of industry experience
- Providing learning opportunities to all conference attendees in for the form of Technical Sessions and panel discussions.

2. Benefits to Industry and PES Members from the Committee Work

The Switchgear Committee creates and maintains standards that benefit humanity in many ways, including but not limited to:

- Electrical equipment users, producers, testing firms, and third-party certification bodies benefit by having performance requirements that are consistent and that give confidence that products carrying equal ratings exhibit equal performance.
- Electrical equipment users and producers benefit by having known performance-oriented requirements rather than rote construction mandated (but not necessarily performance-oriented) requirements. This allows producers to introduce new technologies that produce equal performance without conflicting with arbitrary standards-mandated construction requirements.
- Electrical equipment users, producers, testing firms, and third-party certification bodies benefit from having relatively stable standards for products, as revisions of standards are generally made at intervals of seven to ten years.
- Electrical equipment users, producers, testing firms, and third-party certification bodies benefit from the creation of new standards covering areas previously not addressed in standards, such as testing of equipment under conditions of internal arcing faults, special interrupting applications such as transformer-limited faults, and conversions of existing equipment to implement newer technologies.

3. Benefits to Volunteer Participants from the Committee Work

Participation in standards activities provides a solid basis for education of participants, providing a forum to capturing and sharing the knowledge of participants.

First and foremost, the Switchgear Committee Officers would like to recognize that the Committee enjoys participation by a significant number of domain experts who have formally retired from the business world, yet continue to participate, in several cases without financial support from their former employer or any other firm. It is reasonable to surmise that such individuals would not do so except that participation provides them some measure of satisfaction. Their depth of knowledge and "mentoring mentality" provide a tremendous benefit to the Committee membership and guests.

Participants in the standards process benefit from recognition within their employer organizations as "experts" in their technical field, particularly if they participate in some officer capacity in WGs or in the committee structure.

WG members and committee officers are recognized for their contributions when standards are published by the Standards Association and Switchgear Committee. Typically, plaques or certificates are provided and individuals are recognized publicly during the conferences. The participants are also recognized in the front matter of the document, gaining positive "internet immortality".

Two (2) educational seminars/tutorials are held during each of its Spring and Fall conferences with the Fall conferences including a half-day program dedicated to technical presentations encompassing technical subjects, training, plus a panel session during this conference. These seminars and tutorials are included in the conference registration cost.

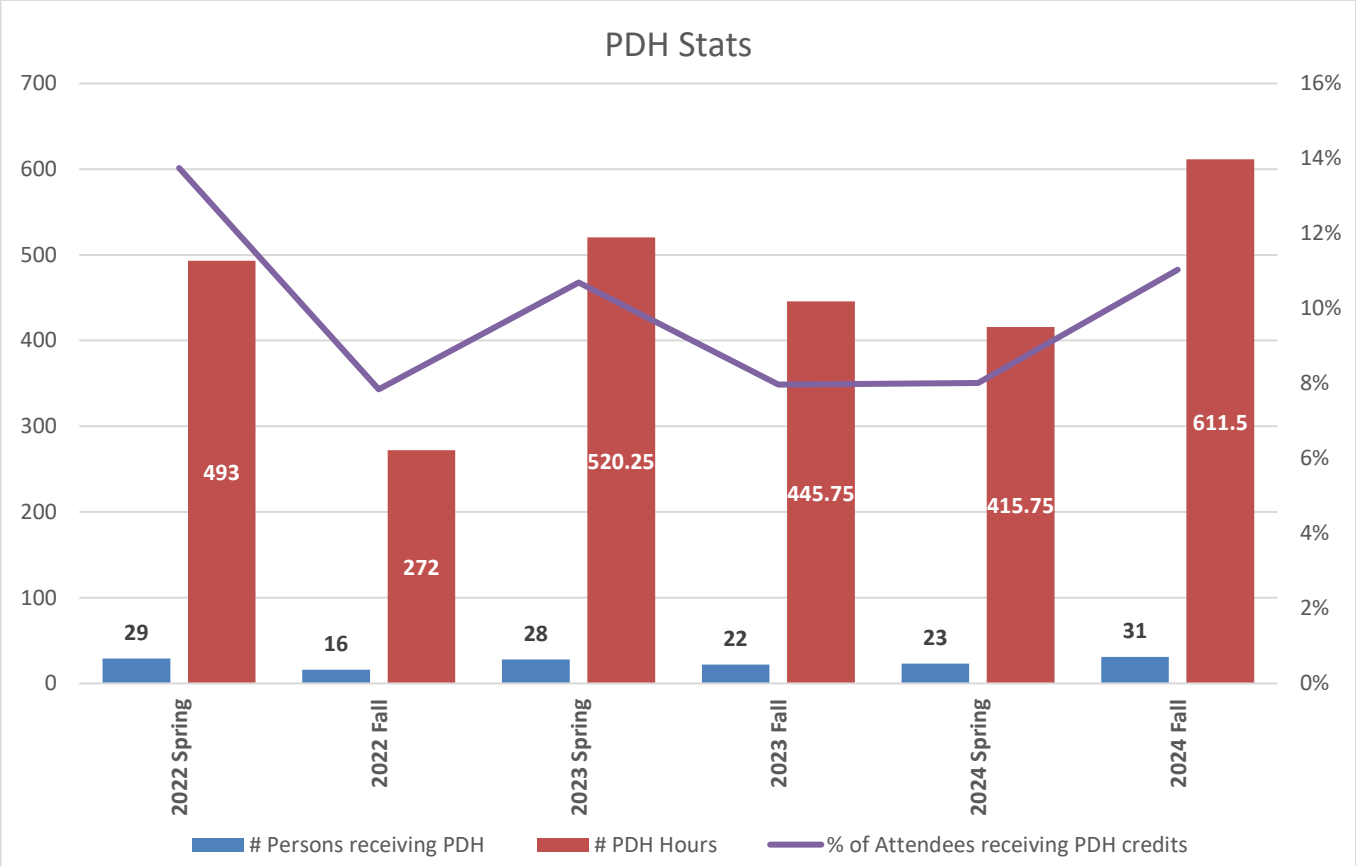
Presentations topics included:

- Connection Between Insulated Power Cables and Switchgear: The Need, Trends and Challenges
- Switchgear Retrofitting: A Look Back over 40 Years – The Evolution and Future of Practices and Standards in Equipment Life Extension
- Offshore Project Challenges
- IEC 61850, Basic Application Profile for Fault Location, Isolation, and Service Restoration
- IEEE-SA MyProject Training
- IEEE Standards Template Training
- Recent Switchgear Committee standards publications:
  - C37.68 – IEEE Standard for Design, Test, and Application Requirements for Microprocessor-Based Controls of Distribution Pad-mount, Dry Vault, Wet Vault, and Polemount Switchgear Rated Above 1 kV and Up to and Including 38 kV
  - C37.63 – IEEE Standard Requirements for Overhead, Pad-Mounted, Dry-Vault, and Submersible Automatic Line Sectionalizers for Alternating Current Systems up to and Including 38 kV
  - C37.20.6 – IEEE Standard for 4.76 kV to 48.3 kV Rated Ground and Test Devices Used in Enclosures
  - C37.20.9a – IEEE Standard for Metal-Enclosed Switchgear Rated 1 kV to 52 kV Incorporating Gas Insulating Systems Amendment 1: Clarification of Metal-Enclosed Gas-Insulated Switchgear (MEGIS) Types Covered, Refilling and Monitoring Requirements, and Production Test Requirements
- Condition Assessment of Switchgear – Panel Session

These technical presentations provide conference participants with training on current topics.

Switchgear Committee conferences are a gathering of industry experts across academia, government regulators, third-party certifiers, consultants, specifiers, end users, and manufacturers. There are tremendous opportunities to network with a wide variety of experts from diverse global regions. Not only are there great social opportunities, but the discussions often facilitate best practice discussions between individuals from all around the world.

The Switchgear Committee issues (since Fall 2019) professional development hours (PDHs) through the IEEE Certificate Program. While each certificate costs the Committee $5 (USD), the Committee has absorbed that expense and does not pass the fees along to attendees. The Switchgear Committee officers feel that this is a tremendous value to the attendees.



The Switchgear Committee recommends that the promotion of such benefits to potential participants, assists users who struggle to secure management support for Committee activities, both financial and time. The Switchgear Committee has taken action to support participants with a simple one-page "brochure" detailing the virtues of Committee participation as well as a justification letter template that may be used by participants.

4. Recognition of Outstanding Performance

IEEE Standards Association Standards Medallion: Keith Flowers received award.

PES Technical Council – Distinguished Service Award: Nenad Uzelac received award.

Working Groups which completed standards receive recognition during Switchgear Conferences along with the plaques and certificates. The following WG were recognized:

- C37.20.3, IEEE Standard for Metal-Enclosed 3 Interrupter Switchgear (1 kV—38 kV)
- C37.20.6, IEEE Standard for 4.76 kV to 48.3 kV Rated Ground and Test Devices Used in Enclosures

- C37.20.9a, IEEE Standard for Metal-Enclosed Switchgear Rated 1 kV to 52 kV Incorporating Gas Insulating Systems Amendment 1: Clarification of Metal-Enclosed Gas-Insulated Switchgear (MEGIS) Types Covered, Refilling and Monitoring Requirements, and Production Test Requirements
- C37.30.6, IEEE Standard Requirements for Overhead, Pad-Mounted, Dry-Vault, and Submersible Automatic Line Sectionalizers for Alternating Current Systems up to and Including 38 kV
- C37.63, Standard for Requirements for Overhead, Pad-Mounted, Dry-Vault, and Submersible Automatic Line Sectionalizers for Alternating Current Systems Up to and including 38 kV
- C37.68, IEEE Guide for the Application of Electronic Controls to Pole Mounted and Padmounted Switchgear
- C37.100.7, Guide for the Evaluation of Performance Characteristics of Non-Sulfur Hexafluoride Insulation and Arc Quenching Media for Switchgear Rated above 1000 V

Four (4) outgoing Subcommittee chairs were recognized.

Sixteen (16) new Main Committee members were added.

Several (do not have count) members were recognized for receiving Senior and Life membership status.

5. Coordination with Other Entities (PES Committees, CIGRE, standards, etc.)

Switchgear Standards Committee members are significant contributors to the IEEE Standards Association governance process, PES, other IEEE Standards activities, and other Standards Development Organization activities. Highlights (alphabetically) include:

Ted Burse (Switchgear Committee former Chair)

Standards Organization & Role	**Years**
IEEE Standards Association Standards Board (SASB)	
• SASB Member	2009 – 2020, 2022 – 2025
• SASB Vice-Chair	2016, 2019, 2022 – 2023
• SASB NesCom	2016 – 2020, 2025
• SASB NesCom Chair	2018, 2025
• SASB ProCom	2012 – 2020, 2022 – 2025
• SASB ProCom Chair	2016 – 2017, 2019 – 2020, 2022 – 2024
• RevCom Member	2009 – 2012, 2021 - 2024
• RevCom Chair	2013 – 2015
• SCC Coordinator	2012 – 2014

Doug Edwards (Switchgear Committee Chair)

Standards Organization & Role	Years
Accredited Standards Committee (ASC) C37	Member – Present
IEEE Quantities, Units, and Symbols Standards Committee (QUSCom) (formerly SCC14)	2024 – Present
• QUSCom Standards Committee Chair	2022 – 2023
• Secretary and Active: Various WGs	2022 – Present
IEEE Standards Association Standards Board (SASB)	
• SASB Member	2017, 2020 – 2025
• SASB AudCom	2016 – 2020, 2022 – 2025
• SASB AudCom Chair	2025
• SASB NesCom	2021 – 2024
• SASB ProCom	2020 – 2021, 2025
• SASB RevCom	2016 – 2019
IEEE Quantities, Units, and Symbols Standards Committee (QUSCom) (formerly SCC14)	2024 – Present
• QUSCom Standards Committee Chair	2022 – 2023
• Secretary and Active: Various WGs	2022 – Present
NEMA	Member – Present

Keith Flowers (Switchgear Committee Past-Chair)

Standards Organization & Role	Years
PES Technical Council EPM (Member-At-Large)	2020 – 2027
QUSCom Standards Committee (Secretary/Vice-Chair, Chair)	2021 – Present
Switchgear Standards Committee (PE/SWG)	
• PE/SWG Officer ((Secretary/Vice-Chair, Chair, Past Chair)	2017 – 2024
• PE/SWG Standards Coordinator	2023 – Present
• PE/SWG – Officer and member of various WGs and LVSD SubCommittee	
Technical Activities Board Committee (Corresponding Member-At-Large)	2021 – Present

Christian Heinrich (Non-Voting Member)

Standards Organization & Role	Years
CIGRE CIRED JWG A3.32 (Secretary)	2015 – 2018
CIGRE WG A3.38 (Secretary)	2017 – 2019
CIGRE	2019 – 2024
CIGRE SC A3 Advisory committee (Member)	2018 – Present
IEC 62271-314	2021 – 2024
IEC MSB/SWG 21	2024 – Present

Todd Irwin (Switchgear Committee Past-Chair)

Standards Organization & Role	Years
PES Tech Council Standards Coordinating Committee (Chair)	2021 – Present
Switchgear Committee Marketing and Communications	2021 – Present

Ian Rosker (Non-Voting Member)

Standards Organization & Role	Years
IEC 62271-111 (Convener)	2023 – Present

Donnie Swing (Switchgear Committee Vice-Chair)

Standards Organization & Role	Years
IEEE Standards Association Standards Board (SASB)	
SASB RevCom	2024 – 2025
SASB AudCom	2025

Karla Trost (Voting Member) – ER&P Vice-Chair

Standards Organization & Role	Years
IEEE SCATE P3476 Member	2023 – Present
IEEE PES Awards & Recognition (Vice Chair 2024, Chair 2025)	2024 – Present
NEMA Technical Comm SG8	2016 – Present
NEMA SF6 & Alternatives Coalition (Vice Chair)	2014 (2021) – Present
USNC SC17/17a/17c Member	2016 – Present

Nenad Uzalec (Switchgear Committee Education, Publications, and Recognitions Committee Chair)

Standards Organization & Role	Years
CIGRE Study Committee A3 (Chair)	2022 – 2024
CIGRE Technical Council	2018 – Present
CIGRE TC Liaison to IEEE PES	2023 – Present
Technical Organizing Committee of Conferences, Symposiums and Colloquiums (member)	2018 – Present

John Webb (Switchgear Committee Secretary and Treasurer)

Standards Organization & Role	Years
Accredited Standards Committee ASC C37: Chair	2016 – Present
CIGRE Committee A3: Regular Alternate Member	2024 – Present
IEC USNC Expert for IEC 62271-100	2012 – Present
IEC USNC Expert for IEEE/IEC 62271-37-013	2014 – Present
IEC USNC Expert for IEC 62271-322	2023 – Present
NEMA SF6 & Alternatives Coalition	2022 – Present
NEMA Technical Comm 8SG (Power Switchgear)	2014 – Present
USNC to IEC: Chair SC17A (HV Apparatus)	2015 – Present

Terry Woodyard (Incoming Switchgear Committee Secretary and Treasurer)

Standards Organization & Role	Years
Accredited Standards Committee ASC C37	2015 – Present
ANSI ASC C84.1	2018 – Present
CANENA THSC 121A WG1	2016 – Present
NEMA 1IS SC3	2017 – Present
NEMA Technical Comm 8SG (Power Switchgear)	2015 – Present
UL STP 1332	2018 – Present
UL STP 1670	2020 – Present
USNC to IEC: TC17, SC17A, and SC17C	2016 – Present
USNC Expert for IEC TC17C	2024 – Present

6. Coordination and Involvement with Young Professionals

The committee is initiating registration question in 2025 (voluntary basis) to identify Young Professionals for actions associated with development, mentoring, and recognition.

7. New Technologies of Interest to the Committee

The committee has several projects and task forces involved in new technologies:

High-Voltage DC Distribution Equipment
In recent years there have been a number of high-voltage dc networks implemented. Additionally, there are several proposed dc grids. Due to the proliferation of high-voltage dc systems throughout the world, the Switchgear Committee has opened PARs for high-voltage dc circuit breakers and high-voltage dc switches.

Active Arc-flash Mitigation Systems
When IEEE Std C37.20.7 (Recommended Practice for Testing Switchgear Rated Up to 52 kV for Internal Arcing Faults) was introduced, the scope was limited to high-voltage arc-resistant switchgear up to 38 kV. The subsequent revisions added low-voltage switchgear, low-voltage switchboards, low-voltage motor control, medium-voltage motor control, metal-enclosed bus, gas-insulated switchgear up to 52 kV, and high-voltage outdoor circuit breakers up to 52 kV. The associated ratings and test procedures were accounting for providing passive arc-flash mitigation techniques. The document was being revised to add ratings and test protocols to cover active arc-flash mitigation techniques. Also, active arc-flash mitigation devices have become more prevalent in safety systems and the standard will provide means of evaluating and communicating the performance expectations of utilizing such devices.

IEEE Std C37.20.7.1 is being developed to provide a Guide addressing typical considerations for the application, installation, and use of switchgear that is arc resistant in accordance with the requirements of IEEE Std C37.20.7.

Thermal Monitoring of Switchgear
Current thermal monitoring inspection practices tend to center around periodic infrared thermographic inspections. However, this practice is under increasing scrutiny because, at best, it only provides partial data points infrequently collected somewhat independent of connected equipment performance. In an increasingly arc-flash conscious world, the required manual interface with equipment that is often energized is elevating costs and concerns. This type of technology is being well received with shifts from labor intensive maintenance practices to safer, more efficient, less costly data collection with options for automated data collection and evaluation.

Sulfur Hexafluoride (SF_6) Alternatives
Revisions are underway to develop Guides for the handling SF6 and non-SF6 gases.

IEEE Std C37.100.7, Guide for the Evaluation of Performance Characteristics of Non-Sulfur Hexafluoride Insulation and Arc Quenching Media for Switchgear Rated above 1000 V, addresses the entire spectrum of circuit breakers and gas-insulated switchgear performance characteristics relative to SF_6 alternatives. The guide identifies areas where there may be some question about the performance evaluation methodology and provide guidance for addressing those issues. Close coordination with CIGRE activities will occur throughout the process. For example:

- D1.67 dielectric strength of SF_6 alternatives
- B3.45 application of SF_6 alternatives
- A3.41 switching and interrupting performance

Solid Dielectrics
The Solid Dielectric Task Force (SDTF) is exploring materials, application, environmental conditions, and tests for new insulation systems in which insulation is molded as an integral element of an assembly that includes the interrupting or switching device, e.g., outdoor distribution reclosers. The task force anticipates issuing their final report in the near future.

Distributed Energy Resources (DERs)
Switchgear Committee members are active with the IEEE Std 1547 WG to address discrepancy with Switchgear standards to address occurrences of ≥200% of rated voltage across an open gap in switchgear due to phase angle differences, when both sides of the gap are energized via independent power sources.

Aging of Electrical Equipment
Two (2) actions are ongoing dealing with aged electrical equipment:

- C37.100.8 Guide for Methodologies to Demonstrate the Expected Life of Lubricants Used in Switching Devices WG is working to address the need to standardize establishing the expected life associated with lubricants used in switchgear equipment.
- The Technology and Innovation Subcommittee Aging of Switchgear Task Force conducted a survey in collaboration with the Centre for Energy Advancement through Technological Innovation (CEATI) about Condition Assessment, maintenance, and replacement challenges in relevant industry segments. This survey, together with general information about aging processes and condition assessments will be published in a technical report. Most of the work for the report has already been completed with the official release of the report expected in 2025.

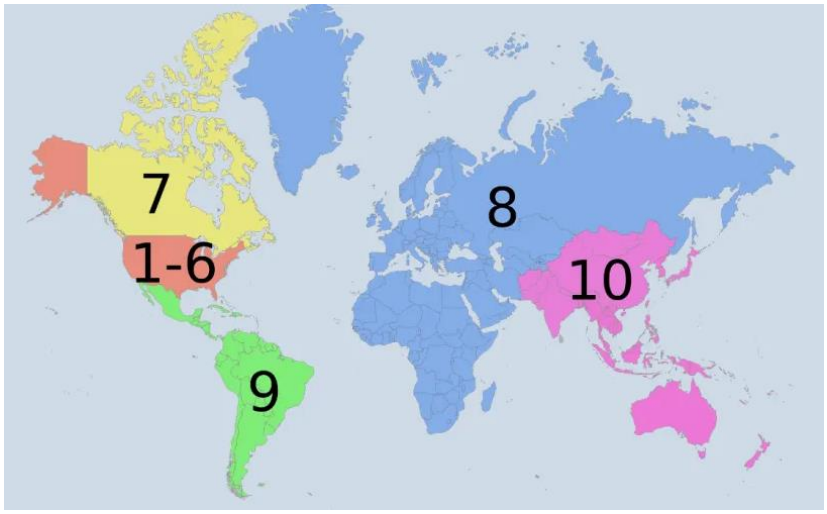
8. Global Involvement

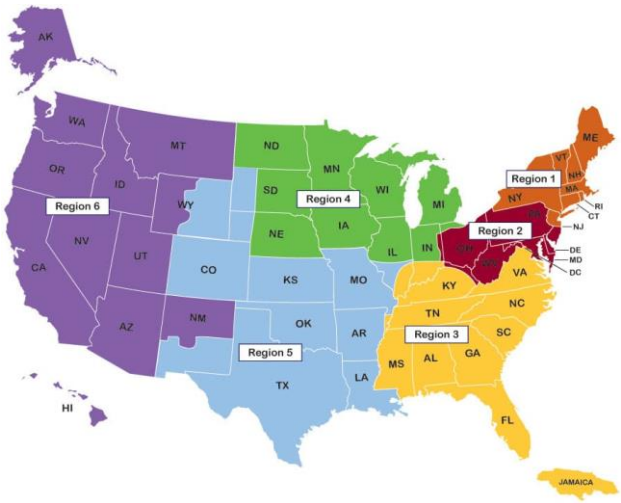
IEEE Region	Number of Members (Voting & Non-Voting)[1]	Officers (Main, Subcommittee, & WGs)[2]	Voting Members[2]	Honorary Members[2]	Non-Voting Members[2]
Region 1	65	-	2	2	15
Region 2	129	1	15	3	37
Region 3	274	11	31	6	80
Region 4	91	36	14	1	23
Region 5	88	13	10	-	33
Region 6	59	12	3	-	15
Region 7	52	2	3	-	16
Region 8	45	-	-	3	12
Region 9	6	3	-	-	3
Region 10	16	-	-	-	35
Totals[1 & 2]	825	78	78	15	235

[1] Counts for total on email distribution list.
[2] Counts are for those participating since 2020 (post COVID).

Notes:

1) Counts for total on email distribution list[1 & 2].
2) Counts are for those participating since 2020 (post COVID).





9. Problems and Concerns

Member Planet

There is cost associate with not have a management system for membership and registrations. This is costing Switchgear Standards Committee financially. Lack of a common method for managing membership and attendance records creates issues providing best practices and reporting and recording by various group officers.

Entity PARs and WGs

The organizational structure and engagement of various staff and volunteers have improved the Entity WG activities. Compliments go to:

- The Switchgear Committee representation on the PES Tech Council EPM
- The Switchgear Committee External Project Approval Group (EPAG) and processes
- Engagement by Switchgear Committee officers
- Support by IEEE-SA Program Manager (in US)
- Engagement by the IEEE-SA staff in China.

Switchgear Officers continue to mentor and support the Entity WGs officers with their activities such as announcing meetings, providing agendas, holding meetings, providing appropriate minutes, making progress, following Roberts Rules of Order, and working to uphold appropriate and minimum expectations while being respectful and allowing them the opportunity to work through the task associated with developing quality standards.

Actions taken to date primarily have been:

- The Switchgear Committee Chair has edited agendas and minutes with the WG officers' approval. The quality of subsequent agendas and minutes have improved.

- The Switchgear Committee Chair has provided mentoring of the WG officers.
- The IEEE-SA staff (US PM and China staff contact) has provided on-the-job and best practice type training and support for various task.
- The on-going issues have been communicated to PES Tech Council.

Ongoing plans include continued diligence with support from IEEE PES Localized Technical Activities Committee (LTAC).

Security
To address a potential concern, obtained, reviewed and trained Officers concerning IEEE Emergency Response Plan. Additionally, basic security briefing is included in Monday breakfast orientation for attendees.

10. Significant Plans for the Next Period

The Switchgear Committee has the following significant plans for 2025.

- Continue of a dedicated half-day of technical sessions will be offered during Fall conferences. This half-day of technical sessions provides a diversification of activities offered during the Switchgear Committee conferences.

- Continue to have registration and booking links and preliminary schedule published before adjournment of the preceding conference. Providing conference details during the preceding conference has been found to be an effective and powerful motivator for generating attendance at the upcoming in-person conference. The "Book Now" availability for the next conference, including conference details to justify the opportunities for participation, has been well received by volunteers.

Submitted by:
Date: