

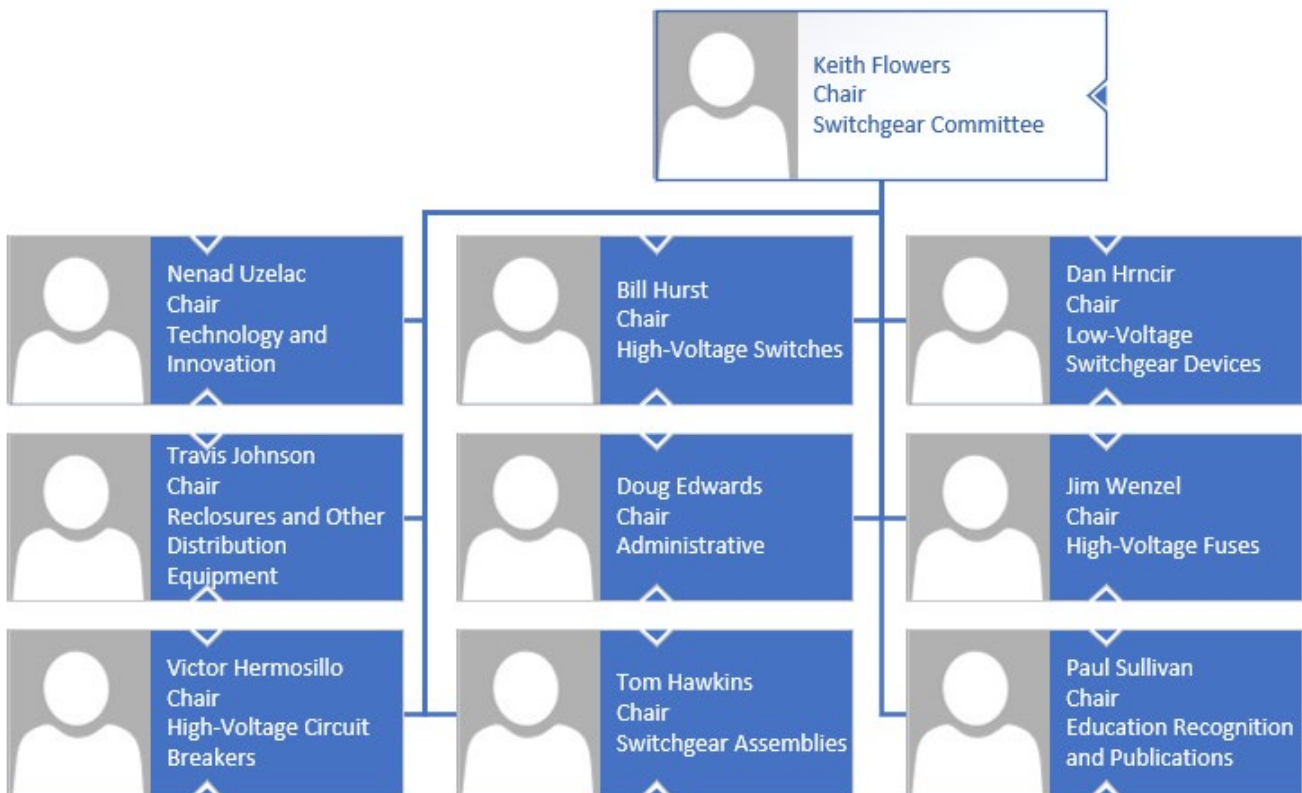
IEEE Power and Energy Society Entity Annual Report 2021

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

1. Significant Accomplishments:

Organization

The Switchgear Committee is organized into seven technical subcommittees (High-Voltage Circuit Breakers, High-Voltage Fuses, High-Voltage Switches, Low-Voltage Switchgear Devices, Reclosers and Other Distribution Equipment, Switchgear Assemblies, and Technology & Innovation (T&I).



Additionally, the Switchgear Committee has an Administrative subcommittee that oversees all sponsored standards activities, as well as direct oversight of standards activities which either 1) cross boundaries between Switchgear Committee subcommittees, or 2) are co-sponsored documents between the Switchgear Committee and another standards development body. For example, the Switchgear Committee is co-sponsoring standards being developed within IEEE PES Substations Committee, IEEE PES Transformers Committee, and IEEE Industrial Applications Society (IAS).



Collectively, the Switchgear Committee have approximately 40 active working groups or task forces preliminary to formation of working group. The Switchgear Committee sponsors approximately 90 active standards and has approximately ten new standards in development. The list of active working groups fluctuates, with working groups disbanded as their projects are completed, and with new working groups forming on a continuing basis.

Furthermore, the Switchgear Committee's Education, Recognition, and Publication Subcommittee (ER&P) oversees:

- Educational and developmental programs
- Working group officer mentoring programs
- Technical program activities within Switchgear Committee meetings and other venues such as the IEEE PES General Meeting
- Technical paper reviews
- Fellows nominations
- Award nominations
- Marketing opportunities

At the end of 2021, the Switchgear Committee officers reached the endpoint of their 2-year term (2020 – 2021) according to normal practice. However, due to extenuating circumstances the Committee desires to extend the terms of the current set of officers, as permitted by the Committee's Policies and Procedures Manual. Selection of an incoming Secretary/Treasurer has taken place, and cross-training and mitigation of the circumstances which resulted in the extension are underway. The officer rotation to take place January 1, 2023.

All officer and liaison updates were provided to Technical Council Secretary as changes occurred throughout the year.

The Switchgear Committee "Policies and Procedures for Standards Development" manual (2018) and "Organization and Procedures" manual (2019) and "Working Group Policies and Procedures (Individual Method)" manual (2019) are up-to-date and approved. Committee officers have provided training sessions for members and guests. In December 2020, the Switchgear Committee drafted a "Working Group Policies and Procedures (Entity Method)" manual, which was balloted and approved within the Switchgear Committee in 2021, and subsequently approved by IEEE SA AudCom.

In 2020, the Technical Council formed the Entity Proposal Management Committee (EPM) to address disposition of external projects that might cross paths with PES Standards Committees. This group formed and initiated meetings in 2021. Keith Flowers, Switchgear Committee Chair, was appointed to

represent the Switchgear Committee and Substations Committee within EPM. His term will extend for six years.

123Signup has been the Association Management System (AMS) utilized by the Switchgear Committee for over a decade. However, 123Signup was discontinued by its parent company, EZ-Facility, in 2021. Technical Council formed an ad hoc to recommend a replacement AMS for use by the PES Technical Committees. Three Switchgear Committee members served on this ad hoc in 2021: Keith Flowers (Switchgear Committee Chair), Doug Edwards (Switchgear Committee Vice-Chair), and Jeremy Hensberger (Switchgear Committee Registrar). Ultimately a tool from Member Planet was recommended by the ad hoc and is slated for introduction in early 2022.

To address discrepancies in content and presentation of content in Operations and Procedures Manuals (O&P Manuals), Tech Council also formed an ad hoc to create a template for baseline Technical Committee Operations and Procedures Manuals to be utilized in creation of future O&P revisions. The result was two baseline O&P templates – one for committees that perform standards work, and one for non-standards generating committees. Doug Edwards, Switchgear Committee Vice-Chair participated in this activity.

Standards Activities

The Switchgear Committee executed a successful plan to get all its standards revised in advance of the 2018 deadline imposed by IEEE Standards Association, in the transition from 5-year maintenance cycles to 10-year maintenance cycles. With a majority of its standards required to complete the next ballot cycle / revisions in the 2026 – 2028 time frame, the Switchgear Committee Officers and Subcommittee Chairs have worked to develop a plan to space the document ballot cycles apart. This has resulted in a lot of new revision work starting in 2021 (eleven new pars in 2021). The Switchgear Committee has 32 active PARs.

As a result of the PES Technical Council EPM, ten entity PARs were referred to the Switchgear Committee for consideration. This equates to approximately 15% of the PARs reviewed by the EPM. Of the ten projects that were assigned to the Switchgear Committee:

- Three projects were determined to be within the scope of the committee, and the Switchgear Committee assumed oversight of the PARs.
- Two projects were determined to be outside of the scope of the Switchgear Committee, and subsequently assigned to other PES technical committees.
- The remaining five are in deliberation, albeit with likely assignment to the Switchgear Committee.

In 2021, six (6) standards, guides, or recommended practices updated or created by the Switchgear Committee, or co-sponsored by the Switchgear Committee were approved by the Standards Board. The approved documents and the subcommittee responsible for the document revisions are shown below.

- IEEE/IEC 62271-37-013
IEEE/IEC International Standard for High-voltage switchgear and controlgear--Part 37-013: Alternating current generator circuit-breakers
- IEEE C37.04-2018/Corrigendum 1
IEEE Standard for Ratings and Requirements for AC High-Voltage Circuit Breakers with Rated Maximum Voltage Above 1000 V - Corrigendum 1
- IEEE C37.09-2018/Corrigendum 1
IEEE Standard Test Procedure for AC High-Voltage Circuit Breakers with Rated Maximum Voltage Above 1000 V - Corrigendum 1
- IEEE C37.016-2018/Corrigendum 1
IEEE Standard for AC High Voltage Circuit Switchers Rated 15.5 kV through 245 kV - Corrigendum 1
- IEEE C37.20.7-2017/Corrigendum 1
IEEE Guide for Testing Switchgear Rated up to 52 kV for Internal Arcing Faults— Corrigendum 1
- IEEE C37.66
IEEE Standard Requirements for Capacitor Switches for AC Systems (1 kV to 38 kV)

The Switchgear Committee actively works to harmonize requirements in various standards with the requirements of the relevant IEC standards. At present, requirements for high-voltage circuit breakers are fundamentally harmonized although not interchangeable with IEC. Requirements for other portions of the Switchgear Committee standards are harmonized with IEC to varying degrees, determined primarily by differences in the user practices between the IEC and ANSI/IEEE markets.

Some of our members are significant contributors to the IEEE Standards Association governance process. Ted Burse and Doug Edwards were members of the 2021 IEEE SA Standards Board.

- Doug Edwards (Switchgear Committee Vice-Chair) was a member of IEEE SA Standards Board, NesCom, and ProCom. Doug will continue as a member of Standards Board in 2022.
- Ted Burse (Switchgear Committee Past-Chair) was a member of IEEE SA RevCom. Ted will continue as a member of Standards Board, RevCom, and ProCom in 2022.
- Beginning in 2021, Todd Irwin (Switchgear Committee Past-Chair) took over from Ted Burse the PES SCC Chair role.

- Also beginning in 2021, Keith Flowers (Switchgear Committee Chair) took on the role as Corresponding Member at Large for the Technical Activities Board Committee on Standards.

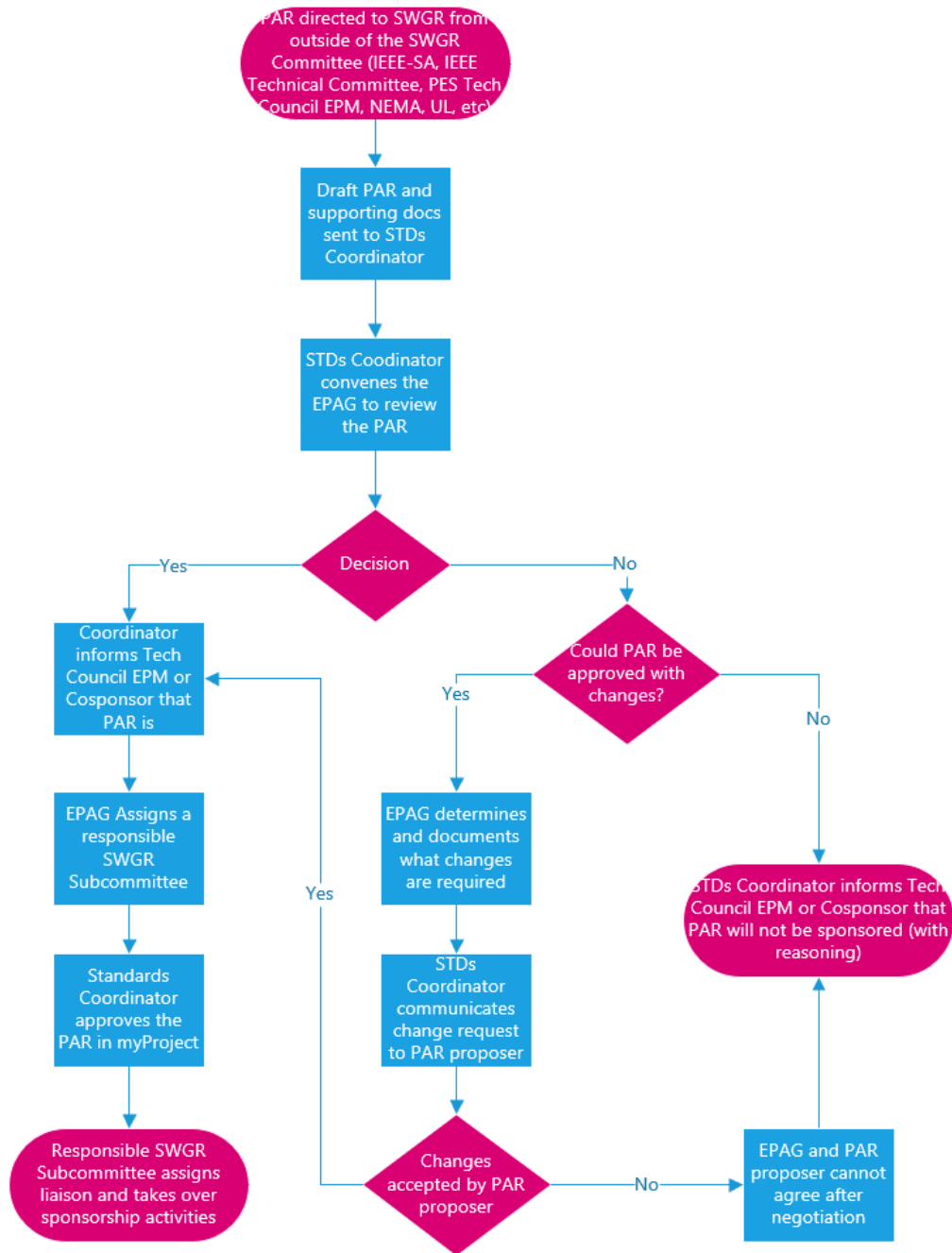
External Project Approval Group (EPAG)

The influx of reviews of external projects exposed some weaknesses in Switchgear Committee processes regarding processing projects within the Switchgear Committee, however arising from outside of the Switchgear Committee. As a result, the Switchgear Committee developed and implemented a new process to deal expedite reviews and provide more real time communication to the proposers. This new process resulted in the formation of the Switchgear Committee External Project Approval Group (EPAG).

EPAG was formed as a group under the Administrative Subcommittee, and is comprised of the following members:

- The Standards Coordinator serves as Chair of EPAG.
- The Subcommittee Chairs (or their proxy) serve as additional 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. Decisions arrived at by the EPAG are communicated back to PES Tech Council EPM or the submitter (as appropriate).



EPAG Process Overview 1

Financial

The Switchgear Committee plans and executes their own meetings with support from IEEE Meetings, Conferences, and Events (MCE) team for hotel contract negotiation. Revenue comes from registration fees charges attendees and from support from corporations. Expenses are those related to meetings (catering, audio/visual, social events, and similar).

Due to the continuing COVID-19 pandemic, the Spring 2021 and Fall 2021 meetings were converted from in-person meetings to online meetings. With the assistance of IEEE MCE, the Switchgear Committee was able to cancel all of the associated contracts with no financial penalties assessed to the Committee. Due to the lack of financial obligations for 2021 meetings, there were no meeting fees assessed for the virtual committee meetings during 2021. Some members and guests had paid in advance for the Spring 2020 meeting. These collected fees have continued to be rolled forward to the next in-person meeting or were refunded in 2020 – as directed by the individual payees. This process was simplified by the use of 123Signup features.

The Switchgear Committee continues to maintain sound financial condition. This is a significant improvement over the Committee financial condition less than 10 years ago. The Treasurer provides monthly reports to Committee officers to report on the health of the Committee. Discrepancies in any account are quickly identified and resolved. The Committee has enough financial reserves to handle varying meeting commitments.

The Switchgear Committee offers complementary registration (waives all registration fees) for all 1) Honorary Members and 2) Student Member attendees of the Committee meetings.

IEEE Annual Audit was not required for 2021 due to the low value of financial transactions created by the absence of in-person meetings in 2021.

Meetings

The Switchgear Committee holds two (2) meetings each year, one (1) in the Spring and one (1) in the Fall. Attendance at these meetings is on an upward trend, rising from around 110 participants in 2003 to an average of 280 individuals over the past three (3) years. Over the same period, we have had an average of 35 first time attendees at each meeting. This is in part due to a strategy of expanding the number of meeting locations to encourage the attendance of local individuals who might not otherwise be able to justify the travel costs for attendance.

The Switchgear Committee meets outside the JCTM and PES General Meeting and therefore plans their own meetings. Although meetings are separate from other PES Technical Committees, the Switchgear Committee provides meeting accommodations for several outside entities during our scheduled meetings, including:

- IEC US National TAG Committee
- Short-Circuit Testing Liaison of the Nations of the Americas (STLNA)
- ANSI Accredited Standards Committee ASC C37
- Utility Users Group Meeting

The Switchgear Committee also sponsors a Women in Engineering Luncheon at each of its face-to-face meetings. Since its inception, this initiative has grown from 2 – 3 participants to approximately 15 participants.

The Switchgear Committee has several entity projects arising out of Asia, and expects increased attendance related to this activity beginning in 2022, which will further increase the diversity of the committee.

Firm arrangements are in place for the next two (2) meetings plus the Fall 2023 and Fall 2025 meetings, as shown below. In a typical environment, the following table would be complete, however because of the COVID-19 pandemic, many hotel staffers have been furloughed, and the ability to establish contracts has been significantly impaired. We see that issue being resolved as 2021 closes, and our Meeting Planning Group is actively pursuing future locations for the coming years with a goal to book through 2025 by the end of calendar 2022. The booked Fall 2025 meeting is a re-booking of the Fall 2021 meeting which was converted to virtual because of the COVID-19 “Delta” variant.

One point of note is with regard to meeting insurance. The Switchgear Committee has been able to navigate the 2020 and 2021 in-person meeting cancellations with minimal financial penalty. However, the Fall 2025 meeting was shifted from Fall 2021 and was originally booked for Fall 2020. The venue did allow the Switchgear Committee to push the meeting out one final time, however the revised contract came with a 100% cancellation fee for the 2025 meeting. Despite this increase in potential for financial penalty (100% cancellation fee), the contract actually bears minimal actual financial risk with the use of IEEE’s insurance broker.

Meeting Name	Specific Dates	Meeting Location
Spring 2022	April 10 – 14, 2022	Hilton Bonnet Creek Orlando, Florida, USA
Fall 2022	October 10 – 14, 2022	Hilton Lake Champlain Burlington, Vermont, USA
Spring 2023	TBD	TBD (in negotiation)
Fall 2023	October 8 – 12, 2023	Catamaran Resort San Diego, California, USA
Spring 2024	TBD	TBD (in negotiation)
Fall 2024	TBD	TBD (in negotiation)
Spring 2025	TBD	TBD (in negotiation)
Fall 2025	October 8 – 12, 2023	Peppermill Resort Reno, Nevada, USA

The Switchgear Committee meeting planning process continues to leverage resources from the IEEE Meetings, Conferences, and Events (MCE) organization. MCE personnel assist with the following:

- Identify potential meeting sites.
- Distribute RFQ to meeting facility/hotel properties where the Switchgear Committee wants to hold a meeting.
- Performing an initial review of all received proposals.
- Assisting with final contract negotiations with the chosen meeting facility/hotel property.
- Coordinating IEEE Legal of all Switchgear Committee contracts for meeting venues or other activities (such as social events held outside of the meeting venues).

The Switchgear Committee does not utilize the IEEE MCE meeting planning / host. Instead, the Switchgear Committee has established a standing position of “Meeting Planner” to coordinate with the hotel after the contract is signed to manage the sleeping rooms, meeting rooms, menus, and audio-visual needs. The meeting planner role has enabled the switchgear committee to better manage meeting expenses and is a major contributor to the overall financial health of the Switchgear Committee.

The Switchgear Committee has been evaluating the possibility for hosting hybrid meetings (in-person and virtual components) moving forward. However, the Committee has not determined an economical means of executing this type of meeting and will proceed with either “all in-person” or “all virtual” meetings moving forward. The primary drivers for this decision making are:

There are operational concerns.

- In order for fairness, does everyone have to be dialed into the virtual meeting in order to make sure everyone gets a fair shake at participating?
- Are we able to effectively accomplish our business online?
- Are we engaging, keeping engaged, and providing benefit to our attendees and the engineering standards community?
- Experience with other technical committees that participation has waned over time with increased virtual components. The Switchgear Committee has been growing in numbers and participation, and we want to be careful that we are not sacrificing our long-term future for some short-term boosts in registration numbers.

Financial model overhaul required to ensure long-term viability.

- Impact to registration fees – allocation of in-person costs and virtual attendee costs.
- Meeting hotel room-night commitments, and associated penalties.
- Meeting hotel food-and-beverage commitments, and associated penalties.
- Significant internet bandwidth issues at meeting venues.
- Substantial incremental audio-visual equipment (and equipment operator) costs associated with supporting the virtual attendees.

Website

The Switchgear Committee website continues to be updated to a more interesting format and included access to minutes of past meetings (from 1990 to date) and many technical presentations. A template was created that the Switchgear Committee Subcommittees use to submit updated information. The template is used by the webmaster for update of the Subcommittee website.

The Switchgear Committee website is still hosted on a legacy IEEE platform and has not migrated to the recently available WordPress option. If Tech Council standardizes on new website templates it may

prove beneficial to migrate to WordPress, however given the current situation, the migration has been deemed an unnecessary burden on the Committee Webmaster and is unplanned.

iMeet Central (formerly Central Desktop)

Switchgear Committee officers use iMeet Central to store important Committee related documents including items such as meeting contracts, meeting planning information, and Committee procedures. Using iMeet Central to store this information ensures each officer has access to the documents that officer may need. This reduces the need to contact other officers and request specific information, and facilitates information sharing during officer rotation.

The officers have found that using iMeet Central is an excellent tool and highly recommends other Technical Council Committees also considering using it.

iMeet Central is being used by a few Working Groups and training is planned for Spring 2022 to promote use by Working Groups.

Virtual Meeting Tools

The COVID-19 pandemic led to the cancelling of all 2020 – 2021 face-to-face meetings, however the Switchgear Committee has taken advantage of the virtual meeting services offered by IEEE SA and Tech Council.

- Switchgear Committee has been utilizing a hybrid of 1) the Tech Council Webex accounts and 2) member Webex and Microsoft Teams accounts for all non-standards related meetings.
- Switchgear Committee has been utilizing a hybrid of 1) the IEEE SA Webex accounts and 2) member Webex and Microsoft Teams accounts for all standards related meetings.

The Switchgear Committee has been grateful for the abundance of virtual meeting resources that have been made available to the Committee, including the extremely helpful Webex tutorials and informational sheets provided by IEEE SA.

The Switchgear Committee Spring 2021 and Fall 2021 virtual meetings were self-organized and operated, with meeting schedules secured behind firewalls – restricting access to only registered attendees.

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

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

- 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.
- 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.
- Users, producers, testing firms, and third-party certification bodies benefit from having relatively stable standards for products, as revisions of standards are generally made except at intervals of seven to ten years.
- 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 accommodate newer technologies.

Switchgear Committee members spoke at IEEE local chapter meetings discussing Switchgear Committee work in Arizona, Missouri, Pennsylvania, South Carolina, and Texas. These opportunities brought awareness to industry issues, facilitated discussions, and encouraging involvement in IEEE.

3. Benefits to Volunteer Participants from the Committee Work:

Participation in standards activities provides a solid basis for education of new participants, while providing a forum to capture the knowledge of experienced participants.

First and foremost, the Switchgear Committee Officers would like to recognize that the Committee has participation by a significant number of persons who have formally retired from the business world, yet continue to participate, in several cases without financial support from their former employer or some other firm. It is reasonable to surmise that such individuals would not do so except that participation provides them some measure of satisfaction, however 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, and particularly if they participate in some officer capacity in working groups or in the committee structure.

The Switchgear Committee provides recognition to working group members and committee officers, typically with a plaque when standards are published. The participants are also recognized in the front matter of the document.

The Committee hosts a minimum of two educational seminars/tutorials (free-of-charge) during the course of each of its Spring and Fall meetings. However, due to the COVID-19 pandemic, the Committee chose to forego these seminars for 2021. This provides meeting participants with free training on current topics.

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

With a new program that started in Fall 2019, the Switchgear Committee started issuing professional development hours (PDHs) through the IEEE Certificate Program (<https://www.ieee.org/education/certificates/offering.html>). 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.

- For the Spring 2021 meeting, 24 individuals (approximately 10% of the attendees) were accredited with for a combined 299.25 professional development hours.
- For the Fall 2021 meeting, 42 individuals (approximately 15% of the attendees) were accredited with for a combined 582.75 professional development hours.

The Switchgear Committee recommends that the promotion of such benefits to potential participants, particularly 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:

Education, Recognition, and Publication (ER&P) Subcommittee oversees all the activities related to nominations, recognitions, awards, prizes, and certificates of appreciation for exceptional individuals and groups. Annually ER&P considers nominations for the following awards:

- PES Prize Paper award
- PES Outstanding WG award
- PES Award for outstanding Standard or Guide
- TC award for prize paper
- TC award for outstanding service to the Committee
- TC award for outstanding Working Group.

The Switchgear Committee was honored to recognize Dave Gohil (long-time member) this year as IEEE Life Senior Member. This brings the Switchgear Committee member count as “Senior Life Member” (or greater) to six:

- Roy Alexander, Fellow Life Member
 - Former Switchgear Committee Chair
 - Honorary Member
 - Current Working Group Chair
- Pat Delilo, Senior Life Member
- Denis Dufournet, Fellow Life Member
- Dave Gohil, Senior Life Member
- Ted Olsen, Senior Life Member
 - Former Switchgear Committee Chair
 - Honorary Member
- Dean Sigmon, Senior Life Member
 - Former Switchgear Committee Chair
 - Former Standards Coordinator
 - Honorary Member



In 2021, Ted Burse, Committee Past-Chair, won the IEEE Standards Association Standards Board Distinguished Service Award.

In addition, all outgoing officers, including subcommittee chairs, are presented with certificates of appreciation. The ER&P Officers agreed to delay all award presentations until calendar 2022, where we expect to be resuming face-to-face meetings in April. At that point, the Switchgear Committee will host an awards luncheon to recognize these individuals.

ER&P stimulates and encourages nominations for Senior Membership of IEEE and IEEE Fellows. Our continuous push to encourage Committee members to become Senior Members has resulted in numerous people receiving that accomplishment. Numerous Switchgear Committee people were elevated to Senior Member in 2021. Senior Members are recognized through special ribbons on name badges worn during the Committee face to face meetings. ER&P continues to work to nominate appropriate Switchgear Committee attendees for IEEE Fellow. An IEEE Fellows nominating group was created to identify potential fellows from our membership and to support the process for nomination. Two individuals were nominated for Fellow in 2021.

ER&P oversees the paper review process for all papers that relate to Switchgear Committee technical areas, whether for conferences such as the IEEE PES T&D, the PES General Meeting, for Transactions, or other publications.

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

Historically, the Switchgear Committee has invested heavily in collaboration with other entities. Year 2021 was no exception to that model.

ANSI ASC C37

NEMA holds the secretariat position with a number of ANSI certified industry standards relating to the design testing and conformance testing of switchgear and switchgear devices. These standards are sponsored by Accredited Standards Committee (ASC) C37. Currently there are 13 Switchgear Committee delegates to ASC C37, providing strong member representation and coordination/cooperation with this technical committee.

CIGRE

Switchgear Committee keeps a close liaison with CIGRE Study Committee A3 (High Voltage Equipment). Many of the Switchgear Committee members are active in A3, however, Nenad Uzelac (Technology and Innovation Chair) is an official US Representative to CIGRE SC A3 and was elevated to convener in 2018, as well as the liaison between IEEE Switchgear Committee and CIGRE A3.

EUSERC and NEMA

Utility metering compartments vary from region-to-region. Electric Utility Service Equipment Requirements Committee (EUSERC), National Electrical Manufacturers Association (NEMA), and the Switchgear Committee have partnered to form a PAR Study Group investigating the feasibility of developing a common set of requirements for utility metering compartments.

IEEE Industrial Application Society (IAS)

The Switchgear Committee has historically had much unofficial involvement within the IEEE Industrial Application Society – in particular the annual Electrical Safety Workshop and annual Petroleum and Chemical Industry Committee (PCIC) conference. The Switchgear Committee and IAS further built upon this relationship in 2020 with an agreement to co-sponsor:

- IEEE Std 2969: Guide for Continuous Thermal Monitoring of Switchgear and Motor Control Centers up to 52kV

Work on this document started in early 2021, with numerous teleconferences of the working group and its subgroups (task forces) and one in-person meeting held in 2021.

IEEE High-Voltage Test Techniques (HVTT)

A PAR has been submitted for a revision to IEEE Std C37.301, Partial Discharge Measurements. A working group has been formed, and the Committee has received considerable support and participation from HVTT – including occupying the Secretary role of the working group.

IEEE PES Substations Committee

The following standards are co-sponsored between the Switchgear Committee and the Substations Committee:

- IEEE Std C37.100.7: Guide for the Performance Characteristics of Alternative Gases
- IEEE Std C37.122: IEEE Standard for High Voltage Gas-Insulated Substations Rated Above 52 kV
- IEEE Std C37.122.2 IEEE Guide for the Application of Gas-Insulated Substations 1 kV to 52 kV
- IEEE Std C37.122.3 IEEE Guide for Sulphur Hexafluoride (SF₆) Gas Handling for High-Voltage (over 1000Vac) Equipment
- IEEE Std C37.20.9, Metal Enclosed Switchgear Rated 1kV to 52 kV Incorporating Gas Insulation Systems

- P2829 Guide for Handling Non-Sulphur Hexafluoride (SF₆) Gas Mixtures for High Voltage Equipment
- IEEE Std C37.017 IEEE Standard for Bushings for High-Voltage [over 1000 V (ac)] Circuit Breakers and Gas-Insulated Switchgear

IEEE PES Transformers Committee

The following standards are co-sponsored between the Switchgear Committee and the Transformers Committee:

- IEEE Std C57.12.30 Standard for Pole-Mounted Equipment--Enclosure Integrity for Coastal Environments
- IEEE Std C57.12.31 Standard for Pole-Mounted Equipment – Enclosure Integrity
- IEEE Std C57.142 Guide to Describe the Occurrence and Mitigation of Switching Transients Induced by Transformers, Switching Device, and System Interaction

IEEE SCC 14 Quantities, Units and Letter Symbols

The Switchgear Committee recognizes the benefits on standardization of units and systems of measurement. To that end, four (4) Switchgear Committee members are active members of SCC 14, with two having been elevated to Chair and Vice-Chair of SCC 14, and Working Group Chair/Secretary of three (3) associated standards (IEEE Std 280, IEEE Std 945 and IEEE Std 1541).

IEEE SCC 21

The Switchgear Committee has also actively monitored IEEE 1547 and IEEE 1547.1 for influence on switchgear standards. Many of the voltage regulation issues noted by the ANSI ASC C84 Committee originated with the IEEE Std 1547 and the IEEE Std 1547.x series. Several joint discussion group meetings have occurred, and the IEEE SCC 21 and Switchgear Committee leadership are working towards forming a joint task force to review and recommend solutions for mitigating the overvoltage concerns.

IEC

The Switchgear Committee hosts working sessions of the IEC U.S. National Technical Advisory Group (TAG), with a number of Switchgear Committee members serving as active liaisons to IEC.

Additionally, a number of projects and standards are in process or published that are joint efforts with the IEC. Among these are:

- IEC 62271-111 / IEEE C37.60, dual logo IEEE/IEC, High-voltage switchgear and controlgear – Part 111: Overhead, pad-mounted, dry vault, and submersible automatic circuit reclosers and fault interrupters for alternating current systems up to 38 kV. (revision in process)
- IEC 62271-37-082, dual logo, IEEE/IEC, High-voltage switchgear and controlgear - Part 37-082: Measurement of sound pressure levels on alternating current circuit-breakers.

The Switchgear Committee in 2020 invited IEC SC 17C to participate in the upcoming revision of IEEE Std C37.23, Metal-Enclosed Bus.

NEMA

The working group for IEEE Std C37.13, IEEE Standard for Low-Voltage AC Power Circuit Breakers Used in Enclosures has obtained approval from NEMA 8SG (NEMA Switchgear Section) to migrate the low-voltage power circuit breaker design test requirements from NEMA C37.50 into IEEE Std C37.13. This will provide significant benefit to the industry as the construction, markings, preferred ratings, and test protocols will be contained in a singular standard. When completed this will align these key documents for low-voltage power circuit breakers and eliminate confusion in the industry. Also, this will improve clarity of requirements as the IEEE C37.13 Working Group is also adding requirements for definite purpose power circuit breakers – tailoring requirements to meet the widely varied needs of renewable energy applications.

STLNA

In conjunction with the Switchgear Committee Meetings, the Committee hosts a meeting of Short-Circuit Testing Liaison of the Nations of the Americas (STLNA). The STLNA takes advantage of this gathering of technical experts to discuss testing techniques, procedures, and other challenges that laboratories face in testing and certification of switchgear and switchgear devices. Many STLNA members are active Switchgear Committee participants as well, and further enhances the synergies and alignment between these two entities.

6. New Technologies of Interest to the Committee:

The committee has several projects or 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 a number of 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. Both PARs were approved by IEEE SA in 2020, with significant work accomplished in 2021.

Active Arc-flash Mitigation Systems

When IEEE Std C37.20.7 was introduced, the scope was limited to medium-voltage arc-resistant switchgear. The subsequent revisions added low-voltage switchgear, low-voltage switchboards, low-voltage motor control, medium-voltage motor control, metal-enclosed bus, gas-insulated switchgear, and high-voltage outdoor circuit breakers. The associated ratings and test procedures were accounting for providing passive arc-flash mitigation techniques. The Switchgear Committee has taken on a project to take the next step, and working towards adding ratings and test protocols to cover active arc-flash mitigation techniques. Active arc-flash mitigation devices have become more prevalent in safety systems. This standard will provide means of evaluating and communicating the performance expectations of utilizing such devices.

Thermal Monitoring of Switchgear

Current thermal monitoring inspection practices tend to center around the 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 shifts from labor intensive maintenance practices to safer, more efficient, less costly data collection with options for automated data collection is being well received.

Sulfur Hexafluoride (SF₆) Alternatives

A new working group was established to develop a Guide for the evaluation of performance characteristics of non-Sulfur Hexafluoride insulation and arc quenching media for switchgear rated above 1000 V. The purpose of this guide is to consider the entire spectrum of circuit breakers and gas-insulated switchgear performance characteristics relative to SF₆ 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 SF₆ alternatives
- B3.45 application of SF₆ alternatives
- A3.41 switching and interrupting performance

Solid Dielectrics

The Solid Dielectric Task Force (SDTF) is exploring materials, application and 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., such as for an outdoor distribution recloser. The task force anticipates issuing their final report in the near future.

Distributed Energy Resources (DERs)

During the last two decades there have been significant technological advancements and increasing installations of distributed energy resources (DERs), on the power grid. The impact of these developments on the grid has so far been outside the purview of medium-voltage (MV) and high-voltage (HV) utilities until recently where switchgear is now being deployed in new applications that include DERs, e.g. microgrids. It is however unclear whether existing switchgear standards adequately account for such applications. A particular issue is the occurrence of $\geq 200\%$ 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. Such a scenario is allowed under IEEE Std 1547, however switchgear standards do not specifically account for it. Recommendations for standardized testing practices should also be developed for such applications.

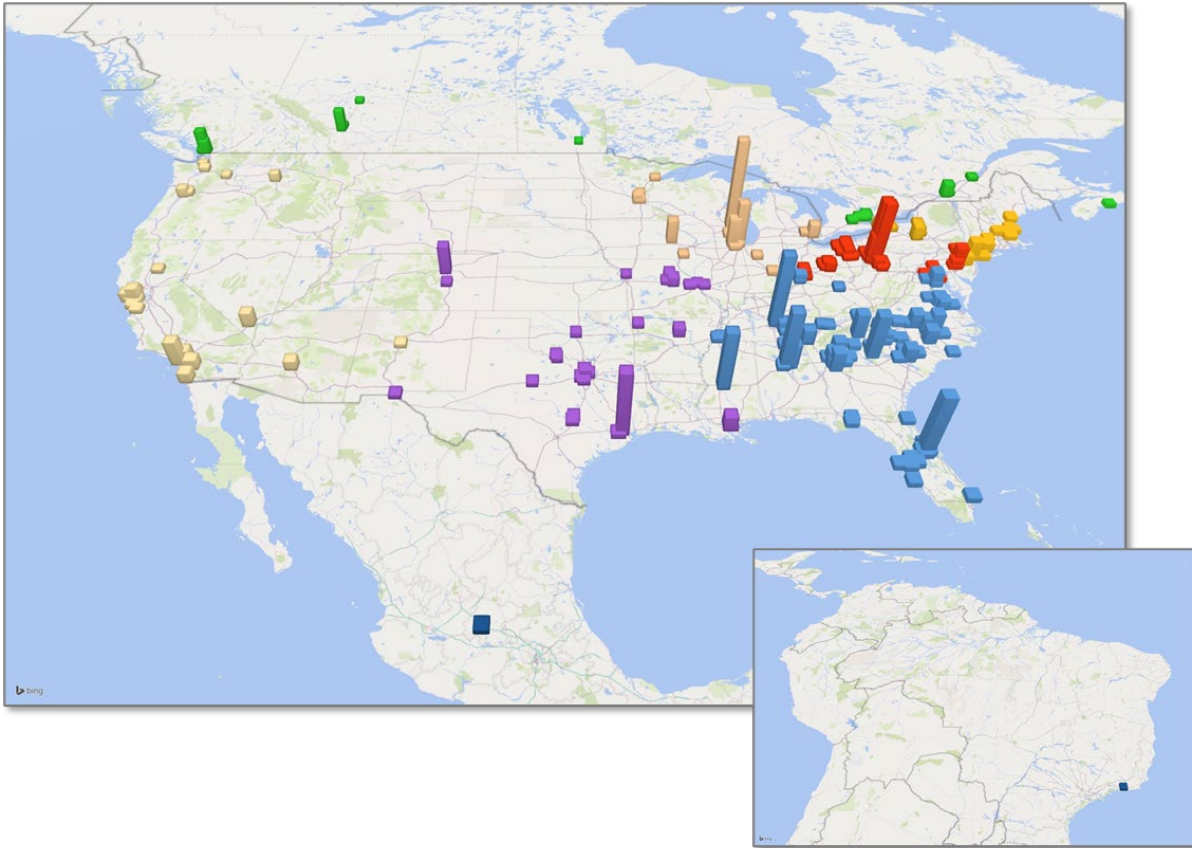
Aging of Electrical Equipment

Two actions are ongoing in the area of dealing with aged electrical equipment:

- A task force has been formed to evaluate the effects of aging of lubricants. The goal is to determine evaluation methods that can be used in maintenance practice to best maintain or extend the life of circuit breakers, switches, and other switchgear devices that depend on lubricants. The goal is to roll this information into a guide or associated product standards.
- The Technology and Innovation Subcommittee is also working on a technical report on the effects of aging on electrical equipment, as a means of recommended practice for monitoring and maintaining switchgear, as to extend its life.

7. Global Involvement

<u>Total Number of committee members</u>	<u>Officers from regions 8,9 and 10</u>	<u>Subcommittee officers from regions 8, 9 and 10</u>	<u>Subcommittee members from regions 8,9, and 10</u>
103	0	0	2

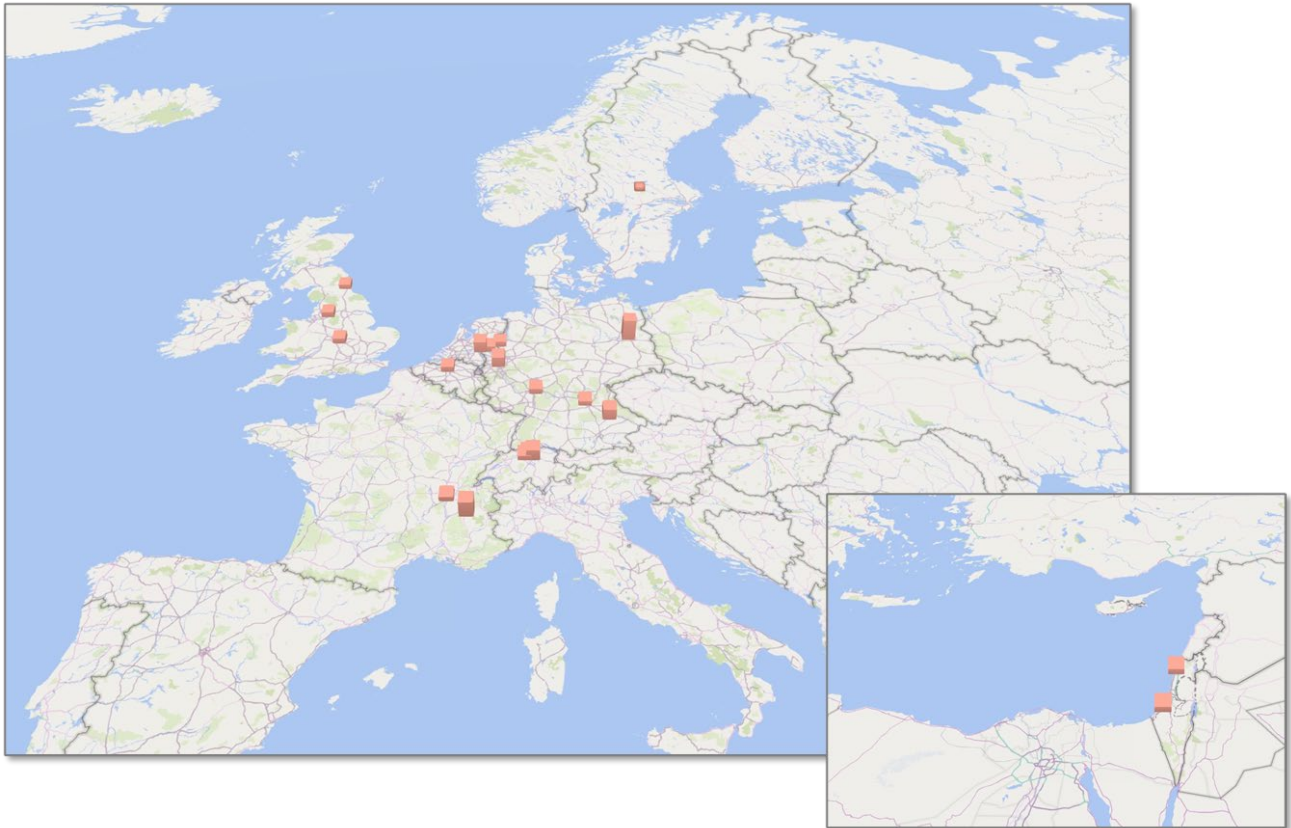


Looking closely at North American, you will notice that a strong majority of the Switchgear Committee attendees are based out of IEEE Regions 1 – 6, including all of the current Switchgear Committee Officers. As you can see in the graph:

IEEE Region	Number of Participants
Region 1	39
Region 2	92
Region 3	173
Region 4	65
Region 5	51
Region 6	43

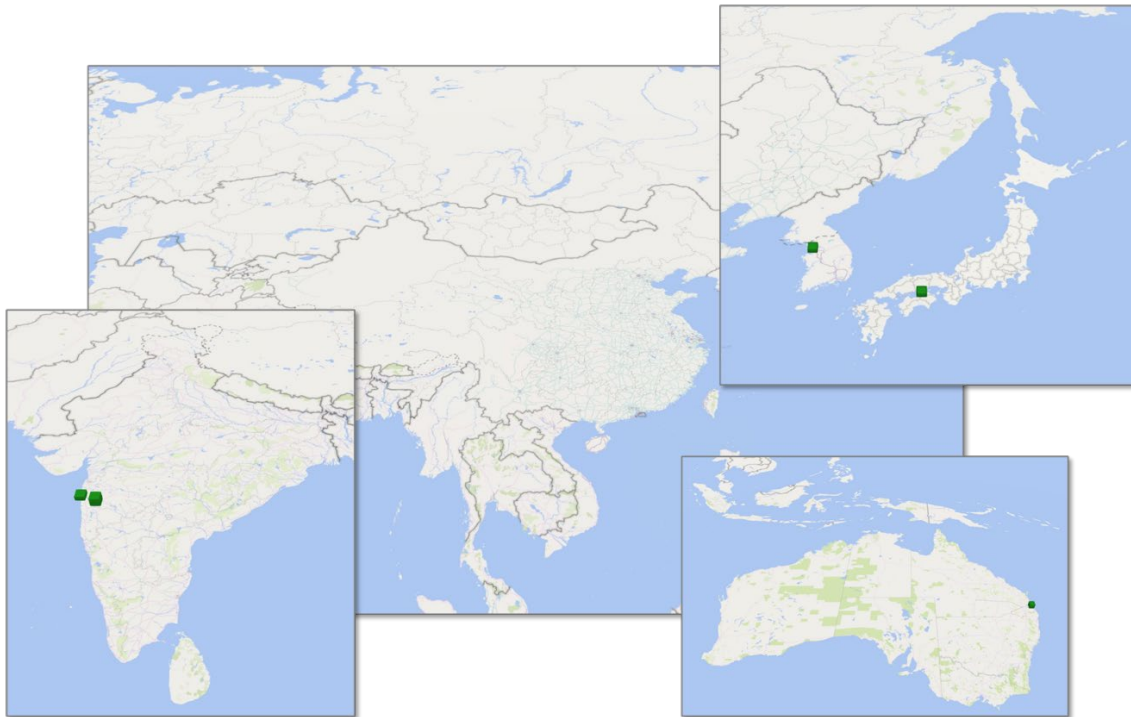
Although a significantly smaller set of representation, you will also notice that the Switchgear Committee does have participants from regions 7 and 9:

IEEE Region	Number of Participants
Region 7	29
Region 9	2



Looking at Europe and the Middle East, you will see that the Switchgear Committee has active participants in Region 8, as well:

IEEE Region	Number of Participants
Region 8	30



Looking at Asia, you will see that the Switchgear Committee has a modest number of active participants in Region 10. With the growth of entity method PARs, the Switchgear Committee expects significant growth in participation from this region.

IEEE Region	Number of Participants
Region 10	9

8. Problems and Concerns:

Members of the Switchgear Committee have continued to voice concerns about the apparent lack of openness and balanced voices with access to “entity method” PARs. While this has been a concern for a number of years, there has historically been no entity method PARs within the scope of the Switchgear Committee, and therefore no impact. However, today the Switchgear Committee is encountering a number of entity PARs either within the scope of the Switchgear Committee, or at least impacting the application of switchgear. However, leadership expects that many of these concerns will be mitigated by the application of the Switchgear Committee Entity Working Group Policies and Procedures, which includes several gating steps, as well as requirements for at least one annual Working Group meeting held in conjunction with the Switchgear Committee face-to-face meetings.

The Switchgear Committee is still closely monitoring the global response to the COVID-19 pandemic and the impact on its participants. The disease has a wide array of impact on those who are afflicted, and the responses and reactions have likewise been broad-spectrum.

The participation in the virtual meetings has been quite strong (and even attracted some new participants), but still there is noticeable need to get back to in-person work.

- When is there reasonable mass of leadership and membership available to return to in-person meetings?
- What does the rate of return of individuals to in-person meetings look like? When should we expect to return to pre-COVID-19 levels?
- The Switchgear Committee was growing rapidly pre-COVID-19. How will that growth rate alter?
- What will be the expected modifications to our traditional meeting structure, necessary to 1) meet government and health code regulations, as well as 2) meet individual expectations for safety and comfort?
- When and how should the Switchgear Committee resume non-technical (social networking) events?

All of these issues affect the meeting planning and potentially Committee finances. The Switchgear Committee has commitments into 2023, and currently working on filling out its meeting schedule through 2025. Some of the areas of impact are:

- Hotel room-night commitments
- Meeting room sizing, seating arrangements, audio-visual requirements
- Food and beverage commitments and disbursement (i.e. will buffets be legally or socially acceptable?)
- Sanitation / disinfection protocols and frequency

The Switchgear Committee has no other significant pressing issues and concerns but would like the end this section with a few notes of “thanks.”

- The relationship with IEEE SA remains excellent, and IEEE SA staff personnel continue to be extremely helpful to the Switchgear Committee. The IEEE SA staff is extremely approachable and responsive, and our Committee members are comfortable with asking for help – knowing that help and guidance is available is much appreciated.

- IEEE MCE staff has been outstanding and provided tremendous support in navigating the legal and contract issues associated with escaping the venue and vendor contracts that were in place for 2021 – and as a bonus, the Committee incurred no significant financial penalties.
- And finally, we are grateful for the oversight and support provided by Tech Council. The ability to work, communicate, and coordinate with the other technical committees and Tech Council leadership has and will continue to improve the quality and efficiency of the Switchgear Committee undertakings.

9. Significant Plans for the Next Period:

The Committee has the following significant plans for 2022:

- Restarting execution of two (2) face-to-face Committee meetings each year. A key component driving this will be selection of locations that attract meeting participation and venues that can accommodate social distancing measures as required into the future.
- Continue to maintain financial stability of the Committee, despite the anticipated increase in the cost of doing business that is expected to be an outcome of the COVID-19 pandemic.
- Work with selected subcommittees having a heavy workload of standards to be revised to assure that the workload can be handled within the available resources and time. This requires that projects need to be completed within the four-year validity of a PAR.
- Continue to market Committee meeting participation in the standards development process. Committee growth has averaged over 5% annual increase for over 10 years with attendance regularly exceeding 250 people at recent meetings.
- Transitioning from 123Signup to Member Planet as an association management system will be a significant investment in 2022.
- We are in the early stages of implementing a leadership development program. Continued development of this program is an objective of the leadership team.
- Encourage increasing participation from young engineers in the standards development process. While college recruitment and local PES chapter recruitments have reaped minimal impact, the Committee strives to look for new ways to encourage a greater spectrum of participation.

Submitted by: Keith Flowers, Chair, IEEE PES Switchgear Committee

Date: January 27, 2022