

IEEE Power and Energy Society Entity Annual Report 2023

Entity:	Substations Committee
Website:	https://cmte.ieee.org/pes-substations
Chair:	Joe Warner
Vice-Chair:	Matt Bauer
Secretary:	DJ Moreau
Immediate Past Chair:	Patrick Fitzgerald

1. Significant Accomplishments:

The Substations committee had a banner year in 2023. The committee manages thirty-seven (37) standards. Of those, thirty-four (34) remain active moving into 2024 and three (3) - IEEE 80, C37.122.6, & C.37.122.5 – will age into inactive status.

As of the end of 2023, the Substations Committee has thirty-one (31) approved Project Authorization Requests (PARs) to create and maintain its standards among thirty (30) working groups. Approximately seventy percent of active PARs are revision projects and thirty percent are new projects. The working groups have successfully brought eight (8) PARs into the balloting stage while twenty-eight (28) remain in draft development.

Looking ahead, six (6) PARs are due to expire in 2024 and one (1) PAR is due to expire in 2025.

We presented several tutorials at IEEE PES GM and at our Annual Substations Committee meeting:

- a. Eight-hour tutorial at the IEEE PES GM, 16th July 2023
Title: Dynamic Grid Stabilization with Grid-forming + Energy Storage Technologies
Joint Tutorial with HVDC & FACTS Subcommittee (T&D committee), highest level of attendance (65 persons registered) we ever had.
- b. Four-hour Panel session at the IEEE PES GM, 18th July 2023
Title: STATCOM & Enhanced STATCOM Technology
Highest Level of attendance (55 attendees) we ever had.
- c. Four-hour tutorial Physical security at the IEEE Substations Annual Meeting, May 2023
- d. Other activities in 2023
Two posters presented at IEEE PES GM, 17th July 2023
 1. SCIO – FACTS and HVDC Stations
 2. WGI7 – Reliability of HVDC Converters

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

The IEEE PES Substations Committee is the professional home for designers and engineers involved in the design, construction and operation of electrical substations used for generation, transmission, and distribution. Moreover, committee activities include development of not only industry standards, but also educational material such as technical papers, white papers, presentations, tutorials, webinars, and panel discussions related to areas of interest.

The most notable activity of the Substations Committee is standard development and maintenance. This work includes the creation and revision of standards and guides through subcommittees and working groups. These standards are widely utilized and provide the most direct benefit to the industry and PES Members.

The Substations Committee has five technical subcommittees supporting forty-four technical working groups. The technical subcommittees and their scopes are as follows:

- a. Electrical Substation Design Subcommittee (SCD0): Responsible for treatment of matters pertaining to the electrical design and construction of transmission and distribution substations. These matters include air insulated station clearances and insulation levels, cable systems, air insulated bus design, seismic design, specification development and auxiliary systems.
- b. Substation Civil Design (SCE0): Responsible for treatment of matters relating to the civil and environmental design and construction of transmission and distribution substations. These matters include community acceptance, oil spill containment, fire protection, animal deterrents and physical and Electronic Security. There is a new WG E8 who has led the Substation Physical Resilience topic in PES and beyond.
- c. Substation Grounding and Lightning (SCG0): Responsible for treatment of matters relating to grounding and lightning design of transmission and distribution substations. These matters include safety, direct lightning stroke shielding, measuring earth resistivity, ground impedance and surface potentials of a grounding system, grounding safety and permanent connections. New WG G8 has led the Arc Flash topic in PES and beyond. Over 100+ interested members/individuals. A new guide is recommended for substation applications on how to establish an arc flash program for electrical safety.
- d. FACTS & HVDC Stations (SCIO): Responsible for treatment of all matters relating to design, construction, and operation of AC substations using HV power electronics as part of the electrical power system, including FACTS and HVDC converter stations at the Transmission and Distribution level. This includes the application of HV power semi-conductor equipment and all other components insofar as they affect the design, construction, and operation of such substations. Interest in such components is limited to their effects on overall station parameters and does not include the detailed design of the equipment itself.
- e. Gas Insulated Substations (SCK0): Review, study and document design, application, installation, testing, operating and maintenance practices for gas insulated substations (GIS) and transmission lines (GIL). Identify the need for and sponsor the preparation of criteria, guides, tutorials, and standards as related to the gas insulated substations and transmission

lines.

PES member involvement in working groups and subcommittees provides invaluable industry insight and knowledge sharing for members. Most design engineers design to standards because that is what the standard says. Attending these IEEE meetings not only provides more knowledge on why the standard is written, but more importantly why they design substations the way they do. It also provides a forum to discuss alternatives that may be acceptable.

3. Benefits to Volunteer Participants from the Committee Work:

Participants have benefited from their collaboration on technical problems with industry leaders and experts, discussing contemporary industry problems and concerns, and the satisfaction of creating standards and guides that are useful to the industry. Committee meetings have included presentations of experts in specific fields and debating of ideas and industry practices, including CIGRE member input. Substations Committee members have also benefited from their exposure to technical paper reviews and technical paper presentations.

Active participants also have opportunities to take on leadership roles and improving their leadership skills as well as mentoring skills working with teams with a variety of experience in technical and organizational activities.

Substations are considered strategic assets, and many components are now reaching the end of their original design life. Valuable information is exchanged on modern design approaches and explaining new technology, as well as the issues specific to new technology and suggested improvements for the electric power industry market; for example, Voltage-Source Converters (VSC) and alternative gases for insulation.

4. Recognition of Outstanding Performance:

The following individual awards were presented at the 2023 Substations Annual meeting in Philadelphia, PA for appreciation for outstanding service:

Don Wengert	IEEE PES Substations Committee Award of Appreciation For outstanding service as the Chair of the G0 Grounding and Lighting Substation Design Subcommittee of the IEEE PES Substations Committee 2012-2022
Ryan Stone	IEEE PES Substations Committee Award of Appreciation For outstanding service as the Chair of the K0 Gas Insulated Subcommittee of the IEEE PES Substations Committee 2020-2022
Jan Paramalingam	IEEE PES Substations Committee Award of Appreciation For outstanding service as the Chair of the I0 FACTS and HVDC Stations Subcommittee of the IEEE

	PES Substations Committee 2019-2022
Patrick Fitzgerald	IEEE PES Substations Committee Award of Appreciation For outstanding service as the Chair of the IEEE PES Substations Committee 2021 –2022
Joe Warner	IEEE PES Substations Committee Award of Appreciation For outstanding service as the Vice Chair of the IEEE PES Substations Committee 2021 –2022
Matthew Bauer	IEEE PES Substations Committee Award of Appreciation For outstanding service as the Secretary of the IEEE PES Substations Committee 2021 –2022

The following IEEE PES Technical Committee Working Group Awards were also presented at the 2023 Substation Annual Meeting:

IEEE PES TECHNICAL COMMITTEE WORKING GROUP AWARD

PES-TR-107 Technical Report Publication (WG G6) - *Testing and application of crushed aggregate for use as a resistive substation surface layer*

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|---|---------------------|-------------------------|
| William (Bill) Carman –
<i>Chair</i> | Steven Greenfield | Edward Nugent |
| Ehsan Azordegan | David Guzman | Rick Nugent |
| Radoslav Barac | Martin Havelka | James Orrell |
| Dane Bar Hoover | Daniel Heider | Stephen Palmer |
| Bryan Beske | Richard Keil | Shanshikant Patel |
| Phil Bolin | Dave Kelley | Caroline Peterson |
| Dale Boling | David Laurence | Anil-Babu Prois |
| Josh Brown | Giancarlo Leone | Eduardo Ramirez Bettoni |
| Bill Chisholm | David Lewis | Christian Robles |
| David Dettenmeier | Martine-Denise Long | Donald Rogers |
| Peter Dick | Reginaldo Maniego | Vinod Simha |
| Jeffery Drummond | John Martin | Brian Smith |
| John Edlebeck | Andrew McElroy | Curtis Stidham |
| Grant Gershmel | Sakis Meliopoulos | Brian Story |
| Joseph Gravelle | Olivianlin Miller | Heather Sudduth |
| Joseph Tynan | Carl Moller | Bill Tocher |
| Keith Wallace | Don Wengerter | Xuan Wu |
| | Aaron Wilson | |



IEEE PES TECHNICAL COMMITTEE WORKING GROUP AWARD

IEEE 1378 - IEEE Guide for Commissioning Line-Commutated Converter (LCC) High-Voltage Direct-Current (HVDC) Converter Stations and Associated Transmission Systems

John Chahwan, Chair	Bryan Faulkner	Kumara Mudunkotuwa
Geza Joos, Vice Chair	Daniel Hill	Jan Paramalingam
Julie Lacroix, Secretary	Anthony Ho	Leslie Recksiedler
Ram Adapa	Christopher Horwill	Mark Reynolds
Andrew Bailey	Neil Kirby	Andrew Steffen
Martin Cameron	David Langner	Humayun Tariq
Frida Ceja-Gomez	Wei Li	Bin Wang
Pierre-Andre Chiasson	Thomas Magg	Joseph Warner
Daljit Dev	Tapan Manna	
	Ben Mehraban	

IEEE PES TECHNICAL COMMITTEE WORKING GROUP AWARD

IEEE 1264 - IEEE Guide for Animal Mitigation for Electric Power Supply Substations

John Randolph, Chair	Alan Gaetz	Steve McCarley
Ryan Escure, Vice Chair	Michael Gallion	Marty Niles
Michael Anderson	Liangjian Gao	Shashi Patel
Gregory Ardrey	Arthur Graves	James Rauckman
Darren Barnett	Ryan Grof	Nicole Rodriguez
Matthew Bauer	Terri Hopkins	Kha Tran
Chris Carson	Kamran Khan	Steve Zaccarelli
Justin Coffey	Reginaldo Maniego	
Bruce Dietzman	Kaolyn Manino	

IEEE PES TECHNICAL COMMITTEE WORKING GROUP AWARD

IEEE C37.122- IEEE Standard for High-Voltage Gas-Insulated Substations Rated Above 52 kV

Ryan Stone, Chair	Cullen Gabler	Pathik Patel
Arnaud Ficheux, Vice Chair	David Giegel	Bobby Rich
Jennings Graham, Secretary	Pablo Gonzalez Touza	Jesse Rorabaugh
George Becker	Peter Grossman	Pravakar Samanta
Eldridge Byron	Alexandra Jaeger	Steven (Scott) Scharf
Vincent Chiodo	SangTae (Brandon) Kim	Tyler Schumacher
Edward Crocket	Hermann Koch	Devki Sharma
Markus Etter	Charlie Li	James Stage
Patrick Fitzgerald	Nicholas Matone	Carl Schuetz
	Jeremy McNutt	Xi Zhu
	Michael Novev	

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

The PES Substations Committee has determined that it is desirable to establish formal and direct liaisons with other IEEE Societies or groups, or other bodies, for the purpose of maintaining an efficient exchange of information on activities and related areas of mutual interest. This information exchange is accomplished through liaison representatives, appointed by the Substations Committee with the agreement and approval of the other group with which the liaison is to be established. The liaison representative will provide reports to the Substations Committee on activities of the other group, based on personal participation in these activities if possible. Depending on the preference of the other group, the liaison representative may also report to them on Substations Committee activities. Active Substation liaisons include:

- a. CIGRE B3
- b. NESC
- c. IEC TC 17 High Voltage Switchgear
- d. Switchgear Committee

The Substations Committee has been participating in IEEE PES Roadmap development. Additionally, the Substation Committee works on fifteen (15) co-standards shared with other IEEE PES Technical Committees. Committees include Switchgear, Power System Communications and Cybersecurity, Transformers, Power System Relaying and Control, and Transmission and Distribution.

6. New Technologies of Interest to the Committee:

- Performance testing of grounding grids, especially CIT current injection testing (for touch and step voltage, transfer voltage, GPR, etc.).
- Arc flash relaying technologies, protection schemes, applications.
- New techniques to develop minimum approach distance MAD calculations for substations.
- Copper theft deterrent hardware, alarm/monitoring systems.
- Software that can address integration of grounding testing and grounding modelling.

7. Global Involvement & YP Involvement

The Substations Committee has a program to help support young professionals and experienced contributors with a scholarship program that will allow members from these groups to get financial assistance for meeting registration and hotel accommodations to attend working group meetings.

Due to the loss of our Membership Management System and the ongoing delays with implementing a new system. Updated membership numbers and details are not accessible for 2022. The numbers below represent our 2021 numbers which should be a good representation of 2023.

Total Number of committee members	Number of Young Professionals (under 35 years of age) – Including committee & subcommittee	Officers from regions 8,9 and 10	Subcommittee officers from regions 8, 9 and 10	Subcommittee members from regions 8,9, and 10
569	Unknown	0	6	50

8. Problems and Concerns:

Committee membership management, working group roster management, and participant communication has been a significant challenge in 2023 without a Membership Management System.

MEC review durations are taking upwards of 3-4 months. MEC/Legal reviews are becoming challenging when they require WGs to provide copyright on figures/tables of standards that have been released for years, possibly decades, very difficult to obtain license and copyrights notes from people/companies that are no longer around.

9. Significant Plans for the Next Period:

The Substations Committee will be hosting its next Annual meeting in San Juan, Puerto Rico on April 29th thru June 2nd 2024.

The Substation Committee is currently working on reviewing and updating our Standards Association Policies and Procedures and our Committee Organization and Procedures Manuals. This effort will bring more clarity and organization to the operation and scope of the Substations Committee and are associated subcommittees and working groups.

Submitted by:

DJ Moreau
IEEE PES Substations Committee
Secretary

Date:

1/31/2024