US National Committee of Cigre
2024
Cigre Session Meeting

Sunday, August 25, 2024

Paris, FRANCE

Agenda – August 25, 2024

- Welcome
- President’s Remarks
- Technical Activities
- Comments of US Representatives to CIGRE Study Committees

Technical Activities

John McDonald – JDM Associates, LLC (johndougmcd@gmail.com)

U.S. Regular Members to CIGRE Study Committees & Appointment Dates (2024-2026)

- A1-Howard Penrose (MotorDoc LLC) - 2024
- A2-Craig Swinderman (MEPPI) – 2024
- A3-John Webb (ABB) – 2024
- B1-Tom Zhao (EPRI) – 2022
- B2-Erik Ruggeri (POWER Engineers) – 2020
- B3-George Becker (POWER Engineers) – 2020
- B4-David Roop (MEPPI) – 2020
- B5-Jonathan Sykes (Quanta Technology) – 2024

U.S. Regular Members to CIGRE Study Committees & Appointment Dates (2024-2026)

- C1-Mark Lauby (NERC) – 2024
- C2-Renuka Chatterjee (MISO) – 2024
- C3-Mandy Olson (Burns & McDonnell) - 2022
- C4-Gaurav Singh (EPRI) - 2020
- C5- Jeff Bladen (Meta) - 2020
- C6-Jouni Peppanen (EPRI) – 2024
- D1-Ibrahima Ndiaye (GE) – 2024
- D2-Chen-Ching Liu (Virginia Tech) – 2020

U.S. Regular Additional Members to CIGRE Study Committees & Appointment Dates (2024-2026)

- A1-None
- A2-None
- A3-None
- B1-None
- B2-Rob Schaerer (POWER Engineers) – 2024
- B3-None
- B4-Marek Furyk (GE) – 2024
- B5-Alex Apostolov (OMICRON electronics) - 2024

U.S. Regular Additional Members to CIGRE Study Committees & Appointment Dates (2024-2026)

- C1-Jay Caspary (Consultant) - 2024
- C2-Adam Keech (PJM Interconnection) - 2024
- C3-None
- C4-Julia Matevosyan (ESIG) - 2024
- C5-Anant Venkateswaran (Hitachi Energy) - 2024
- C6-Tanguy Hubert (EPRI) - 2024
- D1-None
- D2-Junho Hong (University of Michigan-Dearborn) - 2024

SC A1 – Power Generation and Electromechanical Energy Conversion

Dr. Hugh Zhu – Consultant (hughzhu18@outlook.com)

Study Committee A1

In 2024 SC A1 changed its name from “Rotating Electrical Machines” to “**Power Generation and Electromechanical Energy Conversion**” to better serve the evolving landscape driven by the energy transition.

The SC A1 covers the full equipment lifecycle from research, development, design, manufacture, and testing of power generation and electromechanical energy conversion equipment and their associated auxiliaries, through to commissioning, operation, condition assessment, maintenance, life extension, refurbishment, upgrade, operation conversion, storage, and etc.

Study Committee A1

A1 has four sub-Committees

- Turbo-generators
- Hydro-Generators
- Wind Generators and New Technologies
- Large and High-Efficiency Motors

Strategic directions were set up

1. Asset management
2. Machine/Grid interaction and support
3. Renewable generation
4. Machine monitoring, diagnosis, and prognosis
5. High efficiency and efficiency improvement of electrical machines

Study Committee A1

- 24 Regular Members
- 5 Additional Regular Members
- 16 Observer Members
- Represent 42 countries across all continents
- Over 170 experts contributed to SC A1 activities
- 2 TB was published in 2023 and 5 TB should be published in 2024

2023 A1 Colloquium in Japan

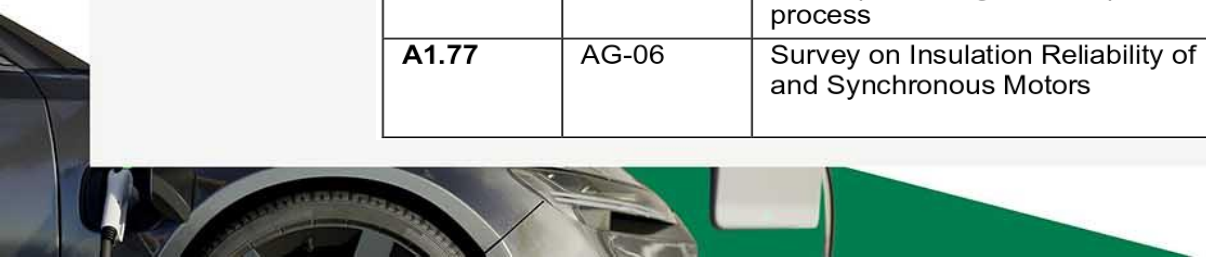
- 3 Tutorials
- 27 papers
- A technical tour

23 Active Working Groups

WG Nr.	ADVISORY GROUP	WG TITLE	CONVENOR	STATUS
A1.42	AG-02	Influence of key requirements to optimize the value of hydro generators	Eduardo Guerra	TB prepared. Final check before review under 6-week rule.
A1.43	AG-02	State of the art of rotor temperature measurement	Stjepan Tvoric	The work is complete and reviewed; a report will be published in 2024.
A1.45	AG-06	Guide for Determining the Health Index of Large Electric Motors	Dr Zhang Pinjia	The responses to the distributed questionnaire have been insufficient so far to complete the work. The SC will assess how to continue with this working group.
A1-C4.52	AG-05	Wind generators and frequency-active power control of power systems	Nick Miller	TB in preparation.
A1.53	AG-06	Guide on Design Requirements of Motors for Variable Speed Drive Application	AK Gupta	Needs revision following 6-week rule feedback. Work to be reallocated as Mr. Gupta has retired.
A1.55	AG-02	Survey on Split Core Stators	Sun Yutian	Draft report available. Will be rechecked before submitting for review under the 6-week rule.
A1.56	AG-02	Survey on Lap and Wave Winding and their Consequences on Maintenance and Performance	Richard Perers	TB prepared. Final check before review under 6-week rule.
A1.58	AG-06	Selection of Copper Versus Aluminium Rotors for Induction Motors	Fredemar Rüncos	TB prepared. To be circulated for review under the 6-week rule.
A1.60	AG-02	Guide on economic evaluation for refurbishment or replacement decisions on hydro generators	Mark Bruintjies	Questionnaire responses are being analysed.
A1.61	AG-06	Survey of Partial Discharge Monitoring in Large Motors	André Tomaz de Carvalho	TB in preparation.
A1.62	AG-02	Thrust Bearings for Hydropower - A Survey of Known Problems and Root Causes	Daniel Langmayr	Limited responses were received from the questionnaire making it difficult to compile a globally representative report. The SC will review how to conclude this working group.
A1.63	AG-01	Turbo Generator Stator Winding Bushings and Lead Connections – Field Experience, Failures and Design Improvements	Jabulani Bembe	Questionnaire responses are being analysed.

23 Active Working Groups

A1.64	AG-06	Guide for Evaluating the Repair / Replacement of Standard Efficiency Motors	Erli Ferreira Figueiredo	Report in preparation.
A1.67	AG-02	State of the Art in methods, experience and limits in end winding corona testing for Hydro Generators	(Hélio de Paiva Amorim Junior)	New convenor required.
A1.69	AG-02	Hydro-Generator Excitation Current Anomalies	J. Johnny Rocha E.	Team assembled.
A1.70	AG-01	Dielectric Dissipation Factor Measurements on Stator Windings	Monique Krieg-Wezelenburg	To be issued in several parts due to volume of content. > TB 918 “DDF Measurements on Stator Windings – Part 1 Survey Answers” issued. > Part 2 in progress.
A1.71	AG-02	Survey on damper-winding Concepts and its operational experience on hydro generators and motor-generators	Thomas Hildinger	Questionnaire is being prepared.
A1.72	AG-02	Survey on multi-turn coils with dedicated turn insulation versus coils without dedicated turn insulation	Yoon Duk Seol	Questionnaire is being prepared.
A1.73	AG-02	Customer Requirements for Qualification of Form Wound Stator Insulation Systems for Hydro Generators	Dr. Marcelo Jacob da Silva	Questionnaire completed and circulated on 13 March 2024.
A1.74	AG-06	Evaluating quality of electric motors (previously WG A1.68)	Kondra Nagesh	Questionnaire being prepared. Need to review WG status & schedule.
A1.75	AG-01	Large air-cooled turbo-generator – state of the art, limits and perspectives for Small Modular Reactors	Vincent Fernagut	Questionnaire is being prepared
A1.76	AG-01	Study on Eco-Design, Circular economy and impacts on generator production process	Raùl Morales Garcia	Questionnaire is being prepared
A1.77	AG-06	Survey on Insulation Reliability of Induction and Synchronous Motors	Fernando Spezia	Planning of work. Need more WG members. Request for WG members to be recirculated.



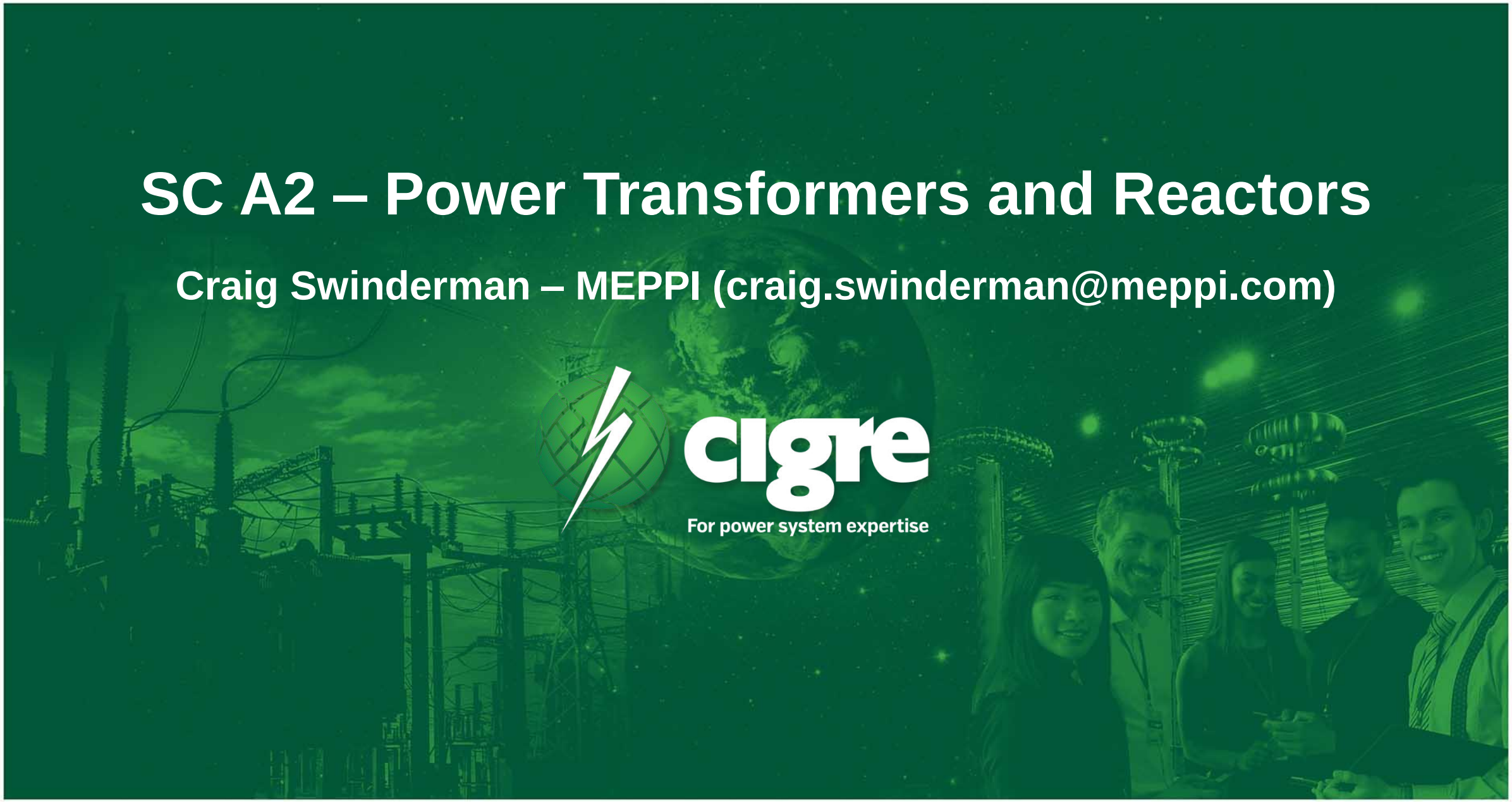
SC A1

2024 Paris Meeting

- 2 Tutorials for 2024 Session
- Preferential subjects for the 2024 SC A1 Session:
  - PS1- Rotating electrical machines and the energy transition
  - PS2- Evolution and development
  - PS3 – Keeping the lights on
- 29 Technical Papers from SC A1 were accepted.
- Prepared questions for presented papers for group discussions
- The 2025 A1 Colloquium will be planned soon.

SC A2 – Power Transformers and Reactors

Craig Swinderman – MEPPI (craig.swinderman@meppi.com)



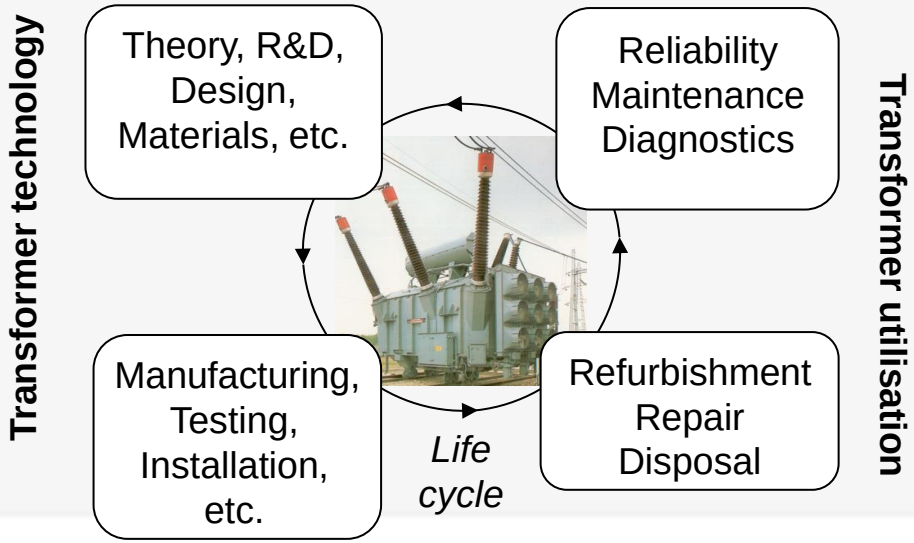
SC A2 – Power Transformers and Reactors

Scope

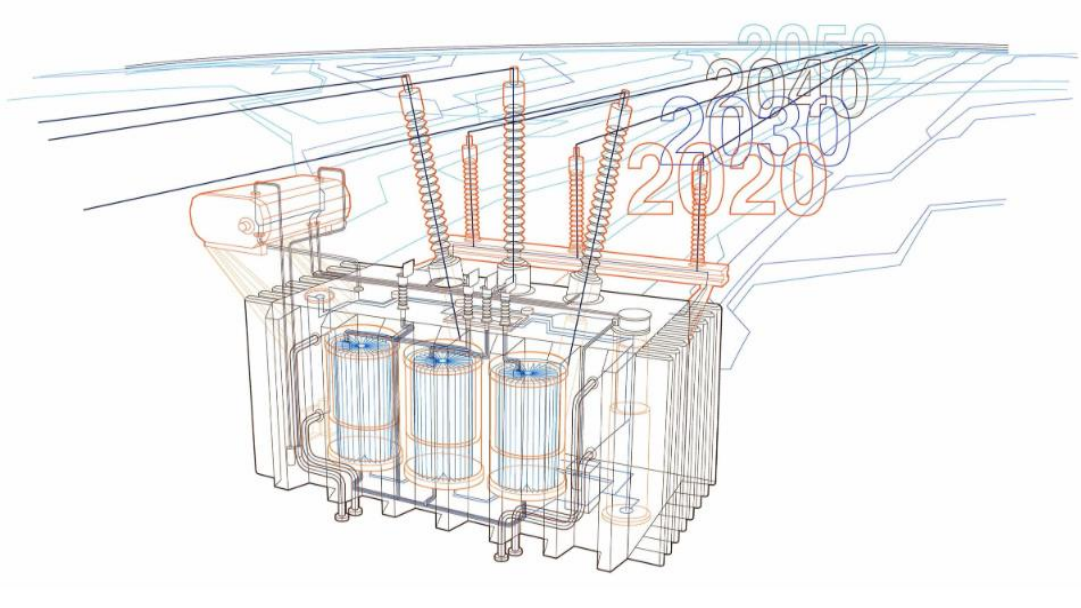
Design, construction, manufacture and operation for all kinds of power transformers, including industrial, DC converters and phase-shift transformers and for all types of reactors and transformer components (bushings, tap-changers…)

In the past *(known as SC12)* activities were focused on design problems related to the rapid increase of rated voltage and power

Today's SC A2 Key Areas of Attention



SC A2 – Power Transformers and Reactors



Chairman – Pascal MÜLLER(CH)
Secretary - Marc FOATA (DE)
30 regular members
18 observer members

21 WG's, which includes 11 JWG's
350 Experts from 40+ countries
8 Advisory Groups

SC A2 – Present Working Groups and Task Forces

WG	Title	Focus Area
A3/A2/A1/B1.44	Limitations in Operation of High Voltage Equipment Resulting of Frequent Temporary Overvoltage's	CONDITION ASSESSMENT
A2/C4.52	HF Modelling	MODELLING
A2.54	Audible Sound Requirements	SOUND
A2.56	TR Efficiency	EFFICIENCY
A2.57	Effects of DC Bias	DC BIAS
A2.58	Site Installation and Pre-commissioning of Power Transformers and Shunt Reactors	SITE INSTALLATION
A2.60	Dynamic Thermal Behaviour of Power Transformers	THERMAL
A2.62	Analysis of AC Transformer Reliability	RELIABLITY
A2.63	Transformer Impulse Testing	TESTING
A2.64	Condition of Cellulose Insulation in Oil Immersed Transformers after Factory Acceptance Test	CONDITION ASSESSMENT

SC A2 – Present Working Groups and Task Forces (cont.)

WG	Title	Focus Area
A2/D2.65	Transformer Digital Twin – concept and future perspectives	DIGITALIZATION
A2/D1.66	Breathing systems of liquid filled transformers and reactors	LIFE CYCLE
A2/D1.67	Guideline for Online Dissolved Gas Analysis Monitoring	MONITORING
D1/A2.77	Liquid Tests for Electrical Equipment	LIQUID TESTING
A2.68	Failure survey of lower voltage generator step up transformers installed in wind farms and photovoltaic parks	RELIABILITY
A2.69	Guide for Transformer Maintenance – Update	LIFE CYCLE
A2/C3.70	Life Cycle Assessment (LCA) of Transformers	CONDITION ASSESSMENT
A2/D1.71	Modern insulating liquids qualification for OLTC, bushings and other accessories	LIQUID TESTING
A2/D1.72	Retrofill of mineral oil in transformers – Motivations, Considerations and Guidance	LIFE CYCLE

SC A2 – Present Working Groups and Task Forces (cont.)

WG	Title	Focus Area
D1/A2.79	Improved understanding of dynamic behaviour of winding insulating materials in liquid insulated power transformers	MODELLING
D1/A2.80	Functional properties of non-metallic solid materials for liquid filled transformers and reactors and their compatibility with insulating liquids	MATERIAL COMPATABILITY
TASK FORCE	Power Transformer Tank Specification for Passive Protection Against Internal Arc	DESIGN/TANK RUPTURE
TASK FORCE	Power Transformers Sound Levels on Site	SOUND
TASK FORCE	Silver Corrosion in Transformers	CONDITION ASSESSMENT

SC A2 - Recent Technical Brochures (https://e-cigre.org/)

TB	Description
887	Life extension of oil filled transformers and shunt reactors (2022)
900	High-Frequency Transformer and Reactor Models for Network Studies - Part A: White-Box Models (2023)
901	High-Frequency Transformer and Reactor Models for Network Studies - Part B: Black-Box Models (2023)
902	High-Frequency Transformer and Reactor Models for Network Studies - Part C: Grey Box Models (2023)
903	High-Frequency Transformer and Reactor Models for Network Studies - Part D: Model interfacing and specifications (2023)
904	High-Frequency Transformer and Reactor Models for Network Studies - Part E: Measurements and transformer design details (2023)

SC A2 - Technical Activities during 2024 Paris Session

Tutorial
Monday, 26 August at 0830-1020 in Salle Maillot Level 2
Analysis of Transformer Reliability

Poster Session
Thursday, 29 August at 1400-1800 in Halle Ternes Level 1

Group Discussion Meeting
Friday, 30 August at 0845-1800 in Amphitheatre Bleu, Level 2
100+ papers
PS 1 – Design of Resilient Transformers
PS 2 – Advances in Transformer Analytics
PS 3 – Reliability of Transformers for Renewable Energy

A2 - Upcoming Technical Activities

SC A2 & D1 Joint Colloquium
October 19-24, 2025
InterContinental Seoul COEX
Seoul, S. Korea

Green Book - Transformer and Reactor Life Management

Scheduled publication by late 2024

2nd Green Book publication by SC A2
reference book on all topics associated with life management, including procurement, losses, sound levels, operation, maintenance, condition assessment and monitoring, moisture, digital twins, ageing, life extension, plus more….

SC A3 - Transmission & Distribution Equipment

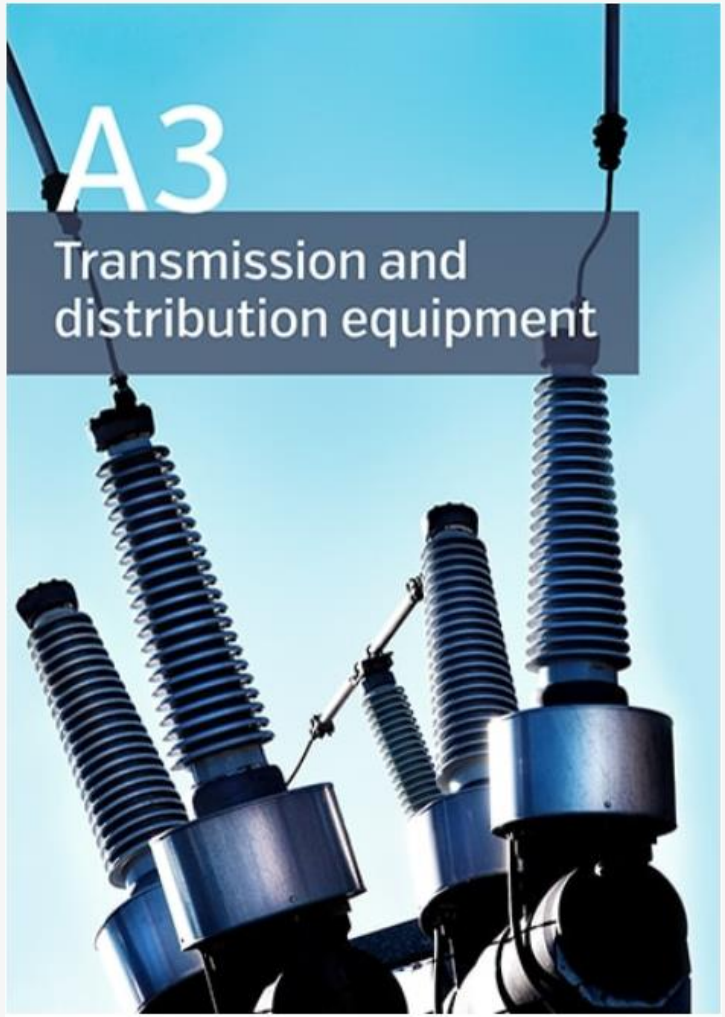
John Webb – ABB Inc. (john.c.webb@us.abb.com)

- Chair
  - Secretary
  - Social Media
  - Webmaster
  - Strategic Planning Group
    - IEEE Liaison
    - IEC Liaison
    - Distribution
    - Current Zero Club Liaison
    - Africa Project
  - WG Conveners
  - Utility Advisory Group
  - Special Reporters / Poster
  - Green books
  - Document Advisors
  - Tutorials / Webinars
  - A3 members
    - 32 regular
    - 4 additional(distr.)

    10 observers

cigre
For power system expertise

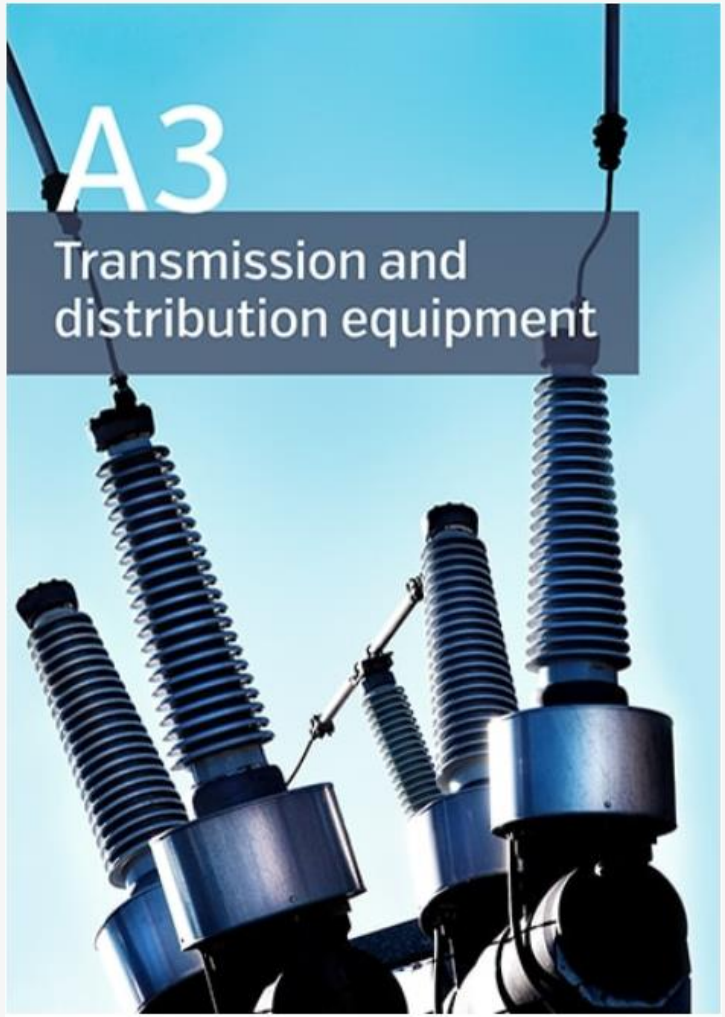
Study Committee A3



SCOPE OF WORK

- Devices for switching, interrupting, or limiting currents
- Surge arresters,
- Capacitors,
- Busbar and equipment insulators,
- Instrument Transformers,
- Bushings,
- Other T&D equipment not specifically covered under another study committee’s scopes

Technical Challenges

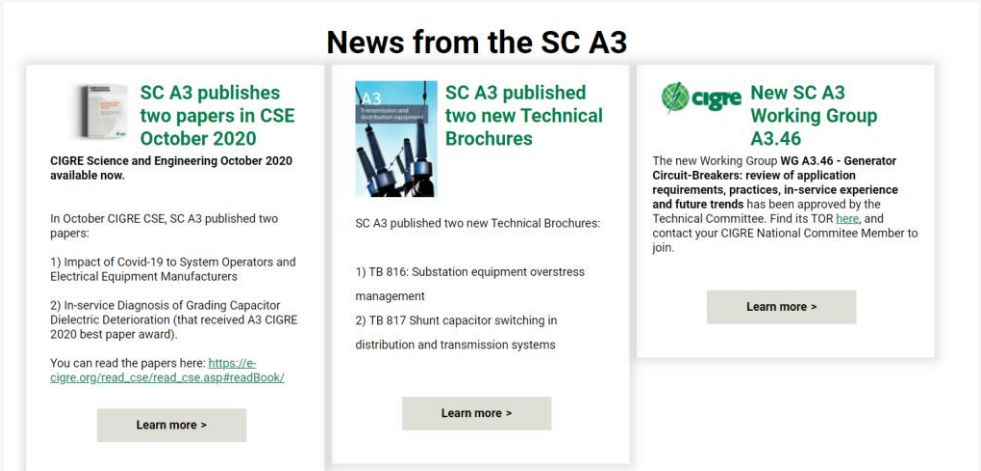


- Impact of renewables on T&D equipment
- Environmental and climate impact on T&D equipment
- Sustainability in the whole lifecycle of T&D equipment
- Digitalization & automatization
- Advanced sensors and data analytics
- Asset management / Condition assessment

SC A3 Officers & Website

For more information visit

https://a3.cigre.org/



- Chair: Nenad Uzelac (US):
  Nenad.Uzelac@cigre.org

- Secretary: Frank Richter (FR)
  Frank.Richter@50hertz.com

- Webmaster: Mahir Muratovic (CH)
  mahir.muratovic@gmail.com

Utility Advisory Board (UAB)

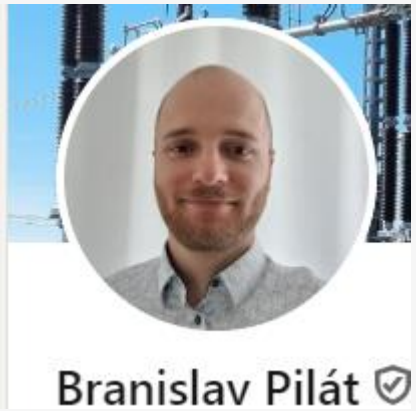
Chair
Robert LeRoux
ESBI International
robert.leroux@esb.ie

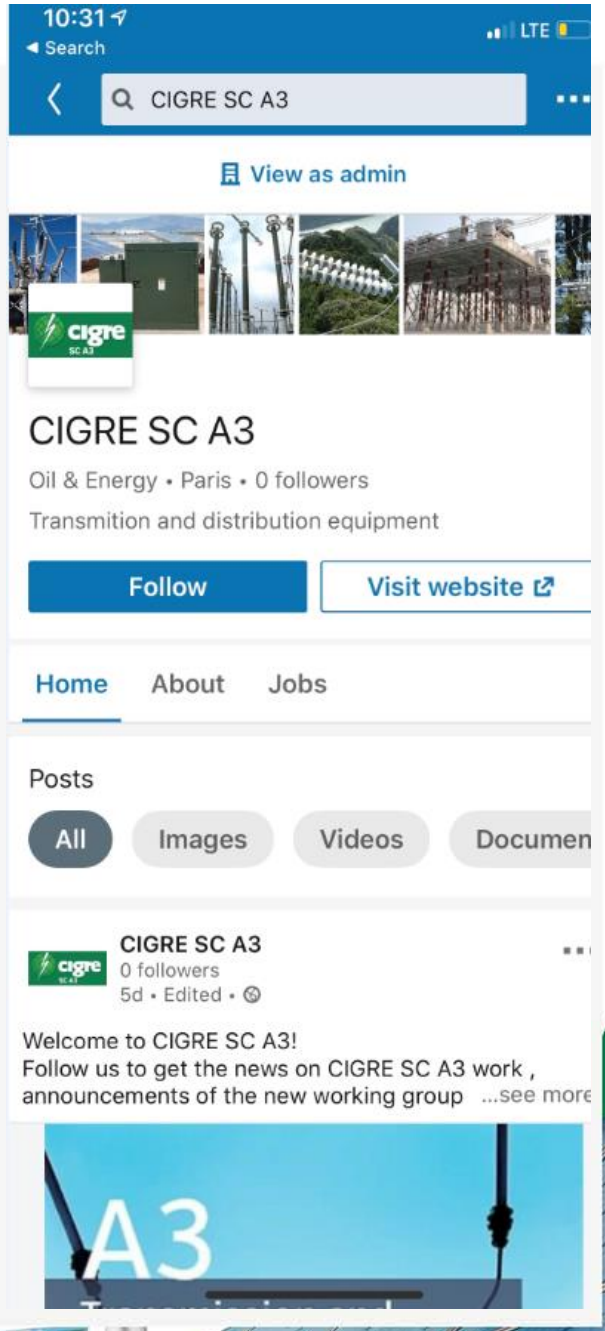
- Recently formed the UAB - the ‘Voice’ of utilities at Cigre.
- UAB consists of Cigre members employed by utilities
- The task is to discuss the needs of utilities and formulate a strategic plan from a utility point of view to advise Cigre of the requirements of utilities with respect to the tasks of A3.
- Accepting new members.

Social Media: A3 LinkedIn

https://www.linkedin.com/company/cigre-sc-a3

- A3 created LinkedIn account for new announcements, events, publications, collecting feedback, etc…
- Currently 475 people following.
- If you have LinkedIn account, please follow this page and share it among your network





SC A3 – Transmission and Distribution Equipment

John Webb, Principal Engineer Electrical Distribution Equipment and Service -- ABB

Schedule for the week

Date	Time	Type	Meeting Name & Location
Sunday	1400 - 1530	Meeting	USNC Opening Meeting – Room 251
Sunday	1530 - 1730	Presentation	Opening Ceremony & Keynote – Grand Amphitheatre
Monday	0830 – 1230	Posters	SC A3 Poster Session – Ternes Room1, Level 1
Monday	1040 – 1230	Tutorial	A3.46: Generator CB in Power Plants – Maillot, Level 2
Monday	1430 – 1730	Workshop	A3.60, A3.66: Driving toward 0 emissions – Bleu, Level 2
Monday	1900 – 2100	Social	USNC Paris Reception – Pavillion Vendome, 7 Vendome
Tuesday	0845 – 1800	Group Disc	SC A3 GDM – T&D Equipment – Bordeaux, Level 3
Tuesday	1040 – 1230	Tutorial	A3.59: SF6 End of Life Guidelines – Maillot, Level 2
Thursday	0830 – 1800	Meeting	A3 Study Committee Meeting (by Invitation Only)

Published Documents

May 2022 through May 2024

TB 931 WG A3.40 May 2024

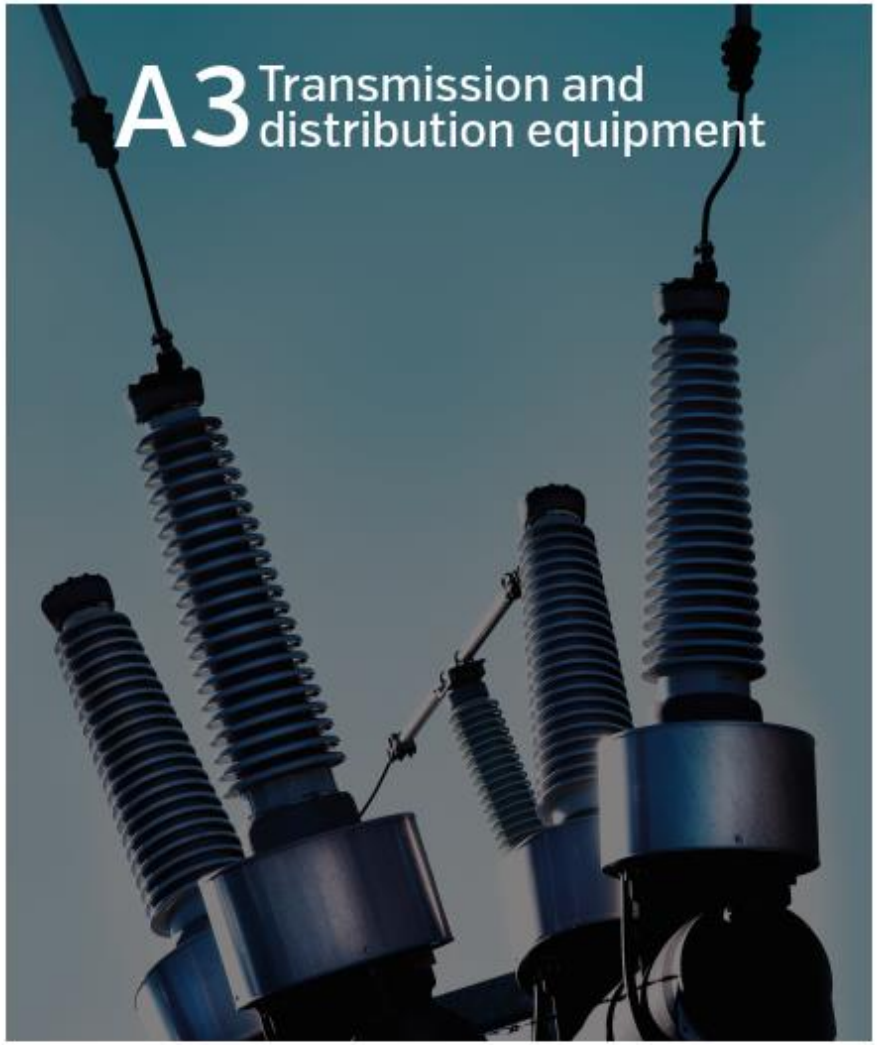
Technical requirements and field experiences with MVDC Switching Equipment

Executive Summary

- Lower distribution losses and higher power capability
- Solar photovoltaic and battery systems are naturally DC
- Almost ½ of electricity used today is DC at point of use
- No zero crossings – majority of switching equipment needs
- HVDC long established, LVDC is most used. MVDC New
- Multiple case studies and uses described

Table of Contents

1. Introduction
2. Application of MVDC Switching
3. Projects and installations of MVDC systems
4. Types, interrupting principles and specific requirements of MVDC switching equipment
5. Testing of MVDC switching equipment



TB 921 JWG C4/A3.53 Dec 2023

Applying Low-Residual-Voltage Surge Arresters to Suppress Overvoltages in UHV AC Systems

Executive Summary

- UHV transmission – high efficiency / low unit transmission cost
- ≥ 1000 kV in Russia, Japan & Italy; China: 30 UHV / 40 000 km
- Overvoltage ‘decisive role’ in UHV power equipment
- Residual Voltage is key factor in cost reduction & reliability
- Summarize the state of low-residual-voltage surge arrestors

Table of Contents

1. Introduction
2. Development stats of low-residual-voltage surge arresters
3. Controllable surge arresters
4. Modeling of surge arresters
5. The effects of LVRSA on supressing switching overvoltages
6. The effects of LVRSAon supressing lightning overvoltages
7. Feasibility of deeply limiting switching overvoltages in UHV
8. Application of low-residual-voltage surge arresters
9. Conclusions

TB 914 JWG B3/A3.59 Aug 2023

Guidelines for SF6 end-of-life treatment of T&D equipment (>1 kV) in substations

Executive Summary

- SF_6 is widely used globally, but reaches end-of-life
- GWP of SF_6 was not realized until recently; special EoL treatment
- Summarized best practices from large TSO's for the benefit of smaller companies with limited installed base and experience.
- Includes checklists for EoL and legal compliance for various AHJ

Table of Contents

1. Definitions for the use of the guide
2. Preparation of the electrical equipment for decommissioning
3. Electrical equipment decommissioning: recovery of SF_6
4. Handling procedures for switchgear following SF_6 recovery
5. On-site storage of recovered (used) SF_6
6. Transport of recovered (used) SF_6
7. SF_6 Quality evaluation procedure
8. Reconditioning of SF_6 for Reuse
9. Overview of disposal procedures for SF_6
10. Overview of regulations to SF_6 end-of-life and proposals

TB 873 JWG B4/A3.80 July 2022

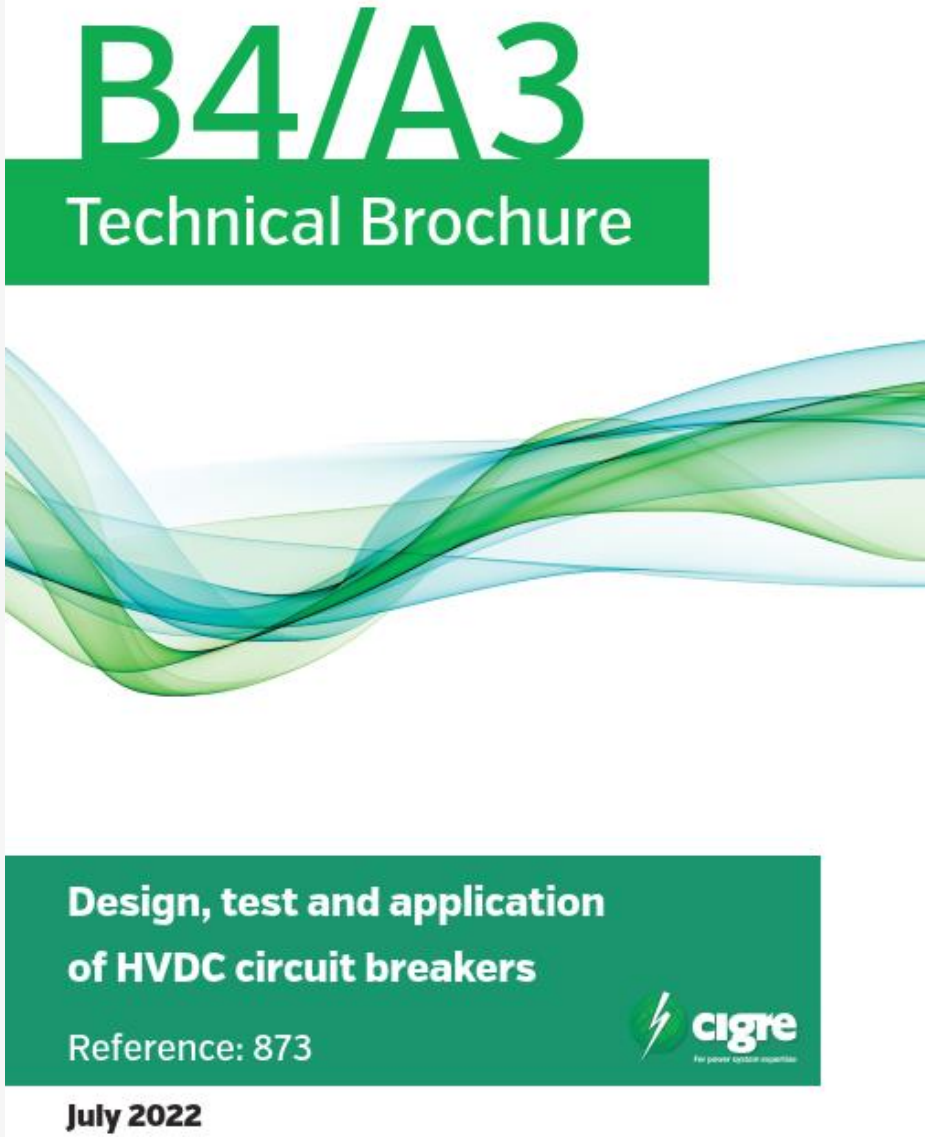
Design, test and application of HVDC Breakers

Executive Summary

- HVDC is preferred for long-distance bulk power transfer
- HVDC largely LCC but new systems VSC technology
- Interruption in DC different & more difficult than in AC
- Currently only ACI and MPE in service, PE, PO in dev.

Table of Contents

1. Introduction
2. Overview of HVDC technology and fault management
3. Overview of HVDC circuit breaker technology
4. Operational experiences of HVDC circuit breakers
5. Modelling requirement of HVDC circuit breaker + system
6. Electrical requirements of HVDC circuit breakers
7. Type test requirements of HVDC circuit breakers
8. Circuit for current interruption test of HVDC circuit breaker
9. Conclusion and suggestion
10. Appendices A, B, & C



TB 871 A3.41 May 2022

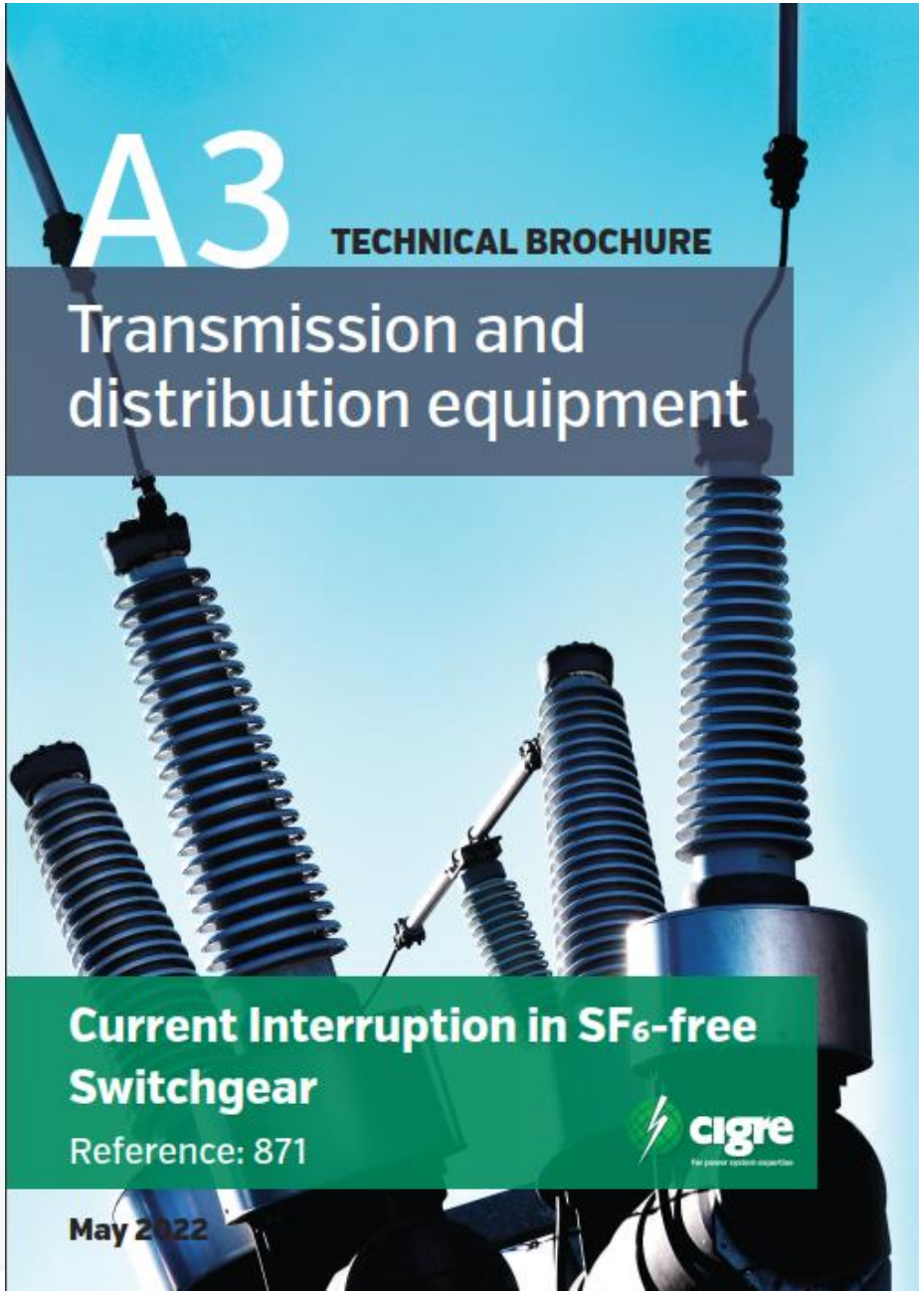
Current Interruption in SF_6-free Switchgear

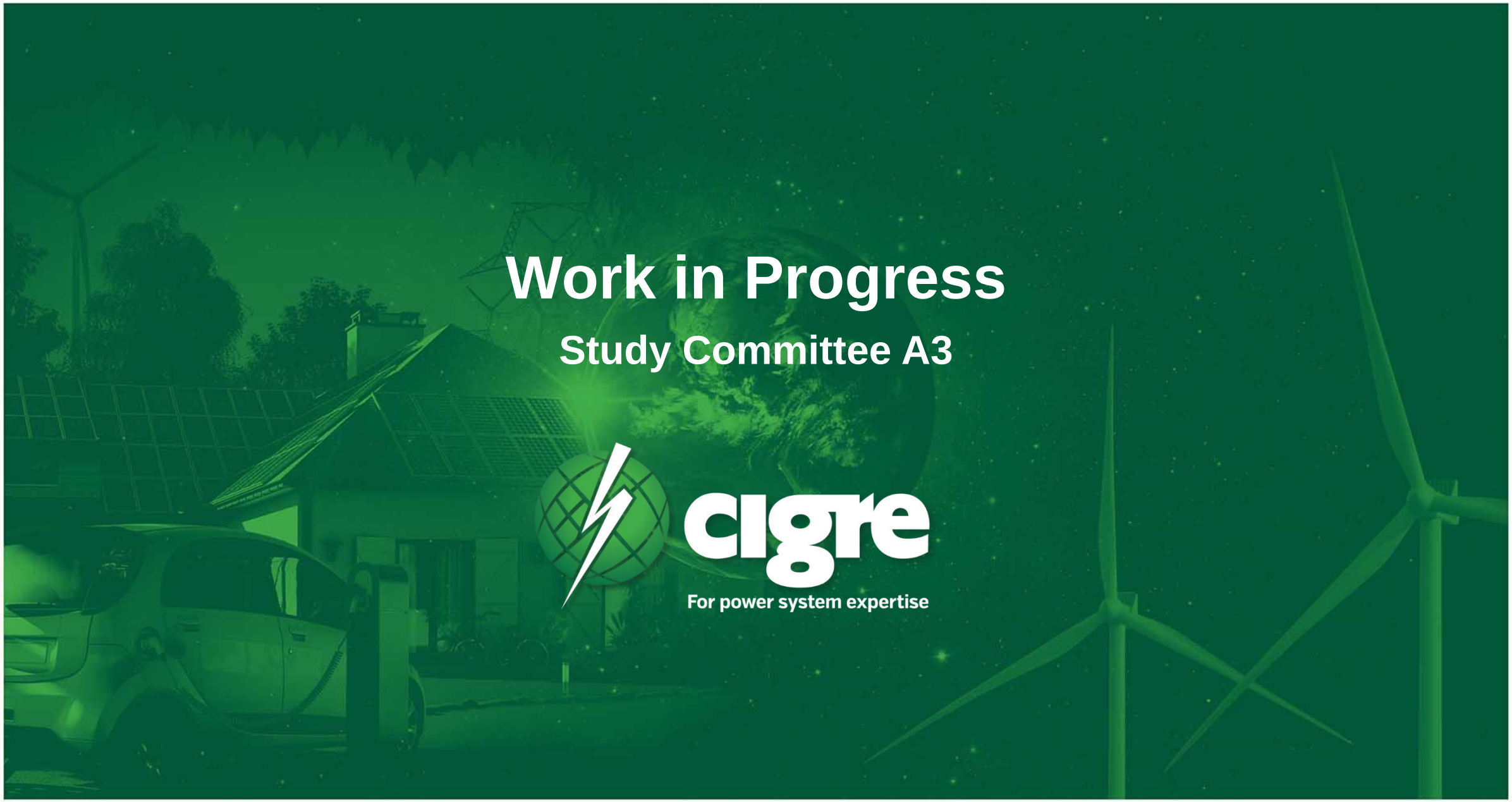
Executive Summary

- SF_6 has high GWP, emission ≈ 100 million gasoline cars
- SF_6 is predominant insulating medium for high-voltage
- Alternatives often CO2 + other gas at high pressure
- Overview of SF6 alternatives in switchgear

Table of Contents

1. Introduction
2. Interruption characteristic of gases
3. Lifetime aspects of SF_6-free switchgear
4. High-voltage gas insulated switches
5. Testing and standards
6. High-voltage vacuum circuit breakers
7. Medium-voltage SF_6-free switchgear
8. High-voltage SF_6-free gas-filled switchgear
9. Ownership and operation
10. Conclusions

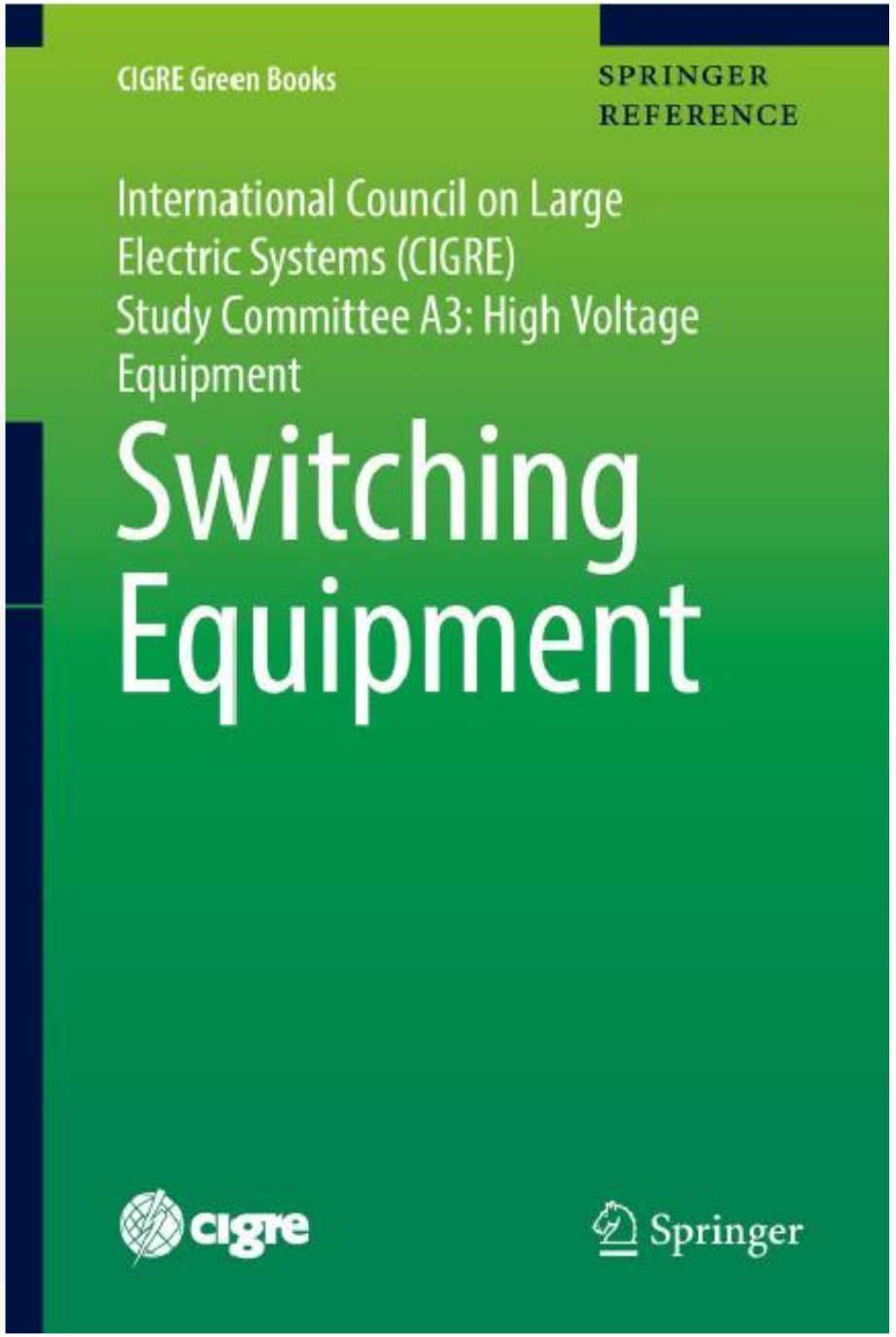



Work in Progress
Study Committee A3
cigre
For power system expertise

A3 Green Book, 1st Ed. 2018

Revision in progress – Dec. 2024 target date

- The SC A3 Green Book revision in work
- Revise the chapter about HV vacuum breakers, SF6 alternatives because of publications by WG A3.41.
- Revise the chapters for instrument transformers and surge arresters
- The content of “Asset Management” chapter should include recommended procedures as well as provide case studies.



Working Groups under SC A3

WG A3.39: Application and field experience with Metal Oxide Surge Arresters -- Published

WG A3.40: Technical Requirements and Testing Recommendations for MV DC switching equipment at distribution levels – Published

JWG C4/A3.53: Application Effects of Low-Residual-Voltage Surge Arresters in Suppressing Overvoltages in UHV AC Systems – Published

JWG B3/A3.59: Guidelines for SF6 end-of-life treatment of T&D equipment (>1kV) in Substations -- Published

WG A3.42: Failure analysis and risk mitigation for recent incidents of AIS instrument transformers

- Planned for publication

Working Groups under SC A3 (cont.)

WG A3.43 Tools for lifecycle management of T&D switchgear based on data from condition monitoring systems

- In committee review

JWG A3/A2/A1/B1.44 Limitations in operation of High Voltage Equipment resulting of frequent temporary overvoltages

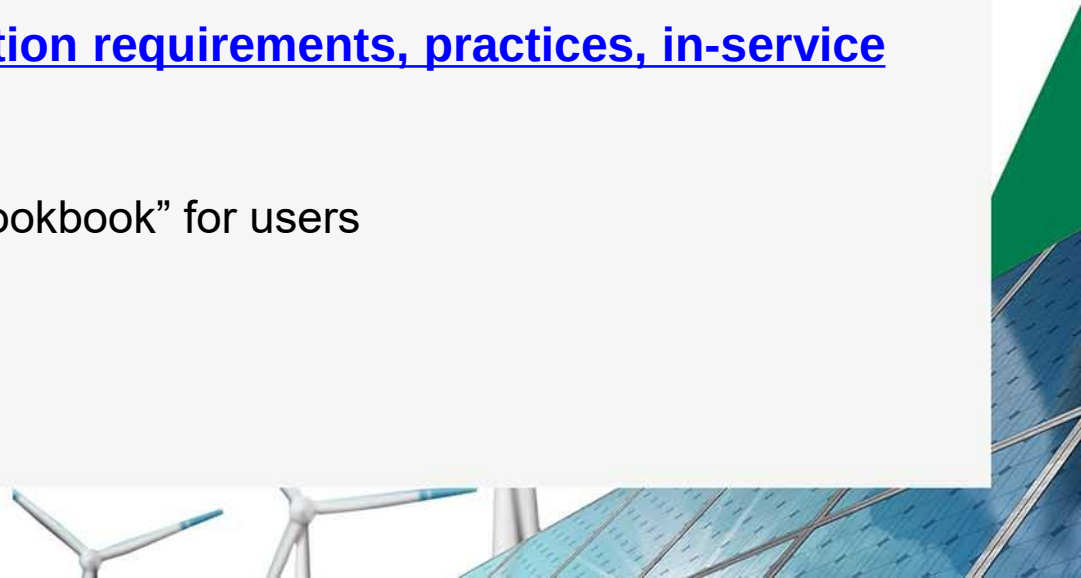
- In committee review

WG A3.45 Methods for identification of frequency response characteristic of voltage measurement systems

- Planned for publication

WG A3.46 Generator Circuit-Breakers: review of application requirements, practices, in-service experience and trends

- New WG started in early 2020.
- TB to serve as educational resource on GCB topics and “cookbook” for users
- Tutorial on Monday 1040 - 1230



Working Groups under SC A3 (cont.)

WG A3.47 Lifetime Management of medium-voltage air-insulated switchgear

- New WG started in early 2022.
- Draft in progress

WG A3.48 4th CIGRE international reliability survey on equipment 2014-17

Part 1: General results on transmission and distribution equipment

- In Committee Review

JWG B3/A3.60 User guide for non-SF6 gases and gas mixtures in Substations

- Approved, started in 2021

JWG B4/A3.84: Fault Current Limiting Technologies for DC Grids

- WG started in 2020. Several online meetings held. Tasks identified.

SC B1 – Insulated Cables

Rusty Bascom – Electrical Consulting Engineers, P.C. (r.bascom@ec-engineers.com)

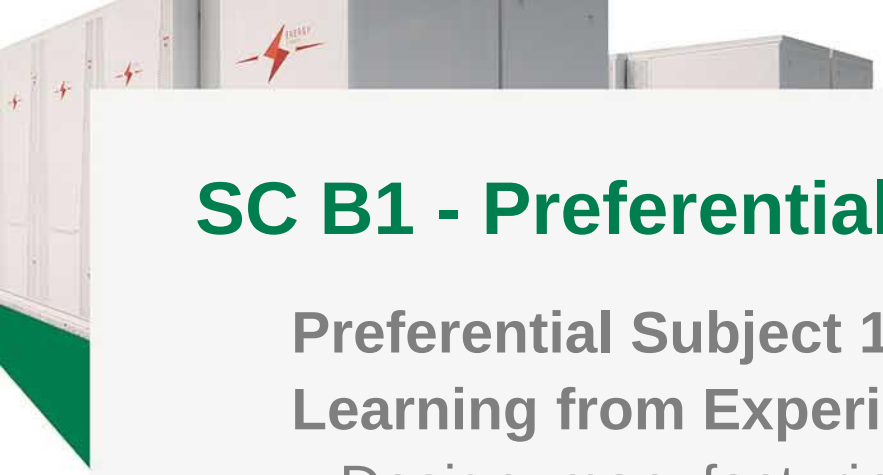
Tom Zhao (tzhao@epri.com) – Incoming Member SC B1

SC B1 – Insulated Cables

Earle C. (Rusty) Bascom III, Electrical Consulting Engineers, P.C.
Tom Zhao, Electric Power Research Institute

Schedule for the week

Date	Meeting
Monday, 26-August-2024	SC B1 New Member Orientation (closed meeting)
Monday, 26-August-2024 (16:10-18:00)	**B1 Tutorial:** ***Room MAILLOT, Level 2***
Tuesday, 27-August-2024 (09:00-12:00)	**B1 Poster Sesion** ***Room HALL TERNES, Room 2, Level 1***
Tuesday, 27-August-2024	B1 Study Committee Meeting (closed meeting)
Wednesday, 28-August-2024	B1 Study Committee Meeting (closed meeting)
Thursday, 29-August-2024 (09:00-18:00)	**B1 Group Discussion (Preferential Subjects)** ***Room BLEU, Level 2***

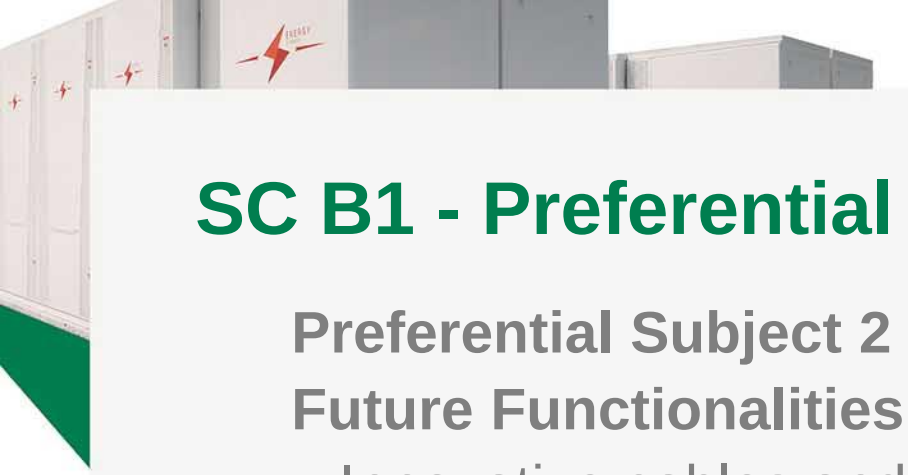


SC B1 - Preferential Subjects for 2024

Preferential Subject 1 (PS1),
Learning from Experiences

- Design, manufacturing, installation techniques, maintenance and operation.
- Quality, monitoring, condition assessment, diagnostic testing, fault location.
- Lessons learned from permitting, consent and safety issues from design to implementation.

- This preferential subject attracted 56 contributions.



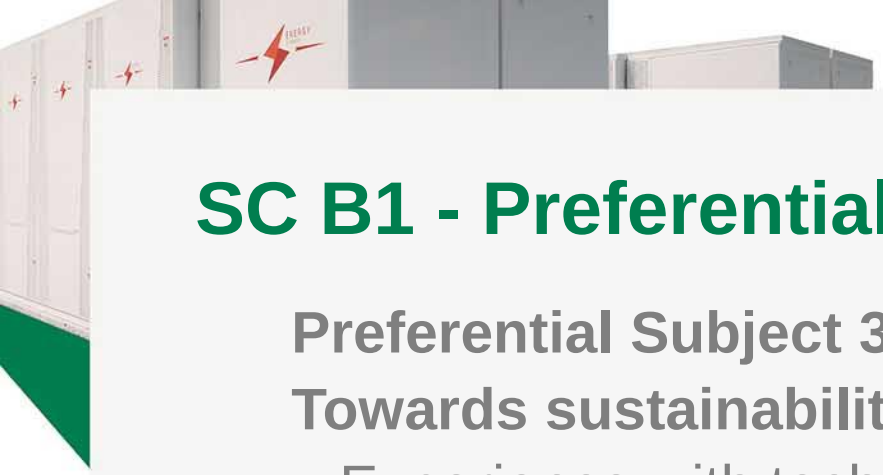
SC B1 - Preferential Subjects for 2024

Preferential Subject 2 (PS2),

Future Functionalities and Applications

- Innovative cables and systems, exploring the limits of both land and submarine cable.
- Role and requirements of power cables in tomorrow’s grids.
- Prospective impacts from the internet of things, big data and industry 4.0 and robotics on power cable systems

- This preferential subject attracted 20 contributions.



SC B1 - Preferential Subjects for 2024

Preferential Subject 3 (PS3),

Towards sustainability

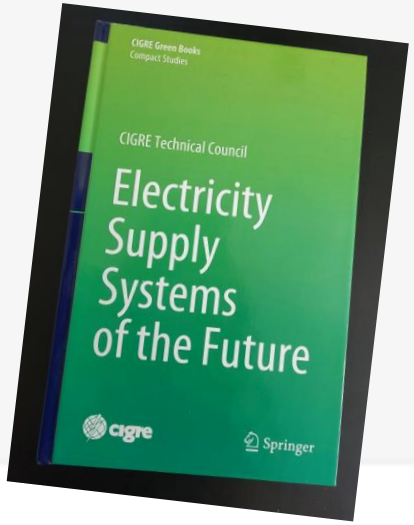
- Experience with technical sides of environmental challenges for current and future cable systems.
- Technical impacts of recycling, roadmap to net zero, life-cycle of system with upgrading and uprating, inclusion of new technologies such as hydrogen.
- Projects and initiatives to promote access to affordable, reliable, sustainable distribution and transmission cable systems for all.

- This preferential subject attracted 9 contributions.

SC B1 – 2024-2025 Main Events

Event	Place	Date
Nordic Regional Council of CIGRE (NRCC) Symposium	Trondheim, Norway	12-15 May 2025 (Paper Synoposes Due 12-Aug-2024)

Published in 2020
(includes a chapter on insulated cables)



U.S. National Committee B1 Participation

First Name	Last Name	WG# & TF#	WG Role	Young member (NGN)	WG & TF Title
Paul	Caronia	TF B1.92	Expert	No	Qualification of Lead-Free Submarine Cables at 72.5kV<Um<170kV
{vacant}	{vacant}	TF B1.93	Expert		Robotic Supervsion of Tunnels
Earle C. (Rusty)	Bascom III	WG B1.72	Expert	No	Cable rating verification – application in complex situations
Wael	Moutassem	WG B1.72	Expert	Yes	Cable rating verification – application in complex situations
Jay	Herman	WG B1.73	Expert	No	Recommendations for the use and testing of Fibre Optic Cables used in Land Cable Systems
Rachel	Mosier	WG B1.76	Expert	No	Enhancing quality assurance - quality control procedures for HV and EHV cable systems
Landry	Molimbi	WG B1.80	Expert	No	Guidelines for Site Acceptance Tests of DTS and DAS Systems used for cable systems monitoring
Paul	Knapp	WG B1.82	Convenor	No	MVDC Cable System Requirements
Sherif	Kamel	WG B1.82	Expert	No	MVDC Cable System Requirements
Robert	Hobson	WG B1.83	Convenor	No	Grounding aspects for HVDC land cable connections
Cory	Liu	WG B1.83	Expert	No	Grounding aspects for HVDC land cable connections
Wael	Moutassem	WG B1.84	Expert	No	Cyclic rating and FEM calculations
Peter	Tirinzoni	WG B1.86	Expert	No	Assessment, Prevention and Mitigation of Safety Risk in Cable Systems
Tiebin (Tom)	Zhao	WG B1.87	Expert	No	Finite Element Analysis for Cable Rating Calculations
Ivan	Jovanovic	WG B1.88	Expert	No	Replacement Gas for SF6 in Cable Accessories
Katherine	Thompson	WG B1.88	Expert	Yes	Replacement Gas for SF6 in Cable Accessories
Kaitlin	Spak	WG B1.89	Expert	No	Cable System Failure Analysis
Nathanael	Martin-Nelson	WG B1.89	Expert	Yes	Cable System Failure Analysis
Rachel	Mosier	WG B1.90	Convenor	No	Cable System Electrical Characteristics (Update to TB 531)
Cory	Liu	WG B1.90	Expert	No	Cable System Electrical Characteristics (Update to TB 531)
Aaron	Winter	WG B1.90	Expert	Yes	Cable System Electrical Characteristics (Update to TB 531)
Wael	Moutassem	WG B1.91	Expert	No	Transient Thermal Modeling of Power Cables (update to IEC 60853)
Jon	Busby	WG JWG B2/B1	Expert	No	Transition Facilities Between Overhead and Underground Lines
Dane	McGrady	WG JWG B2/B1	Expert	Yes	Transition Facilities Between Overhead and Underground Lines

Recent Publications (2022 - 2024)

WG #	Name of the Publication	Publication Date	Technical Brochure #
B1.58	Condition Assessment and Diagnostic Methods to Support Asset Management of MV Cable Networks	2024	TB 924
B1.68	Condition evaluation and lifetime strategy of HV cable systems	2023	TB 912
B1.64	Losses in Armoured Three Core Power Cables	2023	TB 908
B1.73	Recommendations for the Use and Testing of Fibre Cables Used in Land Cable Systems	2023	TB 899
B1.61	Installation of Underground HV Cable Systems	2022	TB 889
B1.65	Installation of Submarine Power Cables	2022	TB 883
B1.56	Power Cable Rating Examples for Calculation Tool Verification	2022	TB 880
B1.63	Recommendations for Mechanical Testing of Submarine Cables for Dynamic Applications	2022	TB 862

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Recent Publications (2019 - 2022)

WG #	Name of the Publication	Publication Date	Technical Brochure #
B1.63	Recommendations for mechanical testing of submarine cables for dynamic applications	2022	TB 862
B1.66	Recommendations for testing DC lapped cable systems for power transmission at a rated voltage up to and including 800 kV	2021	TB 853
B1.62	Recommendations for testing DC extruded cable systems for power transmission at a rated voltage up to and including 800 kV	2021	TB 852
JWG D1/B1.49	Harmonised test for the measurement of residual methane in insulating materials	2021	TB 850
B1.38	After laying tests on AC and DC cable systems with new technologies	2021	TB 841
B1.60	Maintenance of HV Cable Systems	2021	TB 825
B1.57	Update of service experience of HV underground and submarine cable systems	2020	TB 815

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Recent Publications (2019 - 2022) *continued*

WG #	Name of the Publication	Publication Date	Technical Brochure #
B1.44	Guidelines for safe work on cable systems under induced voltages or currents	2020	TB 801
B1.50	Sheath bonding systems of AC transmission cables - design, testing, and maintenance	2020	TB 797
JWG B1/B3.49	Standard design of a common, dry type plug-in interface for GIS and power cables up to 145 kV	2019	TB 784
B1.52	Fault location on land and submarine links (AC & DC)	2019	TB 773
B1.48	Trenchless technologies	2019	TB 770
B1.46	Test regimes for HV and EHV cable connectors	2019	TB 758
B1.45	Thermal monitoring of cable circuits and grid operators' use of dynamic rating systems	2019	TB 756

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Recent Publications (2016 - 2018)

WG #	Name of the Publication	Publication Date	Technical Brochure #
WG B1.28	On-site Partial Discharge assessment of HV and EHV cable systems	2018	TB 728
WG B1.55	Recommendations for additional testing for submarine cables from 6 KV (UM=7.2 KV) up to 60 KV (UM = 72.5 KV) - April 2018	2018	TB 722
WG B1.51	Fire issues for insulated cables in air - March 2018	2018	TB 720
WG B1.41	Long term performance of soil and backfill systems	2017	TB 714
WG B1.36	Life Cycle Assessment and Environmental Impact of Underground Cable Systems	2017	TB 689
WG B1.47	Implementation of Long AC HV & EHV Cable Systems	2017	TB 680
WG B1.34	Mechanical forces in large cross section cables systems -	2016	TB 669
B1.37	Guide for the operation of fluid filled cable systems	2016	TB 652

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U.S. Activities Coordinated with SC B1

IEEE/ICC

- Provided updates on CIGRE activities at ICC meeting held in Palm Springs, California 12-15 May 2024.
- IEEE Insulated Conductors Committee is related technical committee to CIGRE B1.

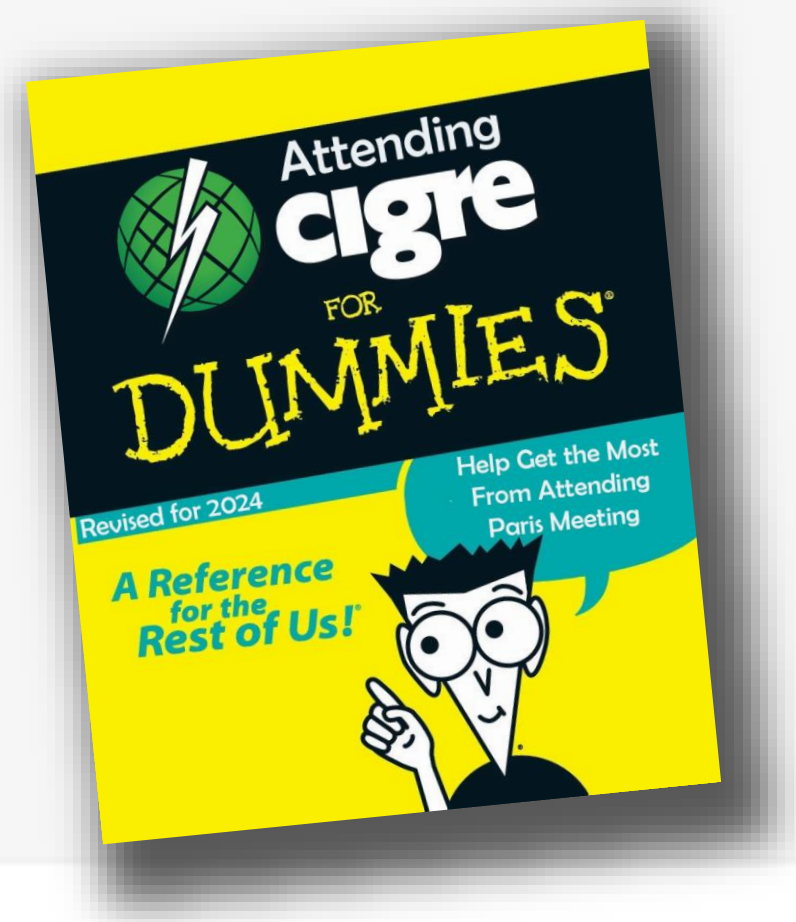
- Upcoming IEEE ICC meetings:
  - 20-23 October 2024: Bonita Springs, FL
  - 18-21 May 2025: Louisville, KY
  - 26-29 October 2025: Amelia Island, FL

Thank You!

Any Questions?

Attending CIGRE FAQ

Is available:



SC B2 – Overhead Transmission Lines

Rob Schaerer– POWER Engineers (rob.shearer@powereng.com)

For Erik Ruggeri – POWER Engineers (erik.ruggeri@powereng.com)

SC B2 TAGs

TAG 04: Electrical Performance

- Chair: Javier Iglesias (Spain)

TAG 05: Towers, Foundations, Insulators

- Chair: João Da Silva (Brazil)

TAG 06: Mechanical Behaviour of Conductors & Fittings

- Chair: Pierre Van Dyke (CA)

TAG 07: Asset Management, Reliability, Availability

- Chair: John McCormack (Australia)

B2 Preferential Subjects for 2024

- PS1: CHALLENGES FROM RENEWABLES INTEGRATION AND INFLUENCES OF ENERGY TRANSITION ON OHL
  - Technical solutions for increasing power transfer capabilities of existing OHLs, methods for enhancing line/corridor utilization
  - Methods and strategies to accelerate approval and permit processes, stakeholder engagement
  - Innovative solutions and construction techniques for overhead lines
- PS2: ASSET MANAGEMENT, STRATEGIES, TECHNOLOGIES AND METHODS FOR OHL
  - Safeguarding of existing oHl from impacts of external infrastructure, encroachments, vandalism, sabotage
  - Asset health index (AHI), time-based and risk-based inspections, ageing, residual life assessments, protective treatment of components
  - Innovative maintenance methods, use of artificial intelligence (AI), augmented and virtual reality techniques (AR-vR) and increasing resilience
- PS3: IMPACTS FROM CLIMATE CHANGE ON OHL
  - Impact on oHl design and operations due to climate change
  - Lessons learned for TSo/DSo, studies and practical experiences from a changing environment

TAG 04 MEETING SCHEDULE – 2024

- **The WGs related to TAG04 that are going to hold meetings in Paris are the following:**
- **WG83 –** Audible noise. Sunday 25 August. 0900 to 1100. Room 362-363. Palais des Congrès
- **WG89 –** Corona discharge during rain. Sunday 25 August. 1400 to 1630. Room 362-363. Palais des Congrès
- **WG80 –** Simulation of EF on insulator strings. Monday 26 August. 0900 to 1300. Room 313-314. Palais des Congrès

TAG 04 – ACTIVE WORKING GROUPS

WG	Name	Convener	Secretary	Established	Comment
WG B2.59	Forecasting dynamic thermal line ratings	George Watt (CA)	Gerhard Biedenbach (DE)	2014	Under revision. Expected Publication 2024
JWG B2/C4.76	Lightning & Grounding Considerations for Overhead Line Rebuilding and Refurbishing Projects, AC and DC	W.A. Chisholm (CA)	Fernando Silveira (BR)	2019	Previous work as XWG3. Expected Publication 2024
WG B2.78	Use of High Temperature Conductors in New Overhead Line Design	Rob Stephen (ZA)	Diarmid Loudon (NO)	2020	Previous work as XWG2. Expected Publication 2024
WG B2.79	Enhancing Overhead Line Rating Prediction by Improving Weather Parameters Measurements	George Watt (CA)	Gabriela Molinar (DE)	2020	Previous work as XWG5. Expected Publication 2024
WG B2.80 (TAG5)	Numerical Simulation of electrical fields on AC and DC Overhead Line Insulator Strings	Fabian Lehretz (DE)	Peter Sidenvall (SE)	2020	Expected Publication 2023 (This WG belongs to TAG5)
WG B2.83	Mitigation of induced noises by corona activity in overhead AC and DC lines	Carlos Da Costa (BR)	Alvaro Menezes (BR)	2020	Previous work as XWG1. Expected Publication 2025.
WG B2.89	Impact of rain upon the characteristics of corona discharge from HV AC and DC overhead transmission lines	Bo Zhang (CN)		2023	Expected Publication 2025
JWG B2/B1.90	Transition facilities between overhead and underground lines	Antonio Useros (ES)		2024	Expected Publication 2026

TAG 04 – New Work Proposals and Future Topics of Interest

- 1. Work Proposals (Exploratory Working Groups - XWG)
  - Proposal "Distributed fault location devices"
  - Proposal "Method for Conductor Technology Selection" (XWG 7) - Postponed
  - Proposal "Update of Rating Model for Low Wind Speeds"
  - Proposal "Use of OPPC in overhead lines" (XWG 6) - on hold
- 2. Proposals already transformed into official Working Groups
  - Proposal "Corona Discharge During Rain" (Created WG B2.89)
  - Proposal "Mitigation of electrically induced audible noise from OHL" - XWG 1 (Created WG B2.83)
  - Proposal "Transition facilities Overhead-Underground" - XWG 4. (Created JWG B2/B1.90)
  - Proposal "Use of HTLS Conductors in New OHL Design" - XWG 2 (Created WG B2.78)
  - Proposal "Weather parameter measurement for OHL rating improvement" - XWG 5 (Created WG B2.79)

3. Other Future Topics of Interest

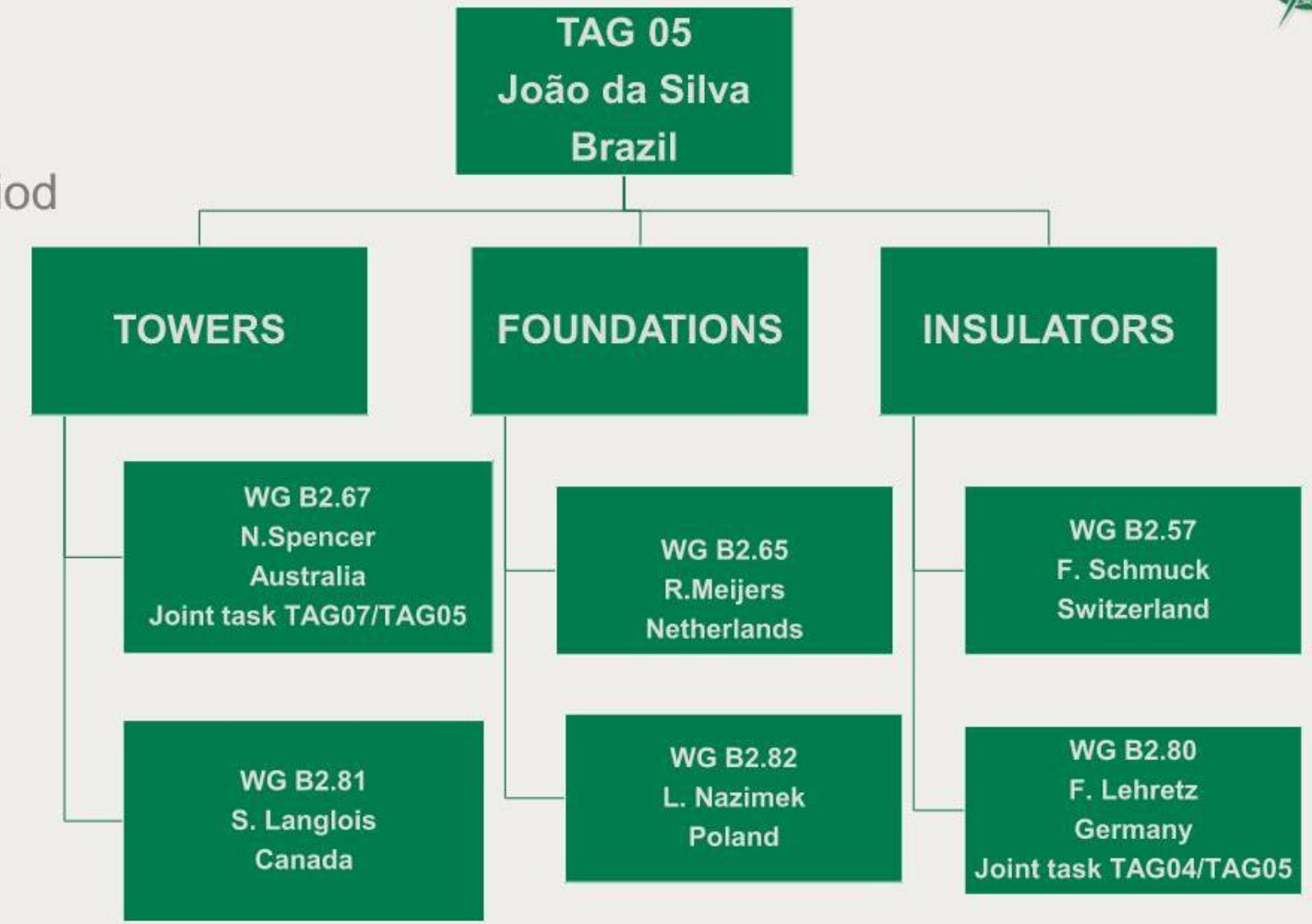
Topic	Comment/Status	Related challenge # (Reference to CAG survey 2014)
Design, calculation and measurement of the impulse resistance of tower grounding devices	Draft TOR prepared by Dr. Wei. Possible article for CSE	3
Voltage upgrading	Compilation of all previous work? The idea need further development	6
Phase & Bundle rearrangements	The idea need further development	4
Electrical aspects of surge arresters in OHL	The idea need further development. Relation with JWG76	3

TAG 04 - TUTORIALS

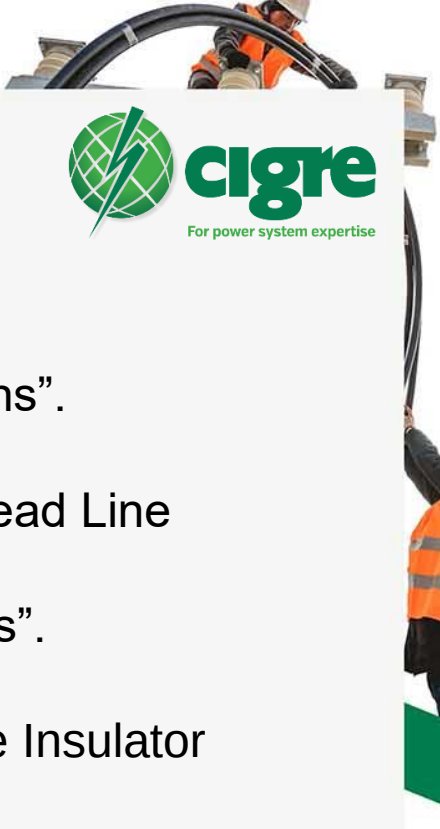
- TB 763 “Conductors for the Uprating of Existing OHL” (WG B2.55)
- TB 782 “Compact AC Overhead Lines (WG B2.63)
- TB 831 “Compact DC Overhead Lines (WG B2.62)

1 – TAG-05 Structure

Notes:
- No TAG05 Secretary
- No meeting in the period



TAG 05 – ACTIVE WORKING GROUPS



- WG B2.57 - “Survey of Operational Composite Insulators Experience & Applications”.
  - Convenor: Schmuck, Frank (Switzerland).
- WG B2.65 - “Detection, Prevention and Repair of Sub surface Corrosion in Overhead Line
  - Supports, Anchors and Foundations”. Convenor: Rob Meijers (Netherlands).
- WG B2.67 - “Assessment and Testing of Wood and Alternative Material Type Poles”.
  - Convenor: Ahsan Siddique (Australia).
- WG B2.80 - Numerical Simulation of electrical fields on AC and DC Overhead Line Insulator
  - Strings - Convenor: LEHRETZ, Fabian (Germany) – TAG05/TAG04.
- WG B2.81 - “Increasing the Strength Capacity of Existing Overhead Transmission Line
  - Structures”. Convenor: Sebastian Langlois (Canada).
- WG B2.82 – “ Overhead Line Foundations for Difficult Soil and Geological Conditions”.
  - Convenor: Lukasz Namizek (PL)

Last Publications

- TOWERS
  - TB 809 – “Dynamic Loading Effects on Overhead Lines: Impact on Structures”. June 2020, Electra 311.
  - TB818 – “Transmission Line Structures with Fibre Reinforced Polymer (FRP)” – November 2020, Electra 313 (In memoriam of Arni Jonasson)
- INSULATORS
  - TB 481 – “On the Assessment of Composite Insulators after Service” – December 2011, Electra 259
  - TB 545 – “Assessment of in-service Composite Insulators by Using Diagnostic Tools” – August 2013, Electra 269
- FOUNDATIONS
  - TB 516 – “Geotechnical Aspects of Overhead Transmission Line Routing – An Overview” – October 2012, Electra 264
  - TB 788 – “Dynamic Loading Effects on Overhead Lines – Impact on Foundations” – January 2020, Electra 308

Last Tutorials

- “Transmission Line Structures with FRP Composites” – India, February 10th 2021 – Janos Toth

TAG-05 Potential New Groups

- "Non-synoptic wind effects on the Structural Design of Transmission Lines" – R. Menezes (BR)

- "Impact of the length in establishing structural reliability of Overhead Transmission Lines" - R. Menezes (BR)

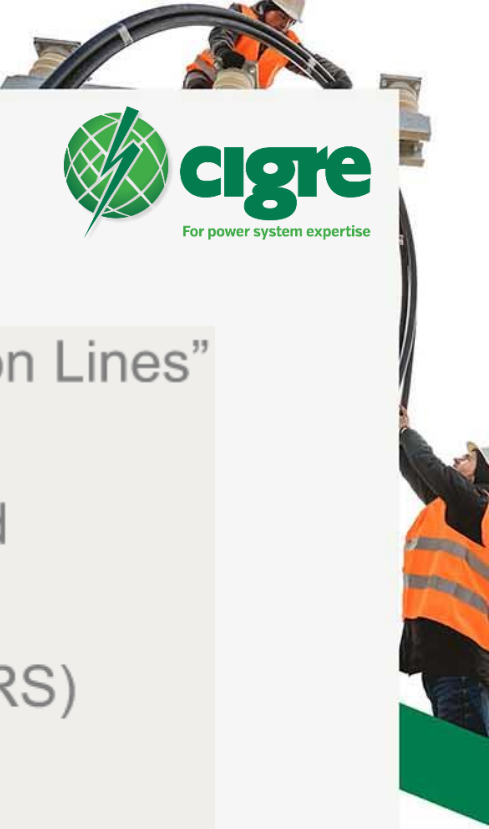
- "Dynamic Analysis on Transmission Line Poles" - Sergey Kolosov (RS)

- "Assessment of the strength factor ØR for OHL supports" – TAG old demand.

- "Sensitive analysis on the OHL supports reliability" – R. Menezes (BR)

Foundations:

- "Foundation Inspection Methods" – "CAG old demand"



TAG-05 Potential New Groups (Continued)

Insulators:

- "Impact of Pollution Levels in the Insulator Strings of HVDC Lines: Design and Operation Aspects" - A. Pigini (IT)
- "Behavior of Porcelain and Glass Insulators Covered with RTV Silicone" - "CAG old demand"
- "OHL Outages due to Birds' action on Insulators" – "CAG old demand"

Construction:

- "Improvements on construction techniques for OHL's"- E.Jacobs (ZA)

TAG 06 – 2024 PARIS/BORDEAUX MEETING SCHEDULE

B2-AG-06 2024 Meeting
August 21 to 23, 2024 in France

Venue: Grand Hotel Français in Bordeaux

https://grand-hotel-francais.com/

	Wednesday August 21, 2024	Thursday August 22, 2024	Friday August 23, 2024
8:30-12:30	WG B2.71 Interphase spacers J.P. Paradis	WG B2.91 Guideline for long crossing with extreme tension B. Adum	WG B2.70 AWM and bird flight diverters N. Sahlani
12:30-14:00	Lunch		
14:00-18:00	WG B2.84 Modelling limitations G. Diana	WG B2.94 HTLS post installation B. Gary	B2 TAG 06 Mechanical behaviour of conductors and fittings M. Landeira
18:00-22:00		Wine testing & Dinner	

TAG 06 – ACTIVE WORKING GROUPS

- WG B2.66 HTLS Counductors: Handling and Installation (V. Chari)
- WG B2.68 Sustainability of Conductors and Fittings (C. Roze)
- WG B2.70 AWM and Bird Flight Diverters (N. Sahlani)
- WG B2. 71 Interphase Spacers (J.P. Paradis)
- WG B2.84 Wind-Induced Conductor Motion Methodologies (G. Diana)
- WG B2.91 Long (>1000 m) Overhead Line Spans: Design Practices and Field Experience (Boris Adum)
- WG B2.94 Inspection after Installation, Maintenance, and End of Life of High Temperature Conductors and Fittings (G. Baptiste)

New Topics Proposed:

- WGs B2.66 and B2.68 completed their activities in 2023. TB1 is 100%;TB2 is 89% complete
- Conductor Selection Process (TAG 04 and TAG 06 Joint Effort)
- Measurement of Vibration Severity on Clamps Using Elastomer and/or Helical Rods and Dead-ends
- Elastomer Performance in Fittings – Life Expectancy
- Tower Vibration
- Conductor Creep
- Spacer Dampers and the Reliability of OHL Fittings

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For power system expertise

SUMMARY *TAG 07 – Asset Management, Reliability*

Convener:	John McCormack (AU)		
	Balint Nemeth (HU) commencing Oct 2022		
Secretary:	Balint Nemeth (HU)		
TAG Membership:	31 Regular members, 29 Corresponding members		
Publications:	1		
Tutorials:	0		
WG status:	Active (total incl new):	9(including 1 JWG)	
	Completed:		2
	New WG since 2021:		3
	New Proposals:	2	
Meetings:	August 2024		Paris
	2023-2024		3x strategy meetings (Hybrid)

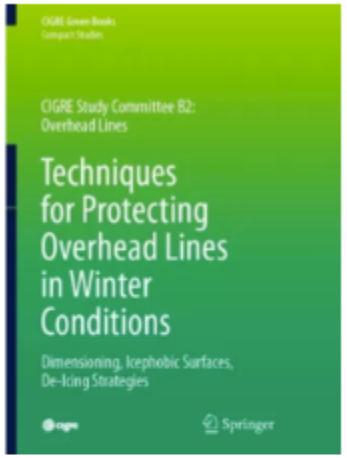
TAG 07 WG – Status as of August 2024 (1 of 2)

WG	Name	Convener	Established	Comment
WG B2.77	Risk Management of OHL's: A Model for Identification, Evaluation, and Mitigation of Operarional Risks	Asif Bhangor (AU)	2020	Work in Progress
JWG B2.85	Emergency Restoration of Overhead Lines	Bing Lin (AU)	2021	Work in Progress; Kick-off Meeting held in Paris 2022
JWG B2/C1.86	Asset Management of Overhead Transmission Lines	Viktor Lorencic (B2-SLO)/Yury Tsimberg (C1-CA)	2022	Work In Progress
WG B2.87	Safety Guidelines for Live Work on Overhead Lines	Balint Nemeth (Hungary)	2022	Work in Progress; Next Meeting in August 2024
WG B2.88	Guidelines for Safety of Overhead Line Construction, Maintenance, & Operations	John McCormack (AU)	2023	Work in Progress
WG B2.89	Impact of rain upon the characteristics of corona discharge from HV AC and DC overhead transmission lines	Bo Zhang (CN)	2023	Expected Publication 2025
WG B2.95	Impact of Extreme Weather Events Under Climate Change on HV Overhead Line Design Standards	Asif Bhangor (AU)	2024	Work in Progress

TAG 07 WG – Status as of August 2024 (2 of 2)

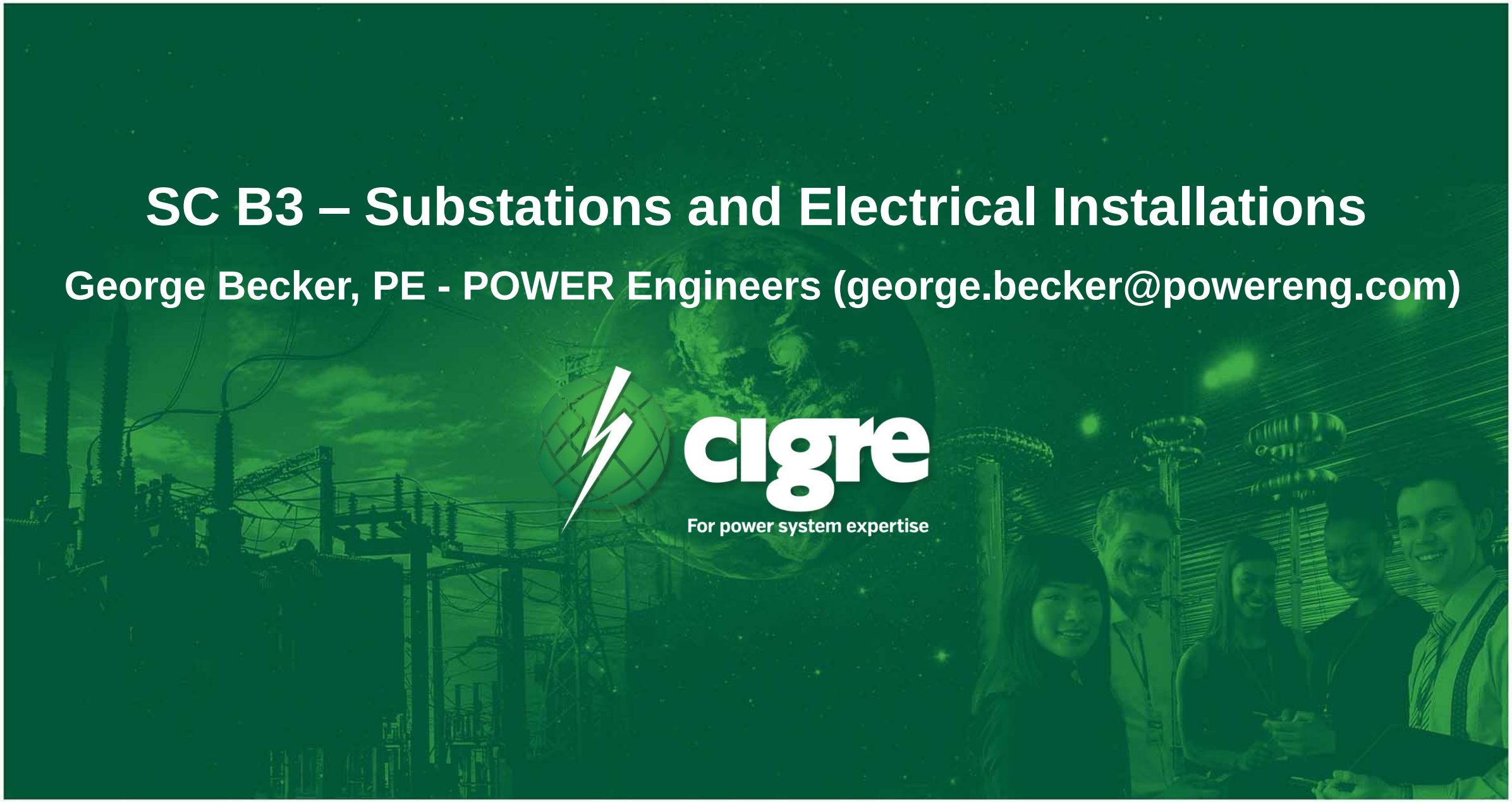
WG	Name	Convener	Established	Comment
WG B2.92	Update on Overhead Transmission Lines Construction Methodologies	Hugo Valente (PT)	2024	Work in Progress
WG B2.93	Artificial Intelligence (AI) Augmented Image-Based Transmission Line Inspection and Condition Assessmen	Janos Toth (CA)	2024	Work in Progress

B2 Green Books Under Preparation

BOOK TITLE		PUBLICATION YEAR	CIGRE SITE REFERENCE
	Techniques for Protecting Overhead Lines in Winter Conditions	2022	Cigre Green Book - Techniques for Protecting Overhead Lines in Winter Conditions
	Compact Overhead Line Design	2024	Cigre Green Book - Compact Overhead Line Design

SC B3 – Substations and Electrical Installations

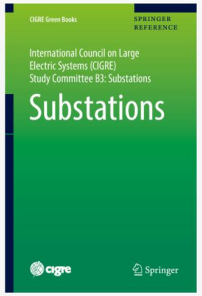
George Becker, PE - POWER Engineers (george.becker@powereng.com)



U.S. Representative on CIGRÉ Study Committee B3 Substations and Electrical Installations
Agenda Topics

- 2024 B3 Study Committee Schedule for the Week
- 2024 B3 Study Committee Structure and Organization
- Study Committee B3 Preferential Subjects for 2024
- Study Committee B3 Active Working Groups 2024
- Study Committee B3 New or Pending (ToRs) Working Groups 2024
- Study Committee B3 Recent Brochures Since 2022 and Brochures Since 2020
- Study Committee B3 Workshops and Tutorials Since 2020
- Study Committee B3 Workshops and Tutorials Paris 2024
- Study Committee B3 Upcoming Meetings and Events
- USNC Mirror Panel For Study Committee B3

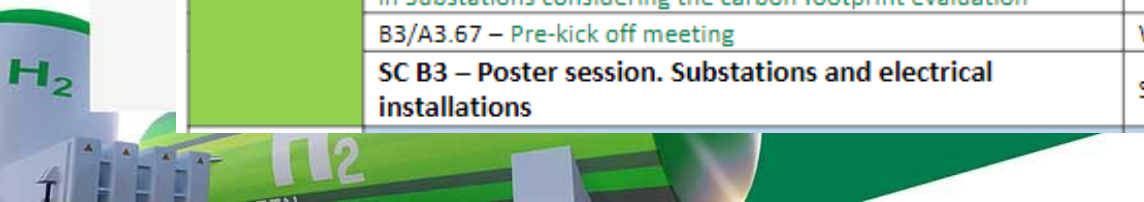
B3 – Substations and Electrical Installations



2024 B3 Study Committee Schedule for the Week:

Please contact the WG convener if you wish to attend

Date	Description	Meeting	Room	Open	Contact/Comments
Sat 24 Aug	B3.AA3 – Discussion on future AA3 TOR topics (Air Insulated Substation)	Working Group	226, Level 2	No	Mark MCVEY mark.mcvey@dominionenergy.com/ Full day
	B3.54 – Earthing System Testing Methods - historic approaches, recent developments and recommended approaches	Working Group	339, Level 3	No	Stephen PALMER spalmer@safearth.com / Full day
Sun 25 Aug	B3.54 – Earthing System Testing Methods - historic approaches, recent developments and recommended approaches	Working Group	328, Level 3	No	Stephen PALMER spalmer@safearth.com / Full day
	Opening Ceremony – Keynote speaker Keisuke SADAMORI, Director of Energy Markets and Security (IEA)	Opening	Grand Amphi	Yes	15:30-17:30, Open to all delegates – Level 1 17:30-18:30, Opening ceremony cocktail – Level 1
Monday 26 Aug 2024	Opening Panel	Opening	Grand Amphi	Yes	08:45-12:00, Open to all delegates – Level 1
	B3/A2/A3/D1 Joint Workshop: "Driving T&D substations and equipment towards ZERO emissions"	Workshop	Room Blue, Level 2	Yes	No registration required 14:30 – 17:30 (SF_6 alternative solutions and CO_2-based LCA)
	B3.64 – Guidelines on Optimising Seismic Design of Substations for Power Resiliency	Working Group	133, Level 1	No	Atsushi ETO eto.atsushi@tepco.co.jp/ Full day
	B3/D1.63 – Guideline for assessing the toxicity of used SF_6 gas onsite and in the lab of T&D equipment above 1 kV in substations	Working Group	329, level 3	No	Roland KURTE roland.kurte@wika.com / Morning
	Task Force – SC B3 Substation Training Course Project	Task Force	343, Level 3	No	Hugh CUNNINGHAM hugh.cunningham@esb.ie/ Morning
Tuesday 27 Aug 2024	**B3 Tutorial (B3/A3.59)**: "Guidelines to SF_6 end-of-life treatment of T&D equipment (> 1 kV) in substations"	SC B3 Tutorial	Room Maillot, Level 2	Yes	No registration required 10:40 – 12:40
	B3.52 – Neutral Grounding Method Selection and Fault Handling for Substations in the Distribution Grid	Working Group	132	No	Li JINZHONG jinzhong-li@sgcc.com.cn / Tony YIP htyip@kehui.com/ Morning
	JWG B3/A2/A3/C3/D1.66 – Guidelines for Life Cycle Assessment in Substations considering the carbon footprint evaluation	Working Group	351, level 3	No	Akshaya Prabakar Akshaya.Prabakar@tennet.eu/ Dennis van der Born D.vanderBorn-2@tudelft.nl/ Morning
	B3/A3.67 – Pre-kick off meeting	Working Group	133, Level 1	No	Maik HYRENBACH maik.hyrenbach@de.abb.com/ Afternoon
	SC B3 – Poster session. Substations and electrical installations	SC B3 event	Hall Ternes	Yes	14:30 – 18:00; Hall Ternes is located at Level 1



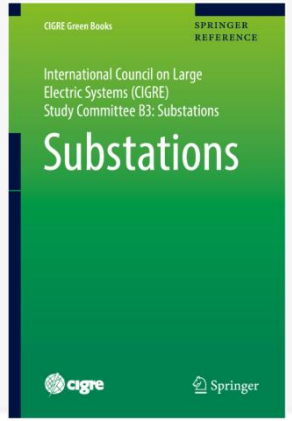
B3 – Substations and Electrical Installations

2024 B3 Study Committee Schedule for the week:

Please contact the WG convener if you wish to attend

Wednesday 28 Aug 2024	**SC B3 – Group Discussion Meeting: Substations and electrical installations**	Discussion Meeting	Grand Amphi	Yes	08:45 – 18:00, All delegates welcome. Contributors must attend in person.
Thursday 29 Aug 2024	**SC B3 – 61st Annual Meeting**	Regular SC meeting	353, level 3	No	Open to all SC Members (Regular, Observer, Additional) and WG Convenors/Secretaries / Full day
	B3/A3.60 User guide for non-SF_6 gases and gas mixtures	Working Group	231-232	No	Piet KNOL Piet.Knol@tatasteeleurope.com / Morning Bernard LUTZ Bernhard.Lutz@fichtner.de / 09:00-12:30
	Cocktail reception	All delegates	"Pavillons de Bercy"	Yes	Cocktail reception 19:30 – 23:30 "Pavillons de Bercy - Musée des arts Forains"
Friday 30 Aug 2024	B3.56 – Application of 3D Technologies in Substation Engineering Works	Working Group	339, level 3	No	Philip KONIG philip.konig@gmail.com / Morning Samuel NGUEFEU samuel.nguefeu@rte-france.com

Any questions? https://b3.cigre.org/ or contact samuel.nguefeu@rte-france.com (B3 secretary)



Study Committee B3 Organization

SC B3 Structure 2023

Strategic Advisory Group (Koji Kawakita)
Quality Assurance Team (Terry Krieg, John Finn, Colm Twomey)
SC B3 Secretary (Samuek Nguefeu)

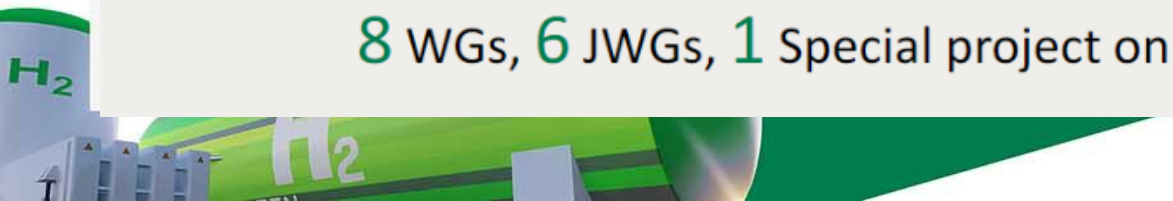
Chairperson
Koji Kawakita

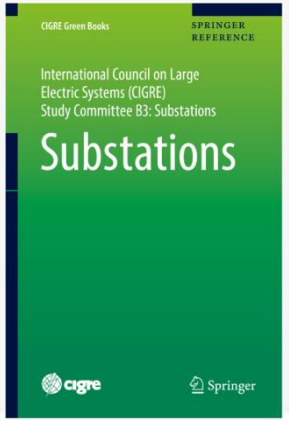
Customer Advisory Group (John Randolph)
Tutorial Advisory Group (Hugh Cunningham)

Study Committee
24 Regular Members, 4 Regular Additional Members, 15 Observer Members + 4 Area Advisors, WG Convenors

Workiing Areas: AA1	AA2	AA3	AA4
Substation Concepts and Development Advisor: Mark Osborne	Gas Insulated Substations Advisor: Mark Kuschel	Air Insulated Substation Advisor: Mark McVey	Substation Management & Digital Integtation Advisor: Johan Smit
B3.49 Review of substation busbar components reliability	B3.50 Concepts for on-site HV testing of GIS	B3.64 Guidelines on Optimising Seismic Design of Substations for Power Resiliency	B3.56 Application of 3D Technologies in Substation Engineering Works
B3.52 Neutral Grounding Mode Selection and Fault Handling for Substation in Distribution Grid	JWG B3/A3.59 Guidelines for SF6 end-of-life treatment of T&D equipment (>1kV) in Substations		B3.61 Risk and asset health-based decision making in existing substations
B3.54 Earthing System Test Methods	JWG B3/A3.60 User guide for non-SF6 gases and gas mixtures in Substations		JWG B3/D2.62 Life-long Supervision and Management of Substations by use of Sensors, Mobile Devices, Information and Communication Technologies
B3.65 Guidelines for the Selection and Design of escape routes for substations rated above 1kV AC and 1.5 kV DC	JWG B3/D1.63 Guideline for assessing the toxicity of used SF6 gas onsite and in the lab of T&D equipment above 1 kV in substations	New WG in 2022/2023	Legend: Current
JWG B1/B3.74 Recommendations for a performance guideline of Polymer Insulated Busbars	JWG B1/B3/D1.79 Recommendations for dielectric testing of HVDC gas insulated system cable sealing ends	Greenbook Project 2 - SF6 Guidebook	Joint WG led by B3
			Special Project / Joint WG led by Other SCs

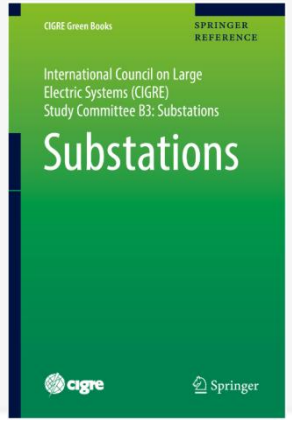
8 WGs, 6 JWGs, 1 Special project on going





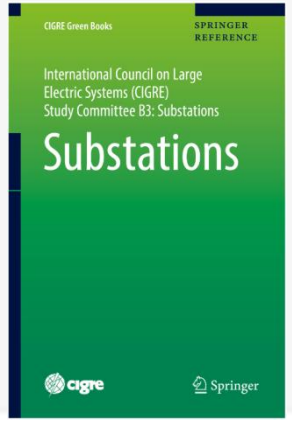
Study Committee B3 Preferential Subjects for 2024

- PS 1 Challenges & New Solutions in T&D Substation Design and Construction for Energy
  - ✓ Design impacts on substations from on-offshore wind, PV, hydrogen, small modular reactors, EV charging infrastructure etc.
  - ✓ New functions in substation (energy storage, synchronous compensators, etc.).
  - ✓ HV-MV DC substation and GIS/GIL application for DC network.
  - ✓ New design, manufacturing and construction towards circular economy.
- PS 2 Return on Operational Experiences for Sustainable Substation Management
  - ✓ Initiatives to strengthen resilience, reliability and security.
  - ✓ Challenge of sustainable management (advanced asset management and end of life management).
  - ✓ Lesson learned from operational experience of SF_6 alternatives solutions.
  - ✓ New findings from user experiences on digital transformation (DX) and digital substation.
  - ✓ New set of competency for technologies, knowledge transfer and high standards of education engineering skills.



Study Committee B3 Active Working Groups

- **B3.49:** Review of Substation Busbar Component Reliability
- **B3.52**: Neutral Grounding Method Selection and Fault Handling for Substations in the Distribution Grid
- **B3.54**: Earthing System Testing Methods - historic approaches, recent developments and recommended approaches
- **B3.56**: Application of 3D Technologies in Substation Engineering Works
- **B1/B3/D1.79**: Recommendations for dielectric testing of HVDC gas insulated system cable sealing ends
- **B1/B3.74**: Recommendations for a performance guideline of Polymer Insulated Busbars
- **B3/A3.60:** User guide for non-SF_6 gases and gas mixtures
- **B3.61:** Risk and asset health-based decision making in existing substations
- **B3/D2.62**: Life-long Supervision and Management in Substations by Sensors, Mobile Devices and ICTs
- **B3/D1.63**: Guideline for assessing the toxicity of used SF_6 gas onsite and in the lab of T&D equipment above 1 kV in substations
- **B3.64**: Guidelines on Optimizing Seismic Design of Substations for Power Resiliency
- **B3.65:** Escape routes for substations rated above 1kV AC and 1.5 kV DC
- **B3/A2/A3/C3/D1.66:** Guidelines for Life Cycle Assessment in Substations considering the carbon footprint evaluation
- **B3/A3.67:** Operational safety of Medium Voltage GIS in case of abnormal leakage
- **SF_6 Green Book**: Reference book on SF_6



Study Committee B3 New or Pending Working Groups

- **B3.68:** Experience of Offshore Substation (OSS) operation and maintenance (originally B3.69 newly issued as B3.68)
- **B3.69:** Process Requirements for Commissioning and Inspecting Substations (originally B3.68 will be newly issued as B3.69)

CIGRE Study Committee B3

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG SC B3.XX	Name of Convenor: First name LASTNAME (Country) E-mail address:
Strategic Directions #1:	Sustainable Development Goal #5:

This Working Group addresses these Energy Transition topics:

- [X] Storage
- [ ] Hydrogen
- [ ] Digitalization
- [ ] Sustainability and Climate Change
- [ ] Grids and Flexibility
- [x] Solar PV and Wind
- [ ] Consumers, Prosumers and Electrical Vehicles
- [x] Sector Integration
- [ ] None of them

Potential Benefit of WG work #5:

Title of the Group: Process Requirements for Commissioning and Inspecting Substations

Scope, deliverables, and proposed time schedule of the WG:

Background:

More and more substations are being designed and constructed by consultants and contractors. There are many cases where the purchaser is unsure of the quality and the level of documentation required of a newly built substation. Regulatory and contractual compliance also requires proper inspection and testing to insure proper warranty of substation facilities and equipment. For example, the completion of the construction hand off requires some type of commissioning document. This brochure could be used as a template to structure such a document. The add advantage would be a ready-made inspection document that would detail required maintenance and test information.

The objective of this WG is to review current practices and to produce a set of guidelines and a template for acceptance of a new or existing AIS substation. The brochure would cover commissioning for new work and process for inspecting a substation for maintenance purposes, etc.

Purpose/Objective/Benefit of this work:

Practises for substation commissioning and inspection while in service vary from company to company with out a standard or a defined best practise. The Brochure would be the collection of best utility practises that would outline new work but also cover topics such as damage from copper theft or vandalism as part of existing inspections. With contractors and new workers tasked with inspection the brochure will be an appreciated guide to the industry and asset owners.

Scope:

1. Review the various practices applied in the utilities regarding the following aspects.
   (1) Commissioning of substation
   - What data is required
   - Define responsibility for maintenance and inspection

CIGRE Study Committee B3

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG[1] B3.69	Name of Convenor: Simon WADDINGTON (UK) E-mail address: simon.waddington@woodplc.com
Strategic Directions #[2]: 2	Sustainable Development Goal #[3]: 9

This Working Group addresses these Energy Transition topics:

- [ ] Storage
- [ ] Hydrogen
- [ ] Digitalization
- [x] Sustainability and Climate Change
- [x] Grids and Flexibility
- [x] Solar PV and Wind
- [ ] Consumers, Prosumers and Electrical Vehicles
- [ ] Sector Integration
- [ ] None of them

Potential Benefit of WG work #[4]: 3, 5, 6

Title of the Group: Experience of Offshore Substation (OSS) operation and maintenance

Scope, deliverables, and proposed schedule of the WG:

Background:

It is over 20 years since the first offshore substation (OSS) was commissioned, and since then, more than 200 AC & DC offshore facilities have been commissioned worldwide.

Despite the existence of specific standards like DNV-ST-0145, which provides guidelines for the design and construction of offshore substations, there is still no comprehensive international standard (IEC, ISO, or otherwise) that addresses all the very specific technical issues in this area. Although the sector is still growing and there is significant operational experience to report on, access to this valuable experience remains very limited.

Purpose/Objective/Benefit of this work:

The Working Group is to produce a technical brochure which synthesises the technical knowledge and experience of all stakeholders regarding the life-cycle issues associated with these offshore facilities in substations. The hope is this will underpin any future establishment of international standards and guidance (ISO or IEC document suite).

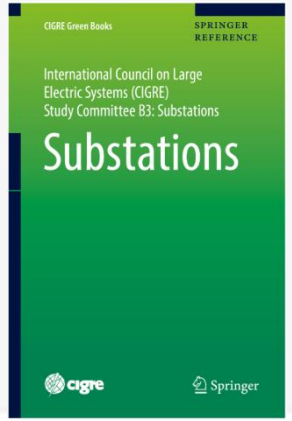
Scope:

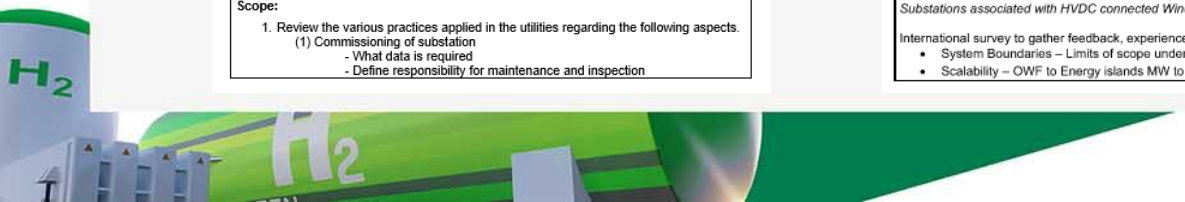
Review Technical Brochure 483; *'Guidelines for the Design & Construction of AC Offshore Substations for Wind Power Plants'* and TB 612; *'Special Considerations for AC collector Substations associated with HVDC connected Wind Power Plants'*.

International survey to gather feedback, experience and statistics on:

- System Boundaries – Limits of scope under review in a Offshore Wind Farm (OWF)
- Scalability – OWF to Energy islands MW to GW

- **Terms of Reference (ToRs)**

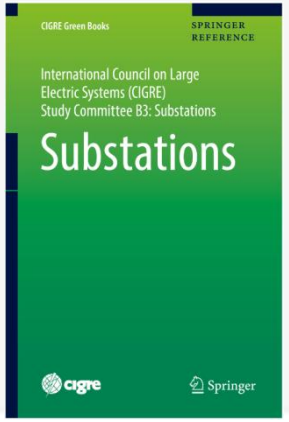




Study Committee B3 Recent Brochures Since 2022 and Brochures Since 2020

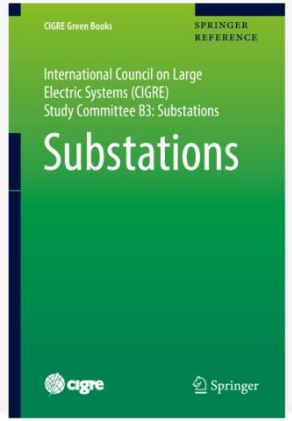
- **TB 802:** Application of Non-SF_6 Gases or Gas-mixtures in Medium and High Voltage Gas-insulated Switchgear
- **TB 805:** Guide for Safe Work Methods in Substations
- **TB 807:** Application of Robotics in Substations
- **TB 814:** LPIT applications in HV Gas Insulated Switchgear
- **TB 823:** Substation servicing and supervision using mobile devices ad smart sensing
- **TB 834:** Reliability analysis and design guidelines for LV AC auxiliary systems
- **TB 858:** Asset health indices for equipment in existing substations
- **TB 870:** Service continuity Guide for HV GIS above 52kV (2024)
- **TB 930:** Review of substation busbar component reliability (2024)
- **TB 886:** Guidelines for Fire Risk Management in Substations (2024)
- **TB 895:** Impact on Engineering and Lifetime Management of Outdoor HV GIS (2024)
- **TB 898:** Knowledge transfer of substation engineering and experiences (2024)
- **TB 907:** Mobile Substations Incorporating HV GIS (2024)
- **TB 920:** Concepts for on-site HV testing of GIS after installation, extension, retrofit or repair (2024)
- **TB 869:** Design Guideline for Substations connecting battery energy storage (2024)

solutions (BESS)



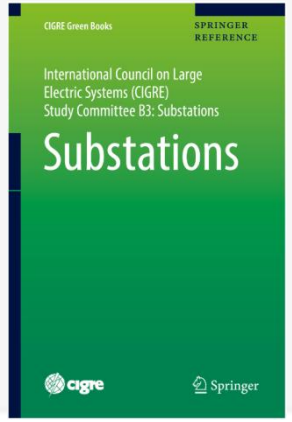
Study Committee B3 Workshops and Tutorials Since 2020

- Residual Life Aspects on GIS (Karsten Pohlink, TB 499)
- Upgrading & Uprating Substations (Akira Okada, TB 532)
- Obtaining Value from On-line Monitoring (Arthur Mackrell, TB 462)
- Standardization vs. Innovation in Substation Design (Terry Krieg, TB 389)
- Application Guidelines for Turn-Key Projects (Akira Okada, Gilles Tremouille TB 439)
- Circuit Configuration Optimization (Gerd Lingner, TB 585)
- Responsible Use of SF_6 - Challenges and Options (Peter Glaubitz)
- High Voltage Offshore AC substations (John Finn, TB 483)
- SF6 analysis for AIS, GIS and MTS Condition Assessment (Eamonn Duggan TB 567)
- Considerations for AC Collector Systems and Substations connected with HVDC Wind (Douglas Ramsay TB 612)
- Substation Design for Severe Climate Condition (Mark McVey, TB 614)
- Saving Through Optimized Maintenance of AIS Substations (Hugh Cunningham, TB 660)
- Application of Non-SF6 Gases or Gas-mixtures in Medium Voltage and High Voltage Gas-insulated Switchgear (Piet Knol, TB 802)
- NCIT Applications in HV Gas Insulated Switchgear (Robert Luescher, TB 814)



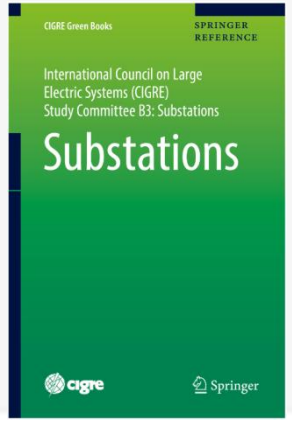
Study Committee B3 Workshops and Tutorials Paris 2024

- B3/A2/A3/D1 Joint Workshop: “Driving T&D substations and equipment towards ZERO emissions”
- B3 Tutorial B3/A3.59: “Guidelines to SF_6 end-of-life treatment of T&D equipment (> 1 kV) in substations”



Study Committee B3 Upcoming Meetings and Events

- CIGRE Canada Conference & Exposition, Winnipeg, CA, October 28 to 31, 2024
- The Grid of the Future, Raleigh, NC, USA, November 11 to 14, 2024
- CIGRE B3 & A3 Joint Colloquium, Klingenberg, Germany, March 24 to 28, 2025
- CIGRE Symposium 2025 Trondheim, Norway, May 12 to 15, 2024
- CIGRE 2025 International Symposium, Montreal, CA, September 29 to October 2, 2025



USNC Mirror Panel For Study Committee B3

Mirror Panel US.B3

Pages

Blog

Dashboard

User Admin

PAGE TREE

- 0 US.B3 General Instructions and Policies
- 1 US.B3 Contact Details and Access Permissions
- United States User engagement in international SC
- US.B3 Discussion on Topics of Interest
- US.B3 Discussions on Published Technical Brochures
- US.B3 Events
- US.B3 Liaison and Reporting
- US.B3 Resources, Links and Reference Material
- 06 US.B3 Preferential Subject Proposals for international SC
- 05 US.B3 Working Group Proposals for international SC
- 04 US.B3 Panel Meetings

Pages

Mirror Panel US.B3 Home

Created by Gary Williams, last modified by George BECKER on Jan 20, 2024

Welcome to B3 Substations and Electrical Installations - National Committee of the United States

Our Mission

The National Committee of the United States and the local B3 Substations and Electrical Installations representative organization of CIGRE in the United States are an important part of CIGRE's global knowledge program of work. The local B3 Substations and Electrical Installations representative organization is committed to understanding our local conditions and feeding that into the CIGRE global knowledge technical program to find solutions for our local challenges, as well as contribute to the global CIGRE community.

cigre SC B3

Our Objectives

1. Represent the views of the National Committee of the United States related to Substations and Electrical Installations - Study Committee B3.
2. Present proposals for new work based on the needs and requirements generated by the views of the National Committee of the United States for B3 Substations and Electrical Installations.
3. Recruit experts to participate and contribute to Working Groups and Task Forces in cooperation with the National Committee of the United States.
4. Act as liaison for Study Committee B3 with the National Committee of the United States.
5. Act as liaison for Study Committee B3 with IEEE Substation Committee and IEEE Switchgear Committee.
6. Inform Mirror Panel Members about Study Committee B3 activities such as; Working Groups, Technical Sessions, Symposiums, Colloquium, etc.
7. Contribute to the life and workings of Study Committee B3 by encouraging the National Committee of the United States to participate in Study Committee B3 Meetings and Events.

Study Committee B3 Information

Study Committee B3 Substations and Electrical Installations - Scope

Study Committee B3 Substations and Electrical Installations - Structure

Active CIGRE Study Committee B3 Working Group List Link

Active Study Committee B3 Working Groups

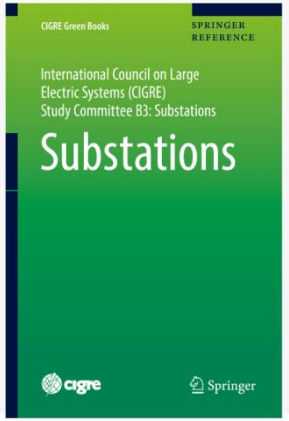
Study Committee B3 Substations and Electrical Installations - 2024 Preferential Subjects

PS 1 Challenges & New Solutions in T&D Substation Design and Construction for Energy Transition

- Design impacts on substations from on-offshore wind, PV, hydrogen, small modular reactors, EV charging infrastructure etc.
- New functions in substation (energy storage, synchronous compensators, etc.)
- HV-MV DC substation and GIS/GIL application for DC network.
- New design, manufacturing and construction towards circular economy.

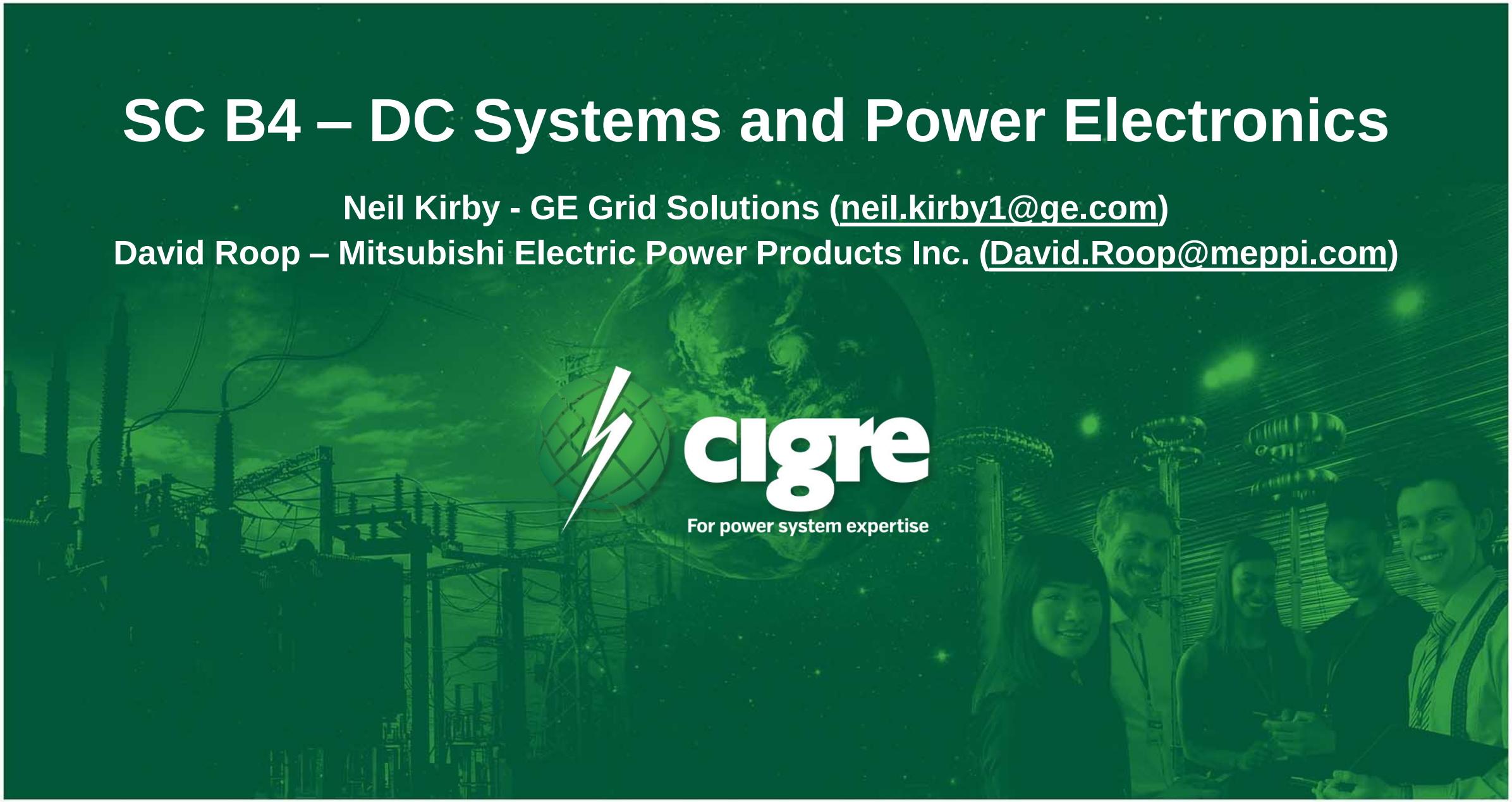
PS 2 Return on Operational Experiences for Sustainable Substation Management

- Initiatives to strengthen resilience, reliability and security.
- Challenge of sustainable management (advanced asset management and end of life management).
- Lesson learned from operational experience of SF_6 alternatives solutions.
- New findings from user experiences on digital transformation (DX) and digital substation.
- New set of competency for technologies, knowledge transfer and high standards of education engineering skills.



SC B4 – DC Systems and Power Electronics

Neil Kirby - GE Grid Solutions (neil.kirby1@ge.com)
David Roop – Mitsubishi Electric Power Products Inc. (David.Roop@meppi.com)



SC B4 – Structure and Scope

Chairman: **Joanne HU**
Secretary: **Rebecca OSTASH**
Webmaster: **Sylvia Sanz VERDUGO**

3 Advisory Groups
21 Working Groups + 13 JWG
1 Task Force + 2 JTF

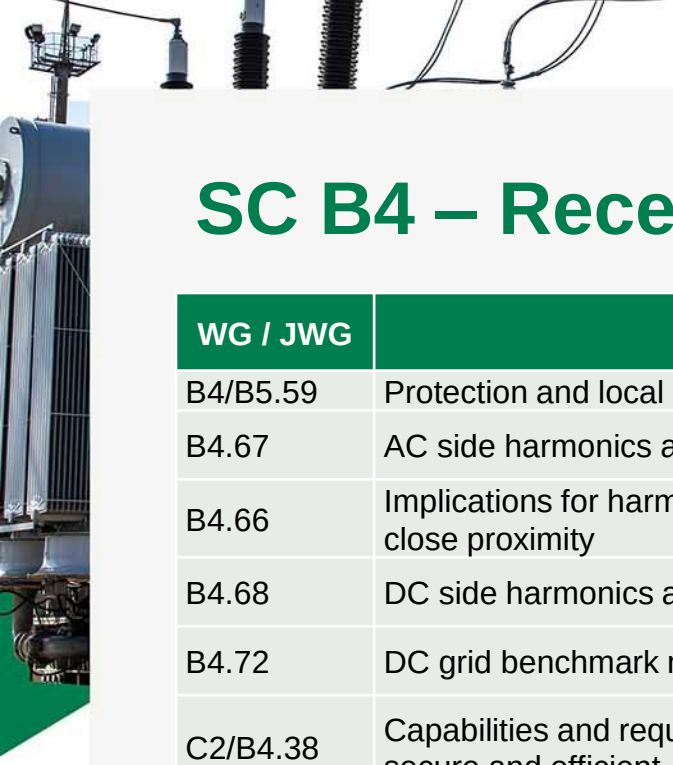
Scope:

- High Voltage Direct Current systems and power electronic equipment for AC systems.
- DC systems and equipment and Power Electronics for other applications such as Distribution, and Power Quality improvement.
- DC converters for energy storage.
- (Overhead lines or cables are not included SC B4)

SC B4 – Advisory Groups

AG/WGs		Title	Convener	Secretary	Publish Date	TB #	Report
B4.AG01		Strategic advisory group	Joanne Hu	Rebecca Ostash			
B4.AG02		B4 Newsletter	Hani SAAD				
B4.AG03		Communication and website	Sylvia Sanz VERDUGO				
B4.AG04		HVDC/FACTS System performance	Josh Burroughs	Phaedra Taiarol			
HVDC		Protocol for reporting Operation Performance of HVDC			2014	590	
HVDC	TF4	Development of Protocol for DC Grids	Sergio DE Santo	Neil Kirby	2024	?	Final comments being reviewed
HVDC					Paris Session Years		Biennial HVDC performance survey results
FACTS		Protocol for reporting Operational Performance of FACTS			2018	717	
FACTS					Paris Session Years		Biennial Static Var Compensator / STATCOM performance survey results
TRF					2021	859	HVDC transformer failure survey results from 2013 to 2020
B4.NGN		B4 NGN group	Yuebin Zhou				
B4.WiE		B4 Women in Energy group	Rebecca Ostash				

B4 encourages the active involvement of NGN and WiE members in all of our activities.

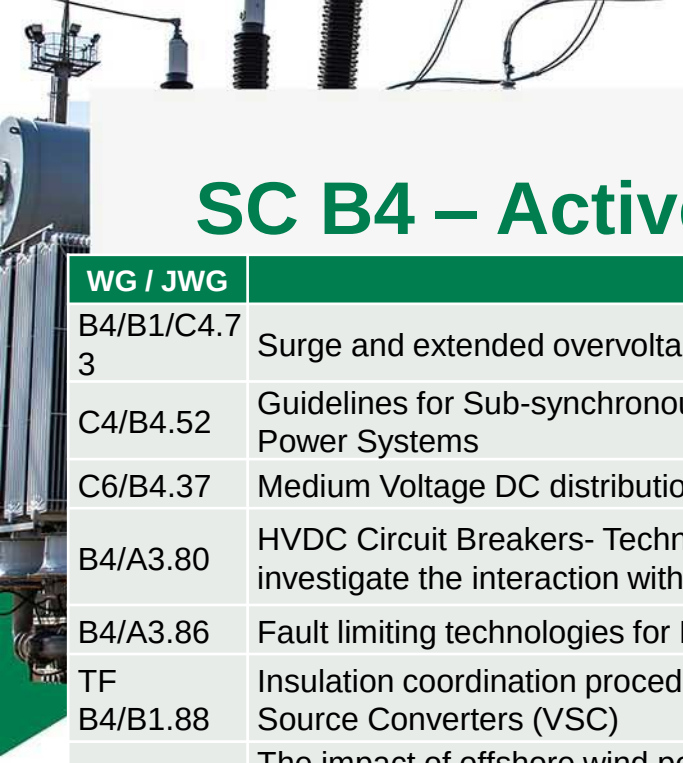


SC B4 – Recent Published Brochures

WG / JWG	Title	Convenor	Publication Date	TB #
B4/B5.59	Protection and local control of HVDC-grids	Kees Koreman	2018	739
B4.67	AC side harmonics and appropriate harmonic limits for VSC HVDC	Nigel Shore	2019	754
B4.66	Implications for harmonics and filtering of the installation of HVDC converter stations in close proximity	F. Cattan-Jusan	2020	798
B4.68	DC side harmonics and filtering in HVDC transmission systems	Nigel Shore	2020	811
B4.72	DC grid benchmark models for system studies	T. An	2020	804
C2/B4.38	Capabilities and requirements definition for Power Electronics based technology for secure and efficient system operation and control	Jan van Putten	2020	821
B4.70	Guide for Electromagnetic Transient Studies involving VSC converters	Sébastien Dennetière	2021	832
B4.75	Feasibility Study for assessment of lab losses of VSC Valves measurement of VSC valves	Christian Rathke	2021	844
B4.76	DC-DC converters in HVDC Grids and for connections to HVDC systems	Dragan Jovcic	2021	827
B4.78	Cyber Asset Management for HVDC/FACTS Systems	Kerry Walker	2021	847
B4.74	Guide to Develop Real Time Simulation Models (RTSM) for HVDC Operational Studies	Qi Guo	2022	864
B4.81	Interaction between nearby VSC-HVDC converters, FACTs devices, HV power electronic devices and conventional AC equipment	Kamran Sharifabadi	2024	934
B4.83	Flexible AC Transmission Systems (FACTS) controllers' commissioning, compliance testing and model validation tests	Babak Badrzadeh	2022	867
B4.84	Feasibility study and application of electric energy storage systems embedded in HVDC systems	Hani Saad	2024	935

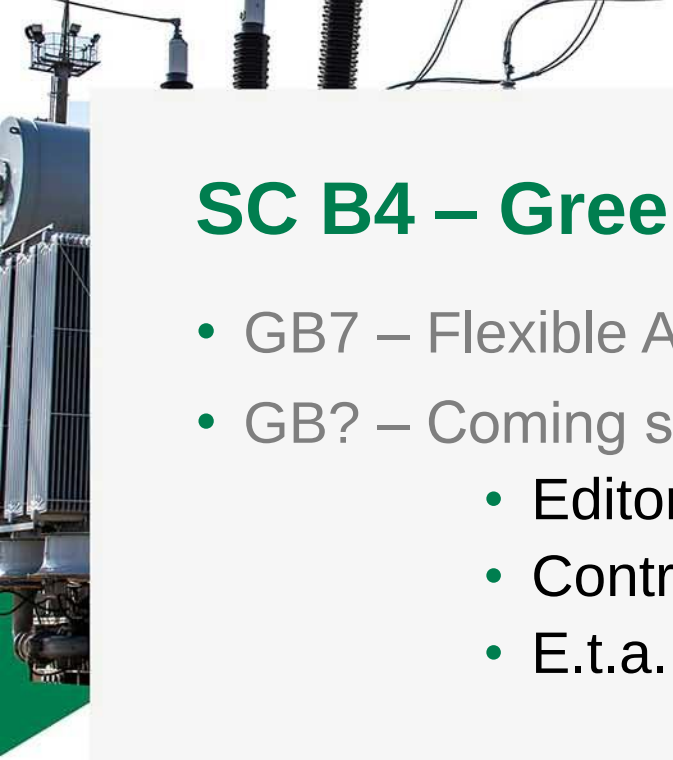
SC B4 – Active Working Groups

WG / JWG	Title	Convenor	Secretary	Start Date	End Date
B4.64	Impact of AC System Characteristics on the Performance of HVDC schemes	Jef Beerten	Alejandro Bayo Salas	Mar-13	Dec-16
B4.69	Minimizing loss of transmitted power by VSC during Overhead line fault	Dennis Woodford	Maryam Salimi	Jan-15	Dec-17
B4.71	Application guide for the insulation coordination of Voltage Source Converter HVDC (VSC HVDC) stations	Mohaddes Mojtaba	Adapa Ram	Mar-15	Dec-18
B4.79	Hybrid LCC/VSC HVDC Systems	Hong Rao	Yi Zhang	Oct-18	Jan-22
B4.82	Guidelines for Use of Real Code in EMT Models for HVDC, FACTS and Inverter based generators in Power Systems Analysis	Garth Irwin		Sep-19	Apr-23
B4.85	Interoperability in HVDC systems based on partially open-source software	Staffan Norrga		Jan-20	Jul-23
B4.87	Voltage Source Converters (VSC) HVDC responses to disturbances and faults in AC systems which have low synchronous generation.	Carl Barker			
B4.89	Condition Health Monitoring and predictive maintenance of HVDC Converter Stations	Nadine Chapalain		Jun-20	Sep-22
B4.90	Operation and maintenance of HVDC and FACTS Facilities	Les Brand		Dec-20	Oct-23
B4.91	Power-electronics-based transformer technology, design, grid integration and services provision to the distribution grid	Marco Liserre	Giovanni De Carne	Dec-20	Dec-23
B4.92	STATCOMs at Distribution Voltages	John Wright-Smith		Oct-20	Dec-23
B4.94	Application of VSC-HVDC in a System Black Start Restoration	Arash Fazel Darbandi		Dec-22	Dec-24
B4.95	Developments in Power Semiconductor Technologies and Applications in HVDC/FACTS	Joerg Dorn		Oct-23	Dec 26
B4.96	HVDC connection of power system with high proportion of photovoltaic (PV) generation	Qi Guo		Oct-23	Mar-27
B4.98	Design considerations in integration of DC systems to meshed DC/AC Transmission networks	Afshin Pashaei		Oct-23	Mar-26
B4.99	Design and construction of offshore VSC Converter Stations	Sofie Nilsson		Oct-23	Sep-26
B4.100	Dynamic active and reactive power supporting devices for VSC HVDC systems	Chandana Karawita		Oct-23	Sep-26
B4.101	Industrial implementation and application of Grid Forming Energy Storage Systems (GFM ESS)	Changjiang ZHAN		Dec23	Nov-26
B4.102	Technical Requirements and Scenario Considerations on Grid-Forming Capabilities of VSC-HVDC Systems	Zhiyong Yuan		Jun-24	Jun-27
B4.103	AC Network Equivalents for HVDC and FACTS Project Studies	Hiranya Suriyaarachchi		Jun-24	Jun-27
B4.104	HVDC Digital Twin – concepts and roadmap	Dr Arkadiusz BUREK		Jun-24	Jun-26



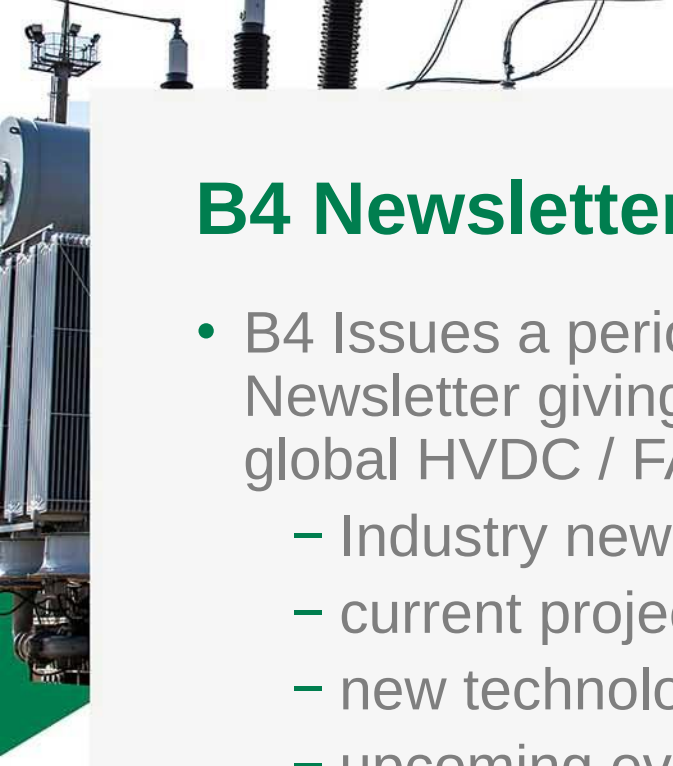
SC B4 – Active Joint Working Groups

WG / JWG	Title	Convenor	Secretary	Start Date	End Date
B4/B1/C4.73	Surge and extended overvoltage testing of HVDC Cable Systems	Markus Saltzer	Anders Gustafsson	Jan-16	Dec-17
C4/B4.52	Guidelines for Sub-synchronous Oscillation Studies in Power Electronics Dominated Power Systems	Chandana Karawita	Udaya Annakkage	Jan-19	Jan-21
C6/B4.37	Medium Voltage DC distribution systems	James Yu		Aug-18	Jul-21
B4/A3.80	HVDC Circuit Breakers- Technical Requirements, Stresses and Testing Methods to investigate the interaction with the system	Junzheng Cao	Jiachen Wang	Jan-19	Aug-22
B4/A3.86	Fault limiting technologies for DC grids	Zhiyuan He			
TF B4/B1.88	Insulation coordination procedure for DC cable systems in HVDC stations with Voltage Source Converters (VSC)	Kees Koreman		Jul-20	Dec-21
C2/B4.43	The impact of offshore wind power hybrid AC/DC connections on system operations and system design.	Christer Norlander		Jul-22	May-24
B4/C4.93	Development of Grid Forming Converters for Secure and Reliable Operation of Future Electricity Systems	Dechao Kong		Sep-22	Aug-25
C4/A3/B2/B4.75	Guide to procedures for the creation of contamination maps required for outdoor insulation coordination	Massimo Marzinotto		Dec-23	Dec-26
B4/C4.97	Benchmarking of simulation Models for control interaction in meshed AC networks with multiple converters	Arash Fazel Darbandi		Dec-23	Mar-26
C1/B4.49	Offshore transmission planning	Cornelis Plet		Dec-23	Jun-25
TF B1/B3/B4/C4/D1.95	Harmonization of voltage designations and definitions across different HVDC component technologies	Bruno Bisewski		Dec-22	Jun-24
C4/B4.72	Lightning and Switching Induced Electromagnetic Compatibility (EMC) issues in DC power systems and new emerging power electronics-based DC equipment	Qingmin Li		Aug-22	Oct-25



SC B4 – Green Books

- GB7 – Flexible AC Transmission Systems
- GB? – Coming soon ….. High Voltage DC
    - Editors-in-Chief : Stig Nilsson + Bjarne Andersen
    - Contributors active on small number of remaining sections
    - E.t.a. : 2024 ?



B4 Newsletter

- B4 Issues a periodical Newsletter giving information on global HVDC / FACTS activities:
  - Industry news
  - current projects
  - new technologies
  - upcoming events
  - etc.

B4 Newsletter – 2024-June-30

cigre | SC B4: DC systems and power electronics *Newsletter*

B4 Newsletter - 30th of June 2024

Editors: Hani SAAD, Rebecca OSTASH, Joanne HU

Table of contents

1. New WGs 2
2. Recent Activities and Upcoming Events 2
3. News on HVDC Projects and Status 5
4. Insight on new technologies 14

SC B4 – 2024 Paris Session B4 Activities

Activity	Details	Day	Time	Room	Floor
Opening Ceremony	**Welcome Address, Keynote Speech, Welcome Cocktails**	**Sunday 25th August**	**15:30 – 17:30 (17:30 - 19:30 Cocktails)**	**Grand Amphitheatre (Exhibition Floor)**	**Level 0 (Level 1, 2, 3)**
Tutorial	**B4 - Hybrid LCC/VSC HVDC Systems**	**Monday 26th August**	**14:00 - 15:30**	**Salle Maillot**	**Level 2**
Tutorial	*B1 – HVDC Cables, Technical Brochures 852, 853 and more*	*Monday 26th August*	*16:10 - 18:00*	*Salle Maillot*	*Level 2*
SC Workshop	**B4 - Interoperable multi-terminal HVDC systems: from dream to reality**	**Tuesday 27th August**	**08:30 - 12:00**	**Rm 251**	**Level 2**
SCB4 Committee Meeting	**SC B4 Committee Admin Meeting**	**Tuesday 27th August**	**08:30 – 17:30**	**-**	**-**
Poster Session	**SC B4 Poster Session - DC systems and power electronics**	**Wednesday 28th August**	**16:00 - 18:00**	**Hall Ternes**	**Room 2, Level 1**
Group Discussion	**SCB4 Preferential Subjects: - DC equipment and systems - FACTS and power electronics - New technologies and concepts of DC and FACTS enabling energy transition**	**Thursday 29th August**	**08:45 – 18:00**	**Grand Amphitheatre**	**Level 2**

SC B5 – Protection and Automation

Jonathan Sykes – Quanta Technology (jsykes@quanta-technology.com)

SC B5 – Structure and Scope

Chair: **Volker Leitloff FR (Past Chair: Rannveig Løken)**
Secretary: **Peter Bishop NZ (outgoing: Richard Adams)**
Webmaster: **Richard Adams**

5 Advisory Groups
26 Working Groups (including 2 JWG)
5 Completed Working Groups (including 1 JWG)

Scope:

- Power system protection
- Substation control and automation
- Remote control systems and equipment
- Metering systems and equipment

SC B5 – Advisory Groups

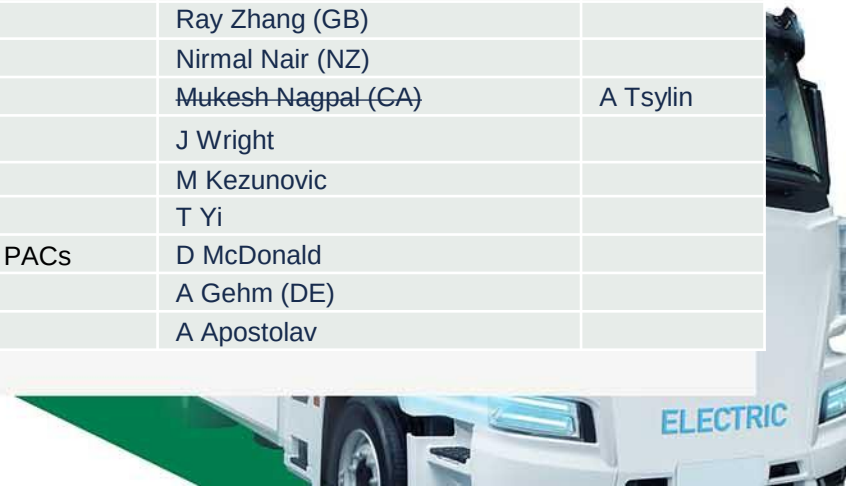
AG/WGs	Title	Convener	Secretary
SAG	Strategic advisory group	Volker Leitloff (FR)	Peter Bishop (NZ)
TG.51	Substation Automation and Remote Control	Volker Leitloff (FR)	
TG.52	Protection and Monitoring	Cedric Moors (BE)	
TG.53	New Network Requirement	Nirmal Nair (NZ)	
TAG	Technical Advisory Group	Anita Oomman (South Africa)	

SC B5 – Recent Published Brochures

WG / JWG	Title	Publication Date	TB #
B5.64	Methods for Specification of Functional Requirements of Protection, Automation and Control	2024	926
B5.48	Protection for Developing Network with Limited Fault Current Capability of Generation	2023	896
B5.60	Protection, Automation and Control Architectures with Functionality Independent of Hardware	2023	891
B5/D2.67	Time in Communication Networks, Protection and Control Applications – Time Sources and Distribution Methods	2022	884
B5.52	Analysis and comparison of fault location systems in AC power networks	2021	854
B5.62	Life Cycle Testing of Synchrophasor Based Systems used for Protection, Monitoring and Control	2021	843
C4/B5.41	Challenges with series compensation applications in power systems when overcompensating lines	2021	829
B5.50	IEC 61850 based substation automation systems – Users expectations and stakeholders interactions	2020	819

SC B5 – Active Working Groups

WG / JWG	Year	(Title	Convenor	Status/Notes
Finished		48(Tianshu Bi) 60(Alexander Voloshin) 64(Iony Patriota de Siqueira) 70?(Alexander Voloshin) B5/D2.67(Yubo Yuan-B5)		
B5.51	2013	Methods & Application of Remotely Accessed Information for SAS Maintenance and Operation	Li Li (CN)	
B5.55	2015	Application of Travelling Wave Technology for Protection and Automation	~~Peter Crossley (GB)~~	A. Guzman
B5.56	2015	Optimization of Protection Automation and Control Systems	Peter Kreutzer (CH)	
B5.57	2016	New challenges for frequency protection	Vladimir Terzija (GB)	
B5.58	2016	Faster protection and network automation systems: implications and requirements	Andrei Podshivalin (RU)	
B5.59	2016	Requirements for Near-Process Intelligent Electronic Devices	Xu Lei (CN)	
B5.63	2017	Protection, Automation and Control System Asset Management	Massimo Petrini (IT)	
B5.65	2018	Enhancing Protection System Performance by Optimising the Response of Inverter-Based Sources	F Farfilho (BR)	
B5.68	2019	Optimisation of the IEC 61850 Protection, Automation and Control Systems (PACS) engineering process and tools	Camille Bloch	
B5.69	2019	Experience gained and Recommendations for Implementation of Process Bus in PACS	Alex Apostolov (US)	
B5.71	2020	Protection, Automation and Control Systems Communication Requirements for Inter-Substation and Wide Area Applications	Cedric Moors (BE)	
B5.72	2020	Modelling, Assessment, and Mitigation of Protection Performance Issues caused by power plants during Dynamic Grid Events	Sean McGuinness (IE)	
B5.73	2020	Experiences and future trends related to functional integration	Bruno André (SE)	
B5.74	2021	Busbar Protection Considerations When Using IEC 61850 Process Bus	Pablo H. Flores (BR)	
B5.75	2021	Documentation and Version Handling Related to Protection, Automation and Control functions	Sushama Khot (CA)	
B5.76	2021	Architecture, Standards and Specification for metering system in a Digital Substation and PACS Environment	~~Alex Roumpies (CH)~~	R Marcenko
B5.77		Requirements for Information Technologies (IT) and Operational Technology (OT) managed PAC	E Casale	
B5/C4.61	2017	Impact of Low Inertia Network on Protection and Control	Ray Zhang (GB)	
B5.78	2022	New requirements of network protection and control for renewable energy integration	Nirmal Nair (NZ)	
B5/C4.79	2022	Protection Roadmap for Low Inertia and Low Fault Current Networks	~~Mukesh Nagpal (CA)~~	A Tsylin
B5.81	2023	Obsolescence Management for PAC Systems	J Wright	
B5.82	2023	Education, Qualification and Continuing Professional Development of Engineers in PAC	M Kezunovic	
B5.83	2023	Protection for modern distribution networks	T Yi	
B5.84	2023	Recommendations and constraints for development and interfacing of virtual Intelligent Electronic Device implemented in PACs	D McDonald	
B5.85	2023	Protection, Control, and Supervision principles of “Grid Stabilizing Generation”.	A Gehm (DE)	
B5.86	2024	PAC System interfaced asset management and condition monitoring using innovative technologies	A Apostolav	



SC B5 – Liaison Groups

Organization	Details	Convenor	notes
IEC TC 13		P Jensen	
IEC TC 17		Xu Lei (CN)	
IEC TC 38		V Leitloff	
IEC TC 57		M Merley	
IEC TC 88		E Nyandoro	Vacant ?
IEC TC 97		X Zhao	
IEEE PSRCC		R Hunt	J Sykes
NGN		Q Hong	A Iamandi

SC B5 – 2024 Paris Session B5 Activities

Activity	Details	Day	Time	Room	Floor
Opening Ceremony	Welcome Address, Keynote Speech, Welcome Cocktails	Sunday 25h August	16:00 (17:00 Cocktails)		
Thermatic Groups Poster Session		Monday 26th August	Morning 14:30		
Group Discussion	B5	Wednesday 27th August	08:30		
Tutorial	B5	Wednesday 27th August	08:30		
Study Committee	B5 Preferential Subjects: - Addressing	Thursday 30th August	08:30		

SC C1 – Power System Development and Economics

Jeff Palermo - PJP Consulting (jeff@pjp-consulting.com)

Mark Lauby – NERC (Mark.Lauby@nerc.net)

C1–Power system development and economics— Principle areas of interest

- Methods and practices for system development
- Resilient system by design
- Asset management
- Evolving metrics in cost/benefit analysis
- Business investment
- Role of hydrogen in the energy transition
- Energy sector integration and impact on power grids
- Interface and allocation issues in multi-party/cross-jurisdiction projects

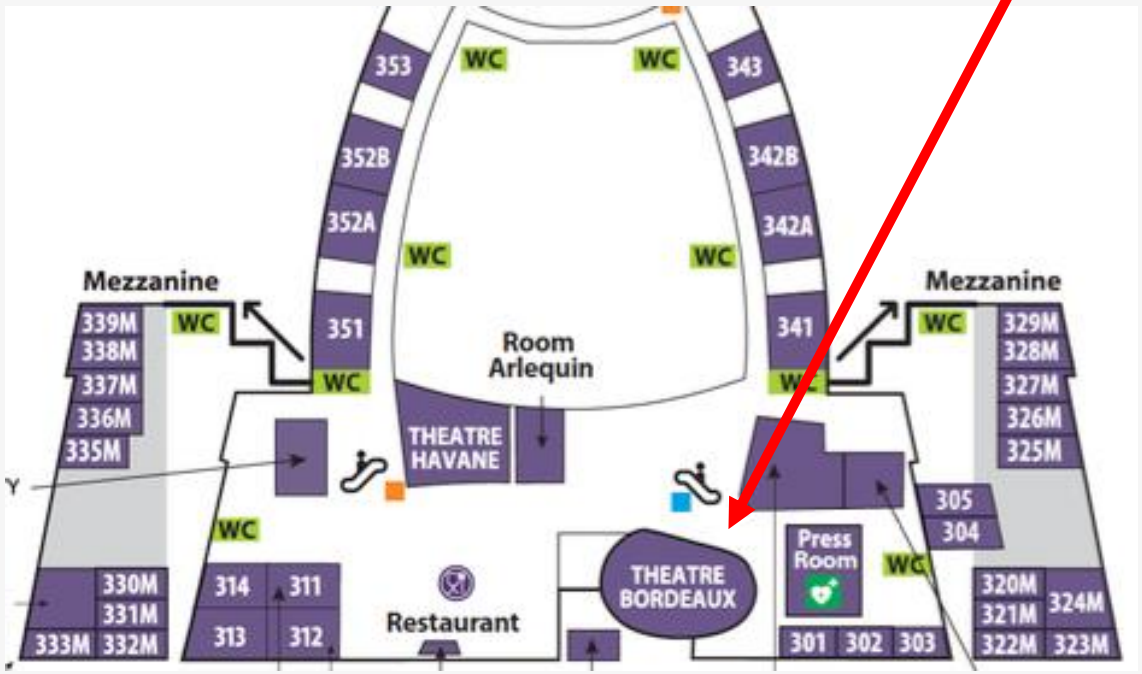
C1—Recent Technical Brochures

TB	Description
882	Closing the gap in understanding between stakeholders and electrical energy specialists
863	Multi-energy System Interactions in Distribution Grids
848	Planning Coordination between ISOs, TSOs, and DSOs: Frameworks, Methods, and Allocation of Costs and Benefits
820	Optimal power system planning under growing uncertainty
791	Valuation as a comprehensive approach to asset management in view of emerging developments
787	ISO series 55000 standards: Implementation and information guidelines for utilities
786	Investment decisions in a changing and uncertain environment
775	Global electricity network - Feasibility study
666	Technical risks and solutions form periodic, large surpluses or deficits of available RES

C1—Active Working Groups

WG	Description
C1.52	Virtual Power Plants role and deployment in large power systems operation and planning
C1.51	The potential roles of energy storage in electric power systems
C1.50	Global sustainable energy system coupling electricity and hydrogen
B2/C1.86	Approach for Asset Management of Overhead Transmission Lines
C1/C6.42	Planning tools and methods for systems facing high levels of distributed energy resources
C1.48	Role of green hydrogen in energy transition - Opportunities and challenges from technical and economic perspectives
C1.47	Energy Sectors Integration and impact on power grids
C1.46	Optimising power system resilience in future grid design
C1.45	Harmonized metrics and consistent methodology for benefits assessment in CBA of electric interconnection projects
C1.44	Global interconnected and sustainable electricity system - Effects of storage, demand response and trading rules
C1.43	Requirements for Asset Analytics data platforms and tools in electric power systems

C1 Technical session—Friday in Bordeaux



Poster session—Wednesday 14:30

C1 PS1 Steering the energy transition: cooperation, achieving top-down targets through bottom-up investment decisions system

1. Governance of the different sectors of the integrated energy system, the role of system operators and regulation & markets; achieving public targets through private investments, coordinated decision-making processes and international cooperation.
2. Power-to-gas & H_2 as an energy carrier and as long-term storage; energy efficiency & infrastructure efficiency in the interconnected electricity/gas/hydrogen system; large interconnection projects.
3. System aspect aggregation of the electrification of transport, industry, and buildings: conditions and barriers, role of stakeholders in the end-to-end system

C1 PS2 Flexibility as the pivotal criterion for system development

1. Including in the planning process the flexibility options both within and outside the grids: non-network assets and non-electric solutions: storage, demand response, energy communities, behind-the-meter resources
2. Matching flexibility needs with flexibility sources: market design evolution, value of various flexibility products, optimal flexibility portfolio; prioritizing sector coupling initiatives; role of forecasts of demand and variable generation
3. Storage device evolution, technical & economic performances, short/medium term measures for balancing the grid, and managing the energy system in the longer term, including thermal & molecular long-duration energy storage

C1 PS3 Resilience as pivotal criterion for system development

1. Metrics and criteria to plan resilience and strength of the future power system; flexibility means as enhancers also of resilience
2. Optimal planning and efficient use of resilience measures: risk assessment, prevention, mitigation, adaptation, re-start measures
3. Resilience improvements from grid architecture and grid components: including the role of power electronics control and grid forming features, smart load shedding, and fast restoration method

US C1 activities

- Planning advisors
  - Team of volunteer advisors
  - Assist with surveys
  - Advise on issues of interest
- My last session (since 2016)
- New C1 rep is Mark Lauby from NERC
- Contact Mark if interested in joining

Mark.Lauby@nerc.net
jeff@pjp-consulting.com

SC C2 – Power System Operation and Control

Todd Ramey – MISO (tramey@misoenergy.org)

SC C2 – Objectives and Organization

1. Scope

The scope of the Study Committee C2 covers the technical, human resource and institutional aspects and conditions for the secure and economic operation of power systems under security requirements against system disintegration, equipment damages and human injuries.

2. Current Activities

- Management of ancillary services, monitoring of operational limits and congestion management.
- Reserves and emergency strategies, management of disturbances, restoration and resilience enhancement strategies.
- Developments and changes in the business of System Operators and their integration into the evolving environment.
- Requirements, methods, tools and performance indicators for Control Centers and training of System Operators.
- Development and use of power system analysis and security assessment functionalities within operational planning and real-time supervision.

3. Upcoming Events

2025 - TBD

Working Groups led by SC C2

- Real time System Operation and Control
- System Operational Planning and Performance Analysis
- Control Centre Infrastructure and Human Resources for System Operation
- Joint Working Groups

SC C2 Chair
Jayme Darriba Macêdo (BR)

Strategic Advisory Group
Jayme Darriba Macêdo (BR)

SC Secretary
Flávio Alves (BR)

Publication Advisor
Anjan Bose (US)

Tutorial Advisory Group
Jens Jacobs (DE)

WG C2.44
Operational strategies to manage power system minimums

Greg Hesse (AU)

WG C2.39
Operator Training in Electricity Grids at Different Control Levels and for Different Participants/Actors in the New Environment
Jayme Darriba Macêdo (BR)

JWG C2/C5.06
The Impact of Market Intterventions by System Operators during Emergency Situations

Jan Van Putten (NL)

WG C2.45
Estimation, evaluation and provision of power system inertia in networks with a high share of renewable generation

Yaran Li (CN)

WG C2.42
The impact of the growing use of machine learning/Artificial Intelligence in the operation and control of Power Networks from an Operational perspective
Antoine Marot (FR)

JWG C2/B4.43
The impact of offshore wind power hybrid AC/DC connections on system operations and system design
Christer Norlander (SE)

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Publications 2023/2024 (1/2)

- Published Technical Brochures
  - ✓ TB 917 Wide Area Monitoring Protection and Control Systems – Decision Support for System Operators (WG C2.18)
- Tutorials & Webinars
  - ✓ Tutorial - C2.24 - Mitigating the Risk of Fire Starts and the Consequences of Fires near Overhead Lines for System Operations – Franco Crisci – September 4th 2023 - Cairns
  - ✓ Tutorial - C2.26 - Power System Restoration Accounting for a Rapidly Changing Power System and Generation Mix – Babak Badrzadeh - September 4th 2023 – Cairns
  - ✓ Power System Restoration Accounting for a Rapidly Changing Power System and Generation Mix – Workshop "Challenges for system planning and operation in face of increasing participation of intermittent sources" – Invited Speaker: Babak Badrzadeh - November 1st 2023 - CEPEL, Brazil
  - ✓ Operational Challenges Towards a Carbon Neutral System - Workshop "Challenges for system planning and operation in face of increasing participation of intermittent sources" – Invited Speaker: Susana De Graaf - November 1st 2023 - CEPEL, Brazil
- Papers
  - ✓ Cairns 2023 International Symposium – Cairns – Australia – September 2023
    - 29 SC C2 full papers
    - Best Paper
      Use of Advanced System Strength Metrics to Identify Critical Regions of a Power Network during Day-to-Day Operations
      Sunitha Uppalapati, William Wesley Baker, Deepak Ramasubramanian, Hoang Tong

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Preparation for CIGRE Session 2024

Sunday 25/08		Monday 26/08		Tuesday 27/08		Wednesday 28/08		Thursday 29/08		Friday 30/08	
A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
			Large Disturbances Workshop C2 & C5 14:00-18:00 Grand Amphitheatre	SC C2 Meeting 08:30-12:30 TBD	Contributors Meeting 13:00-15:30 TBD Tutorial C2.18 16:10-18:00 Salle Maillot TBC	Group Discussion Meeting 08:45-18:00 Amphitheatre Bordeaux		Poster Session 09:00-12:30 Hall Ternes TBC	SAG Meeting 14:00 - 16:00 TBD		

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SC C3 – Power System Sustainability and Environmental Performance

Mandy Olson – Burns & McDonnell (akolson@burnsmcd.com)

C3–History & Scope

- Created in 2002 …to produce unbiased positions and approaches on power system environmental performance impacts and their implications.
- 2019 broadening focus on sustainability: The goal is to facilitate and promote the principles of sustainable development through the global exchange of information and knowledge in the field of system environmental performance, by synthesizing state-of-the-art practices and developing recommendations in line with global best practice.

C3–Status

- Turnover of chairperson and Covid has slowed activity since 2021
- Need more US and NGN representation

	Regular Members	Observers	Represented Countries	Women Participation
2022	28	8	30	40%
2024	33	9	40	48%

C3–2024 Preferential Subjects/Paris Papers

- PS1: Public Acceptance and Stakeholder Engagement in Power System Generation, Transmission, & Distribution Infrastructures (12 Papers)
- PS2: Climate Change and Impact on Power Systems, A Holistic Approach (21 Papers)
- PS3: Sustainability Starting for the Supply Chain (11 Papers)
- 44 Total Papers

C3 – Working Groups

Technical Direction	Number	Name	Status	Notes
Asset Management and Environment	C3-09A	Corridor Management ★	Resumed	Original group disbanded for a few years. Today, starting again with some new and some previous members.
	C3.22	Vegetation Management in Substations	In Progress	Identify experience and knowledge regarding alternatives to herbicides.
	B1/C3.85	Environmental Impact of Decommissioning of Underground and Submarine Cables	In Progress	Investigating the decommissioning strategies and impact on environment.
	C3/B2.24	Methods of Reducing Electrocution of Birds from Power Lines	Launch Delayed	New WG convenor taking over and first meeting taking place in Paris 2024
	C3.14	Impact of Environmental Liability on Transmission and Distribution Activities	Dismantled	Aimed to create a reference doc to enable utilities to understand the impact of environmental liability and to have access to best practices
	C3.17	Interactions Between Wildlife and Emerging Renewable Energy Sources and Submarine Cables	Not Active	Created to complete C3.16 work by addressing renewable projects and associated transmission systems and to look at adding offshore substations/platforms. Looking for new convenor to propose updated TOR.
Sustainability: The Role of the Power Sector	C3.20	Sustainable Development Goals in the Electric Power Sector	In Progress	Develop recommendations on how electric power sector should implement SDGs within business strategies. Very
	C3.25	Eco-Design Methods for the Power System	Relaunching	Replacing C3.23 which stalled due to turnover. Meeting during Paris 2024.
	B3/A2/C3/	Guidelines for Life Cycle Assessment in Substations Considering the Carbon Footprint		
	A2/C3.70	Life Cycle Assessment (LCA) of Transformers		
	C3.12	Greenhouse Gas Emissions Inventory and Report for Transmission System Operators	Not Active	Review and Recommend harmonized procedures and methods for accounting and reporting GHG emissions for
Stakeholder Engagement and Public Acceptance	C3.AG	EMF and Human Health	In Progress	Provide information and advice regarding EMF in all health aspects related to electrical installations and wireless
	C3.15	Best Environmental and Socio-economic practices for improving public acceptance of high voltage substations ★	In Progress	Inventory of best practices, options, and boundary conditions for integration of substations in environment.
	C3.21	Including Stakeholders in the Investment planning Process	Dismantled	Study the best practices of the CIGRE members to improve the decision-making processes for grid development.

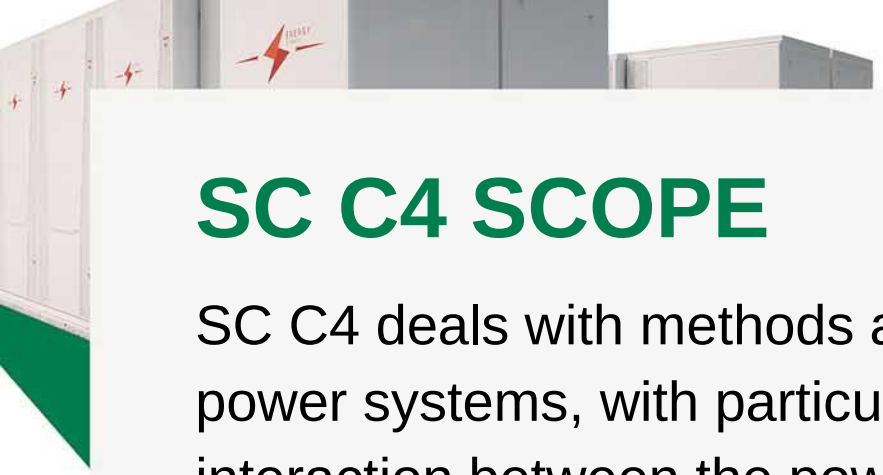
C3 – Publications and Upcoming Events

1. **Published Technical Brochures**
   - **2024**
     - C3.09A – Corridor Management
   - **Scheduled for 2025**
     - C3.15 – Best Environmental and Socio-Economic Practices for Improving Public Acceptance of High Voltage Substations
2. **Paris Tutorial**
   - WG C3.09A – Corridor Management

SC C4 - System Technical Performance

Gaurav SINGH – EPRI (gsingh@epri.com)

Julia Matevosyan – ESIG (Julia@esig.energy)

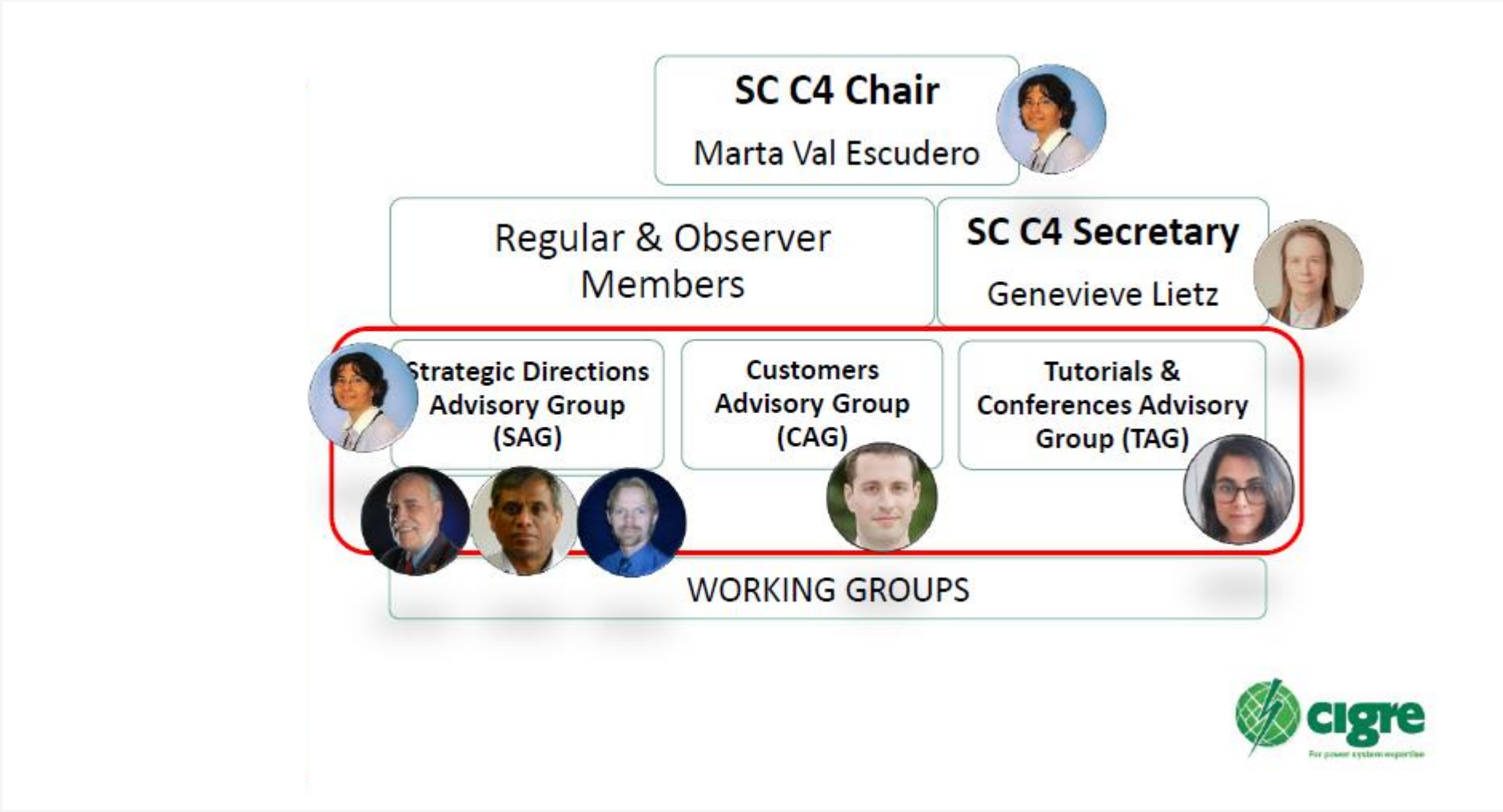


SC C4 SCOPE

SC C4 deals with methods and tools for analysis related to the technical performance of power systems, with particular reference to dynamic and transient conditions and to the interaction between the power system and its apparatus/sub-systems. We cover system technical performance phenomena that range from nanoseconds to many hours, in the following fields:

- **Power Quality**
- **Electromagnetic Compatibility (EMC)**
- **Insulation Co-ordination**
- **Lightning**
- **Power System Dynamics and Numerical Analysis**

SC C4 STRUCTURE



SC C4 Membership effective September 2024

- Chair & Secretary
- 29 Regular M
- 3 Additional RM
- 10 Observer M
- 44 members
- 43 countries

	COUNTRY	NAME	NOMINATION
Chair	Ireland	VAL ESCUDERO Marta	2022
Secretary	Australia	LIETZ Genevieve	2018
Regular	Arab States Of The Gulf	ALSHAIKH Mohamed	2024
	Australia	BADRZADEH Babak	2022
	Austria	SCHWALT Lukas	2022
	Brazil	PENIDO DUTT ROSS Ricardo	2024
	Canada	GUTTORMSON Wayne	2022
	Chile	BRAVO Bernardo	2024
	China	LIU Chongru	2024
	Denmark	SKOVGAARD Chris Liberty	2024
	Finland	HARJULA Antti	2022
	France	VERNAY Yannick	2024
	Georgia	ELIZARASHVILI Teona	2024
	Germany	NAZEMI Mohammad	2024
	Ireland	LOVE Geoff	2024
	Italy	PISANI Cosimo	2022
	Japan	HOJO Masahide	2022
Regular WiE	Jordan	WALA Bani Saeed	2024
	Jordan	AL-MATAR Suad S.	2024
	Netherlands	SCHUTTE Peet	2022
	Portugal	LEIRIA Andreia	2022
	Romania	ALBA Miron	2024
	Slovenia	RIBIC Janez	2020
	South Africa	BEUTEL Andreas	2024
	Spain	SANTOS CARRO Sergio	2020
Regular NGN	Spain	GALLARRETA Alexander	2024
	Sweden	NORLANDER Christer	2022
	Switzerland	LARSSON Mats	2024
	Turkey	GUNERI Melih	2020
	United Kingdom	KARAMITSOS Spyros	2020
	United States	SINGH Gaurav	2020

Regular Additional	China	HUANG Daochun	2024
	Japan	OKADA Naotaka	2024
	United States	MATEVOSYAN Julia	2024

Observer	Argentina	ISSOURIBEHERE Fernando	2022
	Belgium	CHASPIERRE Gilles	2024
	Bosnia Herzegovina	BANJANIN Mladen	2024
	Croatia	STIPETIC Nina	2024
	Iran	AGHAMOHAMMADI Mohammad Reza	2024
	Israel	RABINOVICH Raul	2024
	Peru	BEDRINANA Manfred	2024
	Romania	TOMA Lucian	2022
	Russia	SHCHEPOTIN Alexander	2024
	Thailand	PIMJAIPONG Witchaya	2024

SC C4 ACTIVE WORKING GROUPS

WG #	WG TITLE	CONVENER
WG C4.36	Winter Lightning – Parameters and Engineering Consequences for Wind Turbines	M. Ishii (Japan)
JWG C4.40/CIRED	Revisions to IEC Technical Reports 61000-3-6, 61000-3-7, 61000-3-13, and 61000-3-14	M. Halpin (USA)
JWG C4.42/CIRED	Continuous assessment of low-order harmonic emissions from customer installations	I. Papič (Slovenia)
WG C4.43	Lightning problems and lightning risk management for nuclear power plants	T. Shindo (Japan)
WG C4.44	EMC for Large Photovoltaic Systems	E. Salinas (Sweden)
WG C4.46	Evaluation of Temporary Overvoltages in Power Systems due to Low Order Harmonic Resonances	F. F. da Silva (Denmark)
WG C4.47	Power System Resilience (PSR WG)	M. Panteli (Cyprus)
WG C4.49	Multi-frequency stability of converter-based modern power systems	Ł. Kocewiak (Denmark)
WG C4.50	Evaluation of Transient Performance of Grounding Systems in Substations and Its Impact on Primary and Secondary Systems	B. Zhang (China)
WG C4.51	Connection of Railway Traction Systems to Power Networks	D. Vujatovic (UK)
JWG C4/B4.52	Guidelines for Sub-synchronous Oscillation Studies in Power Electronics Dominated Power Systems	C. Karawita (Canada)
JWG C4/A3.53	Application Effects of Low-Residual-Voltage Surge Arresters in Suppressing Overvoltages in UHV AC Systems	J. He (China)
WG C4.54	Protection of high voltage power network control electronics from the High-altitude Electromagnetic Pulse (HEMP)	W.A. Radasky (USA)
WG C4.55	EMC related very-fast transients in gas-insulated substations - EMC interferences, measured characteristics, modelling and simulations	A. Ametani (Japan)
WG C4.56	Electromagnetic transient simulation models for large-scale system impact studies in power systems having a high penetration of inverter connected generation	B. Badrzadeh (Australia)
WG C4.57	Guidelines for the Estimation of Overhead Distribution Line Lightning Performance and its Application to Lightning Protection Design Scope	K. Michishita (Japan)
JWG C4/C2.58/IEEE	Evaluation of Voltage Stability Assessment Methodologies in Transmission Systems	U. Annakkage (Canada)
JWG C4/C2.62/IEEE	Review of Advancements in Synchrophasor Measurement Applications	A. Rajapakse (Canada)
WG C4.59	Real-time Lightning Protection of the Electricity Supply Systems of the Future	C. Tong (China)
WG C4.60	Generic EMT-Type Modelling of Inverter-Based Resources for Long Term Planning Studies	A. Haddadi (USA)
WG C4.61	Lightning transient sensing, monitoring and application in electric power systems	J. He (China)
WG C4.63	Harmonic power quality standards and compliance verification – a comparative assessment and practical guide	N. Shore (UK)
WG C4.64	Application of Real-Time Digital Simulation in Power Systems	C. Fang (Canada)
WG C4.65	Specification, Validation and Application of Harmonic Models of Inverter Based Resources	J. David (Australia)
WG C4.66	New concept for analysis of multiphase back-flashover phenomena of overhead transmission lines due to lightning	M. Miki (Japan)
WG C4.67	Lightning Protection of Hybrid Overhead Lines	A. Piantini (Brazil)
WG C4.68	Electromagnetic Compatibility (EMC) issues in modern and future power systems	P. Munhoz-Rojas (Brazil)
WG C4.69	Quantifying the lightning response of tower-footing electrodes of overhead transmission lines: methods of measurement	S. Visacro (Brazil)
WG C4.70	Application of space-based lightning detection in power systems	J. Montanyà (Spain)
WG C4.71	Small signal stability analysis in inverter based resource dominated power system	S. Goyal (Australia)
JWG C4/B4.72	Lightning and switching induced electromagnetic compatibility (EMC) issues in DC power systems and new emerging power electronics-based DC equipment	Q. Li (China)
JWG A2/C4.52	High-frequency transformer and reactor models for network studies	B. Gustavsen (Norway)
JWG A1/C4.52	Wind generators and frequency-active power control of power systems	N. Miller (USA)
JWG A1/C4.66	Guide on the Assessment, Specification and Design of Synchronous Condensers for Power Systems with Predominance of Low or Zero Inertia Generators	D. K. Chaturvedi (India)
JWG B1/C4.69	Recommendations for the insulation coordination on AC cable systems	T. du Plessis (South Africa)
JWG B4/B1/C4.73	Surge and extended overvoltage testing of HVDC Cable Systems	M. Saltzer (Sweden)
JWG B4/C4.93	Development of Grid Forming Converters for Secure and Reliable Operation of Future Electricity Systems	D. Kong (UK)
JWG B5/C4.61	Impact of Low Inertia Network on Protection and Control	R. Zhang (UK)
JWG C1/C4.36	Review of Large City & Metropolitan Area power system development trends taking into account new generation, grid and information technologies.	V. Jesus (Brazil)/S. Utts (Russia)
JWG B2/C4.76	Lightning & Grounding Considerations for Overhead Line Rebuilding and Refurbishing Projects, AC and DC	William A. Chisholm (Canada)
JWG C1/C4.46	Optimising power system resilience in future grid design	Christian Schaefer (Australia)
JWG B5/C4.79	Protection Roadmap for Low Inertia and Low Fault Current Networks	Mukesh Nagpal (Canada)

42 JWG/WGs

- **6 on PQ**
- **5 on EMC**
- **5 on IC**
- **10 on L**
- **16 on PSD**

C4 WG Status Reports - 1

- New WG/JWG since last SC meeting (7th September 2023)
  - WG C4.77 “Best practices for individual and collective conformity assessment of inverter-based resources during their lifetime”
  - WG C4.103 “AC network equivalents for HVDC and FACTS project studies ”

C4 WG Status Reports - 2

- Disbanded since last SC meeting (7th September 2023)
  - JWG C4/A3.53 “Application Effects of Low-Residual-Voltage Surge Arresters in Suppressing Overvoltages in UHV AC Systems”.
  - WG C4.49 “Multi-frequency stability of converter-based modern power systems”.
  - WG C4.46 “Evaluation of Temporary Overvoltages in Power Systems due to Low Order Harmonic Resonances”.

Upcoming Events

- Trondheim (Norway): “Changes needed in the power system for the Energy Transition”, 12-15 May 2025.

- Montreal (Canada): “Grid Enhancement, Strategic Planning, Technological Innovation and Climatic Adaptation for Resilient Future Energy Systems”, September 29-October 2 2025.

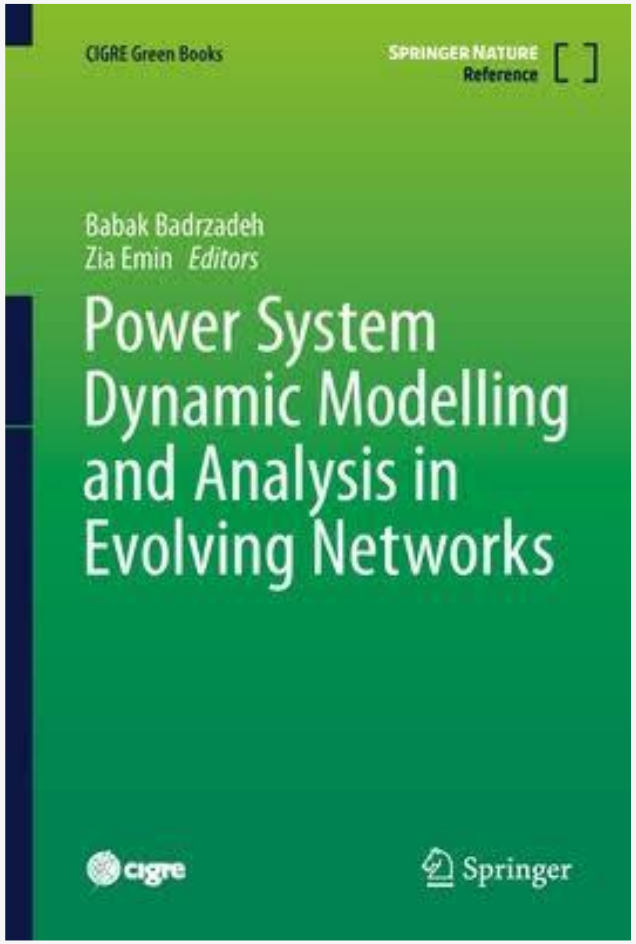
- Raleigh, NC (USA), “Grid of the Future,” 11-14 November 2024

Recent TBs

- TB 928: Multi-frequency stability of converter-based modern power systems by WG C4.49
- TB 922: Review of Large City & Metropolitan Area power system development trends taking into account new generation, grid and information technologies JWG C1/C4.36
- TB 921: Applying Low-Residual-Voltage Surge Arresters to Suppress Overvoltages in UHV AC Systems by JWG C4/A3.53
- TB 913: Evaluation of Temporary Overvoltages in Power Systems due to Low Order Harmonic Resonances by WG C4.46

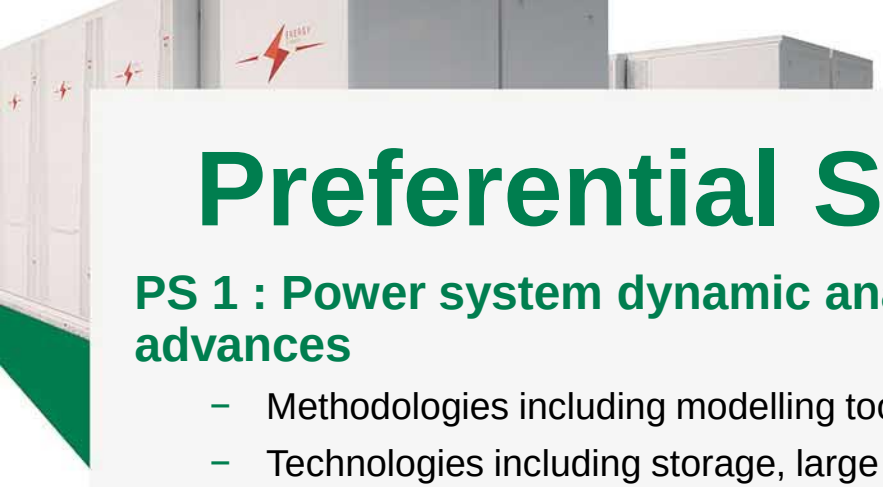
New SC C4 Green Book

- **Title**: Power System Dynamic Modeling and Analysis in Evolving Networks
- **Editors**: Babak Badrzadeh and Zia Emin
- **Chapter Leads**:
    - Babak Badrzadeh
    - Zia Emin
    - Marta Val Escudero
    - Genevieve Lietz
    - Julia Matevosyan
    - David Jacobson
    - Nilesh Modi
    - Deepak Ramasubramanian



Upcoming TBs

- JWG C4/C2.58/IEEE: Evaluation of Voltage Stability Assessment Methodologies in Transmission Systems.
- JWG C4.42/CIRED: Continuous Assessment of Low-Order Harmonic Emissions from Customer Installations.
- WG C4.59: Real-time Lightning Protection of the Electricity Supply Systems of the Future.
- WG C4.61: Lightning Transient Sensing, Monitoring and Application in Power Systems.
- JWG B4/B1/C4.73: Surge and Extended Overvoltage Testing of HVDC Cable Systems.
- WG C4.36: Winter Lightning – Parameters and Engineering Consequences for Wind Turbines .
- WG C4.43: Lightning Problems and Lightning Risk Management for Nuclear Power Plants.
- WG C4.44: EMC for Large Photovoltaic Systems.
- WG C4.47: Power System Resilience. JWG C4/C2.62/IEEE: Review of Phasor Measurement Unit Applications.
- WG C4.50: Evaluation of Transient Performance of Grounding System in Substation and Its Influence on Secondary System.



Preferential Subjects 2024

PS 1 : Power system dynamic analysis in the energy transition: challenges, opportunities and advances

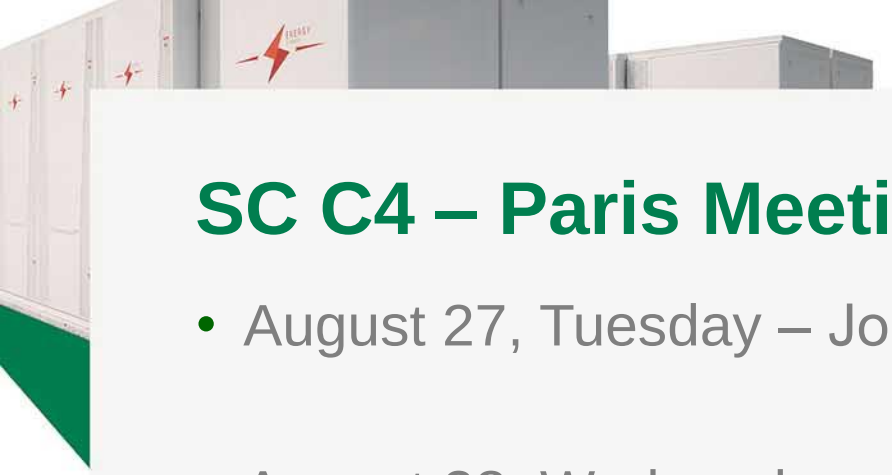
- Methodologies including modelling tools and techniques, model validation, metrics and data analytics.
- Technologies including storage, large scale electrification and advanced control methods.
- Phenomena including control interactions, system needs and required equipment capabilities for planning and operation of secure power systems.

PS 2: Power quality (PQ) and electromagnetic compatibility (EMC) analysis in the energy transition: challenges, opportunities and advances

- New tools and methods for the assessment and the mitigation of PQ issues for low-carbon grids,
- EMC related challenges arising from large penetration of renewable energy plants and electric vehicles (EV) charging networks.
- Evaluation and mitigation of high-altitude electromagnetic pulse (HEMP), intentional electromagnetic interference (IEMI) and geomagnetically induced current (GIC) in modern power systems.

PS 3: Insulation co-ordination and lightning interference analysis: challenges, opportunities and advances

- Overvoltage stress of future HVDC and HVAC transmission and distribution systems, including new characteristic waveforms.
- Advancements in lightning detection systems and lightning performance assessment methods including advanced data analytics of AC and DC high voltage, medium voltage, hybrid overhead lines and other exposed structures.
- Impact of extreme weather events, such as wind, fires, flooding, lightning, icing, snow, etc, on insulation co-ordination including practical solutions.



SC C4 – Paris Meeting Schedule

- August 27, Tuesday – Joint C1/C4 Workshop titled ‘Resilience by Design’
- August 28, Wednesday – Poster Session/Contributor's Meeting
- August 28, Wednesday – Workshop on C4 Green Book titled ‘Power system dynamic modelling and analysis in evolving networks.’
- August 29, Thursday – Tutorial titled ‘EMC issues in modern and future power systems’
- August 30, Friday – Group Discussion Meeting

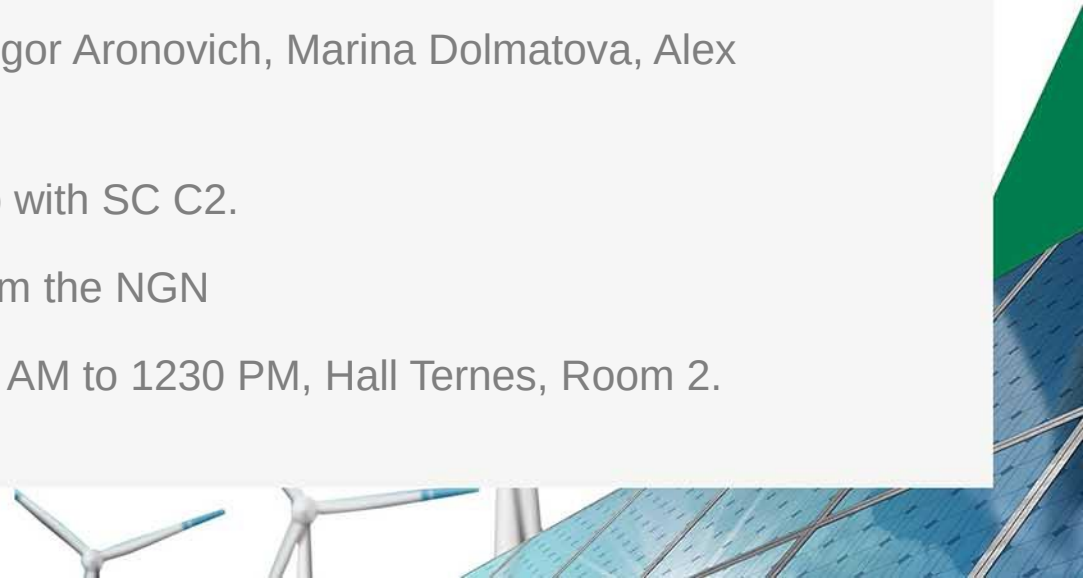
SC C5 – Electricity Markets and Regulation

Jeff Bladen – Meta (bladen@fb.com)

Anant Venkateswaran – Hitachi Energy (anant.Venkateswaran@hitachienergy.com)

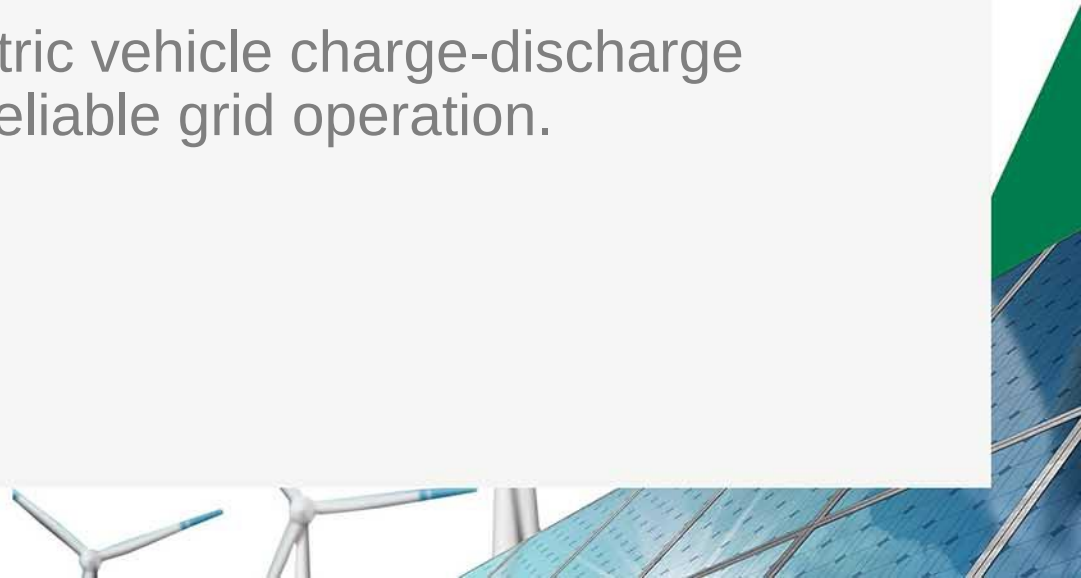
Update on C5 Activities – 2024 Session

1. SC C5 is presenting one tutorial; Electric Vehicle integration in markets by Jessica Harrison, Aditie Garg, Andre Nekrasov, Anant Venkateswaran on Wednesday August 28, 2024, Room Maillot Level 2, 1400 to 1550.
2. SC C5 and SC C1 are presenting a workshop on Green Hydrogen titled “Role of Green H2 in the Energy Transition and its impacts across the value chain” moderated by Anant Venkateswaran. Antonio Iliceto, Alex Cruikshank, Alexandre Oudalov and Ricardo Gedra. Wednesday August 28, 2024, Room 342 A-B, Level 3, 1600 – 1800
3. C5, C6 and D2 are jointly presenting a workshop on “Consumer-Side Energy Resource Management - Market, Control and Information Systems Perspectives”. Speakers are Alex Cruikshank, Anant Venkateswaran, Daniel Eghbal, Alexey Nebera, Yannick Jackquemart. Tuesday August 27, 2024, 1400 to 1600 Room 251, Level 2.
4. C5 workshop on retail market development by Alexandra Viana, Igor Aronovich, Marina Dolmatova, Alex Cruickshank, Matthias Hofmann & Aurora Opstad.
5. Greg Thorpe is again preparing the Large Disturbance Workshop with SC C2.
6. We received 56 papers, including one student paper and two from the NGN
7. We have a poster session on Wednesday, August 28, 2024 1030 AM to 1230 PM, Hall Ternes, Room 2.



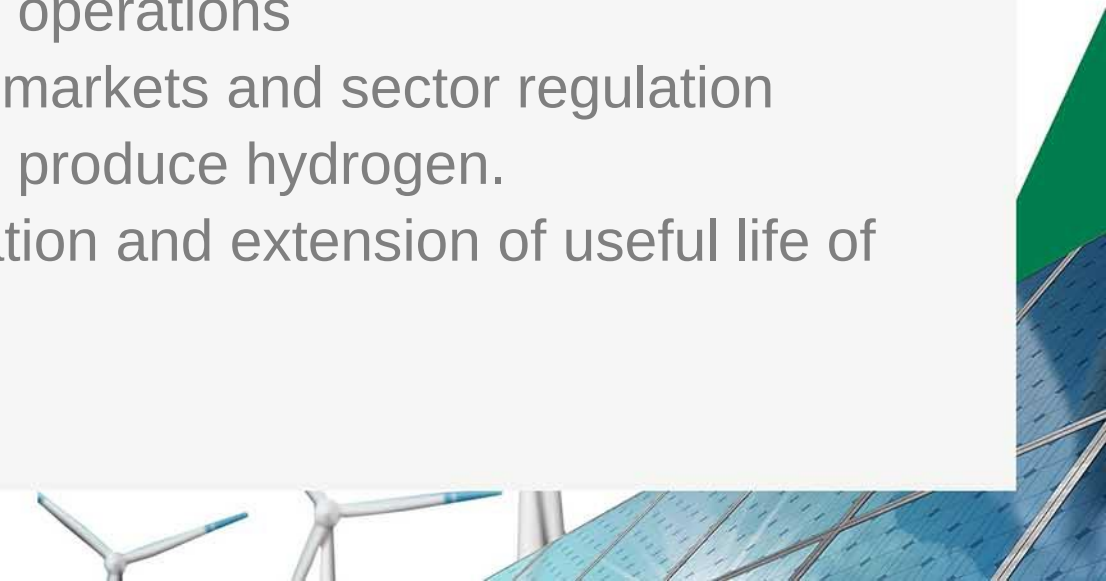
Update on C5 Activities – Adaptation of the SC to the orientations of the new CIGRE Strategic Plan

1. Two working groups examining Hydrogen, in conjunction with SC C1:
   - JWG C5/C1.35 Integration of hydrogen into electricity markets and sector regulation.
   - JWG C5/C1.36 Hydrogen source tracing
2. One WG examining local energy communities:
   - JWG C5/C6.29 New Electricity Markets, Local Energy Communities.
3. One WG examining EVSE charging, including V2G:
   - WG C5.34 Summary of current uses of electric vehicle charge-discharge flexibility in wholesale energy markets and reliable grid operation.



Update on C5 Activities – 2023 Working Groups

1. No new working groups were formed in 2023:
2. No working groups were disbanded in 2023.
3. Total number of active, WGs, JWGs
   - C5.C6-29 New Electricity Markets, local energy communities
   - C5.31 Wholesale and Retail electricity cost impacts of flexible demand response.
   - C5.34 Summary of Current Uses of EV Charge/Discharge Flexibility in wholesale energy markets and reliable grid operations
   - C5.35 Integration of hydrogen in electricity markets and sector regulation
   - C5.36 Certification of the electricity used to produce hydrogen.
   - C5.37 Regulatory framework on modernization and extension of useful life of transmission & distribution assets



Update on C5 Activities – Publications during 2023/ 2024

- Four articles were published in Electra for SC C5 during 2023:
  - Restoration of cyclone damage in rural Western Australia through long-term, off-grid supply", by Jacinda Papps
  - VPP Market Participation in the NEM, by Mitch O'Neil
  - Cairns Symposium was a blast, by Alex Cruickshank — report on the CIGRE Cairns Symposium
  - Renewable gases to decarbonize the power system, by Snow and Harris
- One article was published in Electra for SC C5 during 2024:
  - Operating a 2 GW power system on 100 % resources, by Jenni Reisz

Update on C5 Activities – Publication plan for the coming year

- JWG C5/C6.29 — New Electricity Markets, Local Energy Communities.
- WG C5.31 — Wholesale and Retail electricity cost impacts of flexible demand response.
- WG C5.34 — Summary of current uses of electric vehicle charge-discharge flexibility in wholesale energy markets and reliable grid operation.
- JWG C5/C1.35 — Integration of hydrogen into electricity markets and sector regulation.

Update on C5 Activities – Other Noteworthy

1. Yannick is taking over as chair and Anthony G is taking over as secy.
2. Tutorials, webinars and workshops in 2022/ 23
   - One tutorial was conducted on Blockchain in 2022 (Anant V and David Bowker)
   - There was a joint CIGRE/IEEE seminar on Blockchain at the same time as the Centennial Session (David B, Anant V, Alex C, and others)
   - One tutorial was conducted in Cairns(C5C1.36 was conducted by Anant V and Ricardo G)
   - Two tutorials were conducted by webinar during the Centennial Session. The first was on the outcomes of WG C5.27: Market Design for Short Term Flexibility and the second was based on the outcomes of WG C5.30: The Role of Blockchain in Electricity Markets.
3. Strategic Plan (2018-2028), SC Structure and Action Plan:
   - The strategic plan of SC C5 is being reviewed in light of the changes to the CIGRE strategic plan.
   - The action plan will be updated after the strategic plan is completed.
4. Planned SC meetings (in 2025 and next)
   - The 2025 meeting of SC C5 will be held in Montreal, Canada.
   - The 2026 annual meeting of SC C5 will be held in Paris, France during the 2026 Session.

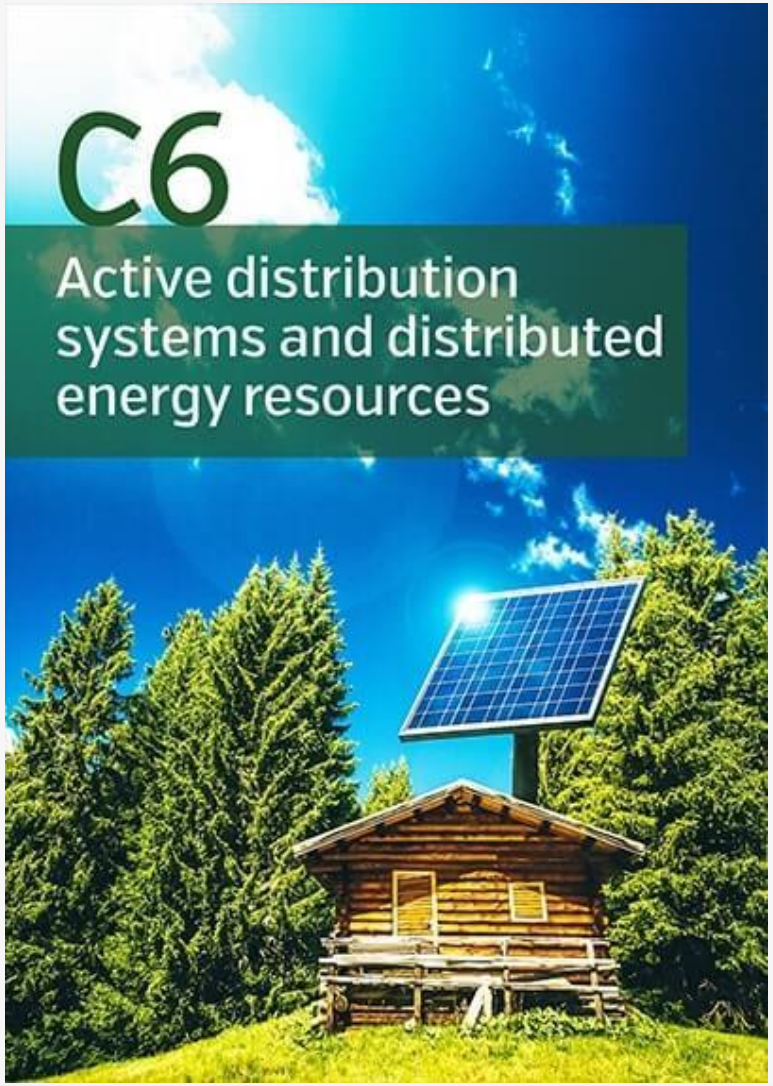
SC C6 – Active Distribution Systems and Distributed Energy Resources

Jouni Peppanen – Electric Power Research Institute (jpeppanen@epri.com)

SC C6 – Scope

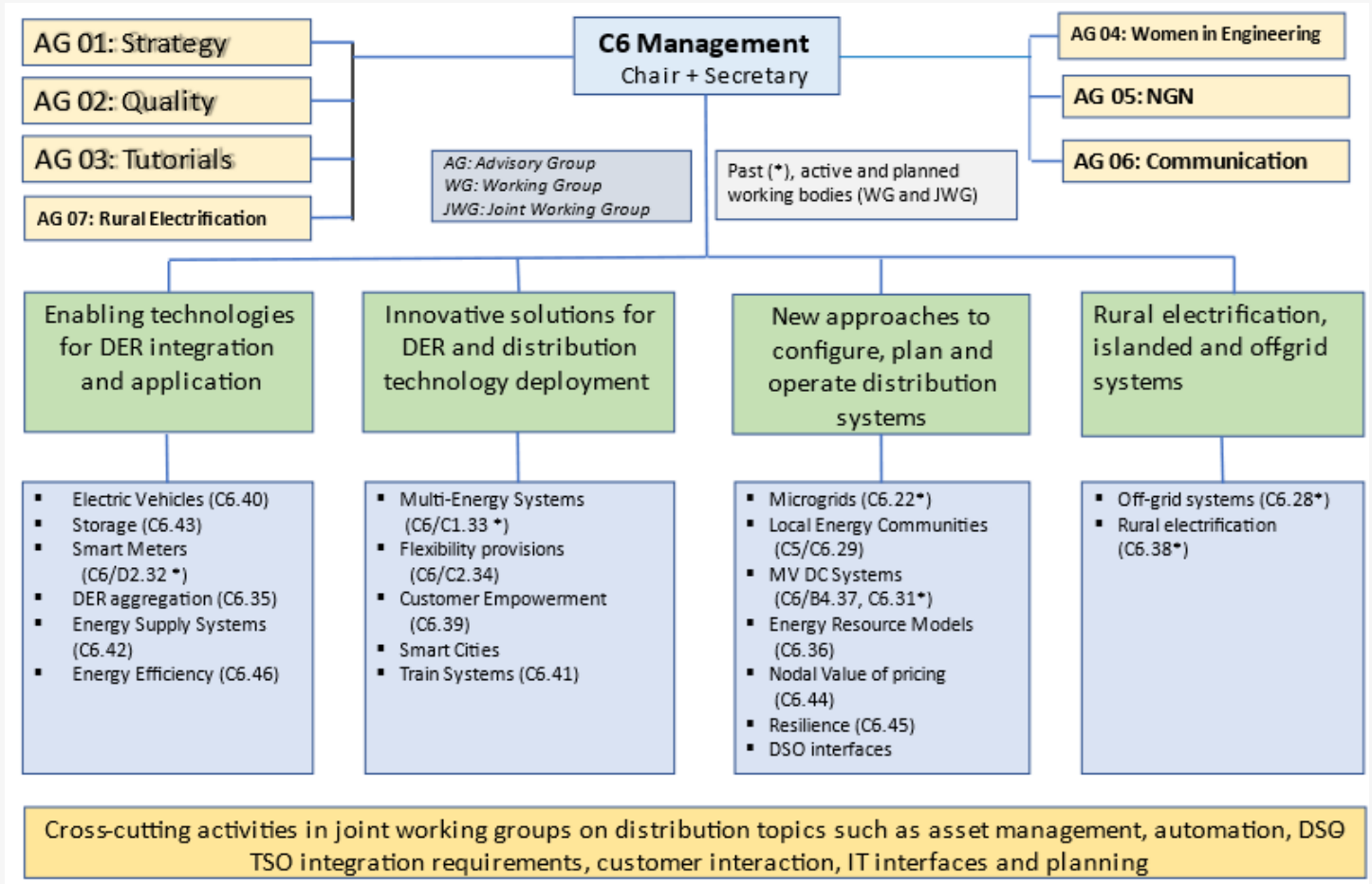
- **Principal areas of interest:**
  - Assessment of the technical impacts of high DER adoption on planning and operations
  - Assessment of enabling technologies and innovative solutions for DER integration in active distribution systems

- **Areas of attention:**
  - Planning & operations of distribution systems with high DER adoption
  - DER integration
  - Innovative solutions for DER and distribution technology deployment
  - Storage technologies
  - Reliability and resilience
  - Consumer integration and empowerment
  - Smart cities
  - Rural electrification



SC C6 – Structure

- **Composition:**
  - 24 regular members
  - 4 additional members
  - 19 observer members
  - A Chair and Secretary
  - 46 countries represented
- **Membership profile:**
  - Distribution planning & operations engineers
  - System operators
  - Consultants
  - Technology providers
  - Manufacturers
  - Applied ICT experts
  - Researchers
- Most activities conducted in **WGs**
- **7 AGs** assist with the strategic direction setting and functioning of the Study Committee activities

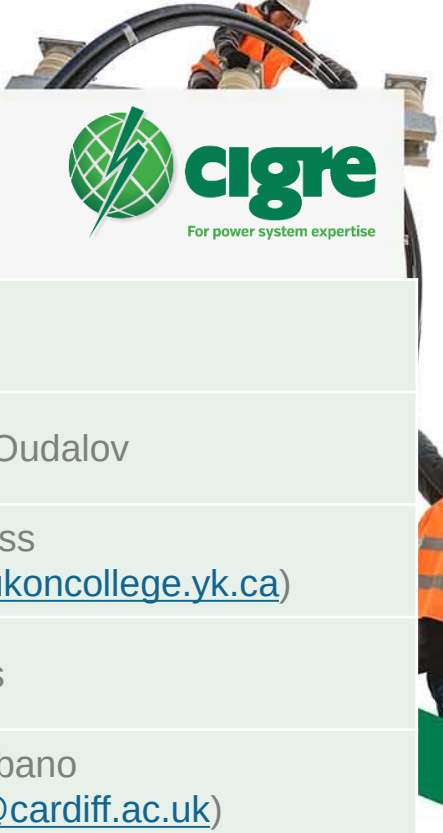


Notes: WG: working group, AG: advisory group
Source: https://c6.cigre.org/GB/about-sc-c6/our-structure

SC C6 – Recent Brochures

WG Title	WG #	TB #	Publication Year
Aggregation of Battery Energy Storage and Distributed Energy Resources	C6.43	932	2024
Advanced Consumer Side Energy Resource Management Systems	D2/C6.47	929	2024
Optimal transmission and distribution investment decisions under increasing energy scenario uncertainty	C1/C6.37/CIRED	923	2024
Distributed Energy Resource Benchmark Models for Quasi-Static Time-Series Power Flow Simulations	C6.36	906	2023
Multi-Energy System interaction in Distribution Grids	C6/C1.33	863	2022
Medium Voltage DC Distribution Systems	C6/B4.37	875	2022
Rural electrification	C6.38	835	2021
Hybrid systems for off-grid power supply	C6.28	826	2021
Medium Voltage Direct Current (MVDC) grid feasibility study	C6.31	793	2020
Utilization of data from smart meter systems	C6/D2.32	782	2019
System Operation Emphasizing DSO/TSO Interaction	C2/C6.36	733	2018
Modeling of inverter-based generation for power system dynamic studies	C4/C6.35/CIRED	727	2018
Asset management for distribution networks with high penetration of distributed energy resources	C6.27	726	2018
The impact of battery energy storage systems on distribution networks	C6.30	721	2018

SC C6 – Active Working Groups



WG#	WG Title	Start Year	Status	Convenor
C6.35	DER aggregation platforms for the provision of flexibility services	2018	No update received	Alexandre Oudalov
C6.39	Customer empowerment	2018	<10%, call for additional participants	Michael Ross (mross@yukoncollege.yk.ca)
C6.40	Electric Vehicles as Distributed Energy Resource (DER) systems	2019	95%, draft TB reviewed and waiting final edits	Joao Lopes
C6.42	Electric Transportation Energy Supply Systems	2020	<10%, call for additional participants	Maurizio Albano (AlbanoM@cardiff.ac.uk)
C6.44	Nodal Value of Distributed Renewable Energy Generation	2020	50-80%, work on-going	Kilian Reiche
C6.45	The Impact of Distributed Energy Resources (DER) on the Resilience of Distribution Networks	2022	<10%, call for additional participants	Nasser Usman (faarooqui@gmail.com)
C6.46	Energy Efficiency in Distribution Systems	2023	<10%, work on-going	Aradhna Pandarum
C6.47	DSO-customer interfaces for efficient system operation	2023	<10%, work on-going	Daniel Eghbal

If you are interested in getting involved in any of the active C6 WGs please contact: harry.evans@ghd.com

SC C6 – Paris Schedule Highlights

Date	Time	Room	Session
Sun Aug 25th	3:30 – 5:30 pm	GRAND AMPHITHEATRE, level 0	**Opening Ceremony**
Mon Aug 26th	8:30 am - noon	GRAND AMPHITHEATRE, level 1	**Opening Panel discussion**
Tue Aug 27th	08:30 am	TBD	**C6 Group Discussion Meeting finalization** (meeting with Group Discussion Meeting contributors and Special Reporters)
Tue Aug 27th	8:30 am – 12:30 pm	HALL TERNES, room 1 level 1	**C6 poster session**
Tue Aug 27th	2:00 – 4:00 pm	251, level 2	**Joint Workshop C5 / C6 / D2 – Consumer-Side Energy-Resource Management**
Tue Aug 27th	2:00 – 3:30 pm	MAILLOT, level 2	**C6 Tutorial – Aggregation of battery energy storage and distributed energy resources (DER), including solar PV**
Wed Aug 28th	08:45 am – 6:00 pm	BLEU, level 2	**C6 Group Discussion Meeting**
Thu Aug 29th	8:30 am – 6:00 pm	TBD	**C6 Study Committee Meeting** (all are welcome)

Notes: Working Group meetings will be slotted in during the week. Program and venues may be subject to change

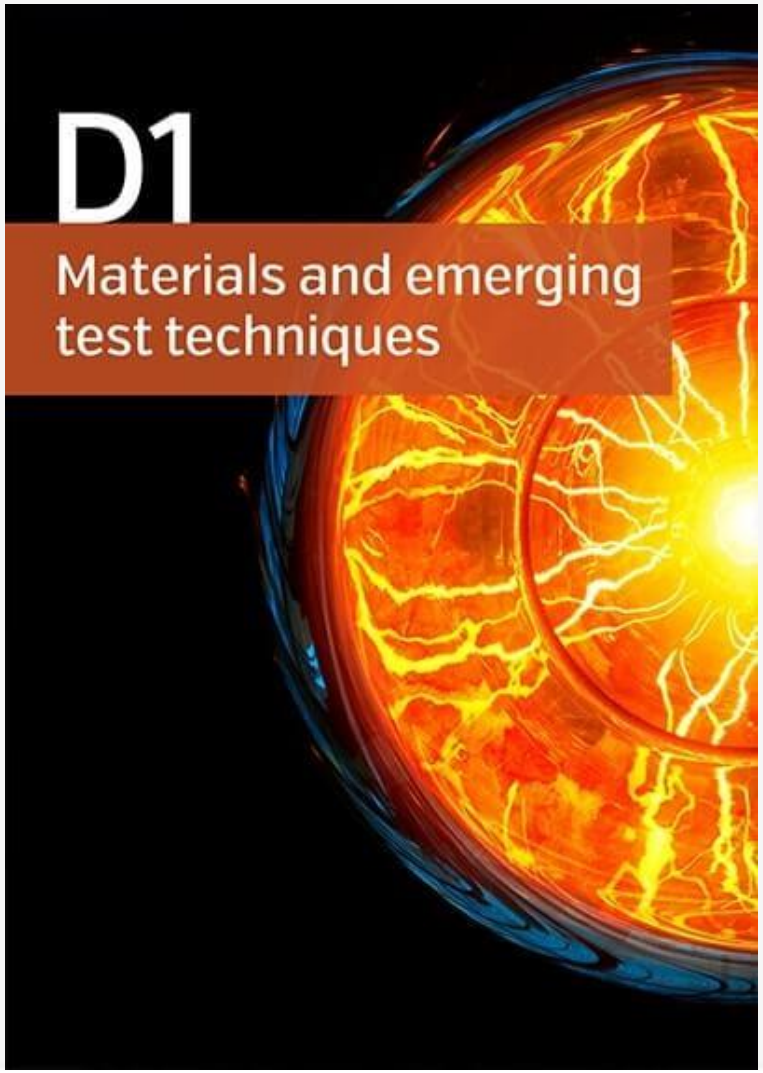
SC D1 – Materials and Emerging Test Techniques

Luke van der Zel - EPRI (lvanderz@epri.com)

SC D1 – Structure

1. **Chairman**
   Simon Sutton

2. **Secretary**
   Gordon Wilson



SC D1 – Advisory Groups

AG	Title	Convener
SCAG	Strategic and Customer Advisory Group	ssutton@doble.com
TAG D1	Tutorial Advisory Group	ivanka.hoehlein-atanasova@siemens-energy.com
AG D1.01	Liquid and liquid impregnated insulation systems	qiang.liu@manchester.ac.uk
AG D1.02	High voltage and current testing and diagnosis	uwe.riechert@hitachienergy.com
AG D1.03	Solid materials	jerome.castellon@umontpellier.fr
AG D1.04	Insulating gases and mixtures	karsten.juhre@siemens-energy.com

SC CD1 – Objectives and Organization

1. Scope

The activities of SC D1 concern the evaluation and monitoring of:

- Fundamental aspects of new and existing materials for electro-technology (conducting and insulating materials for electrical use)
- Multi-component insulating arrangements with one or more electrical insulating materials used in conjunction with associated conducting parts
- Diagnostic techniques and related knowledge rules
- Emerging test techniques.

Provision of timely information on new developments and trends in the field of materials and emerging test techniques to other Study Committees and support for their analysis of the introduction and application of these materials and techniques.

2. Mission

To facilitate and promote the progress of engineering and the international exchange of in- formation and knowledge in the field of materials and emerging test techniques. To add value to this information and knowledge by means of synthesizing state-of-the-art practices and developing recommendations.

SC D1 – Recent Brochures

- New Laboratory Methodologies for Investigating of Insulating Liquids - Further Developments in Key Functional Properties
  - Study committees Materials and emerging test techniques (D1)
  - Working groups WG D1.70
  - 2024

- Requirements and application of UHF PD monitoring systems for gas insulated systems
  - Study committees Materials and emerging test techniques (D1)
  - Working groups WG D1.66
  - 2024

SC D1 – Recent Brochures

- New Laboratory Methodologies for Investigating of Insulating Liquids - Further Developments in Key Functional Properties
  - Basic principles and practical methods to measure the AC and DC resistance of conductors of power cables
  - Study committees Materials and emerging test techniques (D1)
  - Working groups WG D1.54
  - 2023

- Atmospheric and altitude correction factors for air gaps and clean insulators
  - Study committees Materials and emerging test techniques (D1)
  - Working groups WG D1.50
  - 2023

- Improvements to PD measurements for factory and site acceptance tests of power transformers
  - Study committees Power transformers and reactors (A2), Materials and emerging test techniques (D1)
  - Working groups JWG A2/D1.51
  - 2023

SC D1 – Current Activities

- SC D1 2023-09 Cairns
  - Theme for the Symposium is The End-to-End Electricity System: transition, development and integration.
  - Topic streams:
    - Learning from experiences. What can we draw from past experience to develop the power system?
    - Developing practices, functionalities and applications. What are the current developments and their application to the future power system?
    - Towards a sustainable power system. What are the future needs and requirements of the power system?

SC D1 – Active Working Groups

2024	D1.82	Additive Manufacturing/3D Printing in Service of the Electrical Power Industry
2024	JWG B3/A2/A3/C3/D1.66	Guidelines for Life Cycle Assessment in Substations considering the carbon footprint evaluation
2023	A2/D1.72	Retrofill of Mineral Oil in Transformers – Motivations, Considerations and Guidance

SC D1 – Active Working Groups

2023	A2/D1.71	Modern Insulating Liquids Qualification for OLTC, Bushings and other accessories
2023	D1.81	Methods and common data file format for Time-Domain Reflectometry
2023	D1/A2.80	Functional properties of non-metallic solid materials for liquid filled transformers and reactors and their compatibility with insulating liquids

SC D1 – Active Working Groups

2023	D1/A2.79	Improved understanding of dynamic behaviour of winding insulating materials in liquid insulated power transformers
2023	D1.78	Partial discharge properties of non-SF6 insulating gases and gas mixtures
2022	A2/D1.67	Guideline for online dissolved gas analysis monitoring
2022	B3/D1.63	Guideline for assessing the toxicity of used SF6 gas onsite and in the lab of T&D equipment above 1 kV in substations
2022	A2/D1.66	Breathing systems of liquid filled transformers and reactors

SC D1 – Paris Schedule Highlights

- Monday 26
  - D1 Posters and A3/B3/D1 Workshop "Driving T&D substations and equipment towards net zero emissions“, Hall Ternes, 14:00-18:00
- Tuesday 27
  - D1 GDM Session, BLEU, Level 2, 08:45-18:00
- Wednesday 28
  - SC Meeting. Room 242AB
- Thursday 29 D1 Tutorial
  - "Functional properties of insulating liquids for transformers: laboratory methodologies and dielectric performance“, Room MAILLOT, Level 2, 10:40-12:30

SC D2 – Information Systems Telecommunication and Cybersecurity

Chen-Ching Liu – Virginia Polytechnic Institute and State University (ccliu@vt.edu)
Junho Hong - University of Michigan-Dearborn (jhwr@umich.edu)

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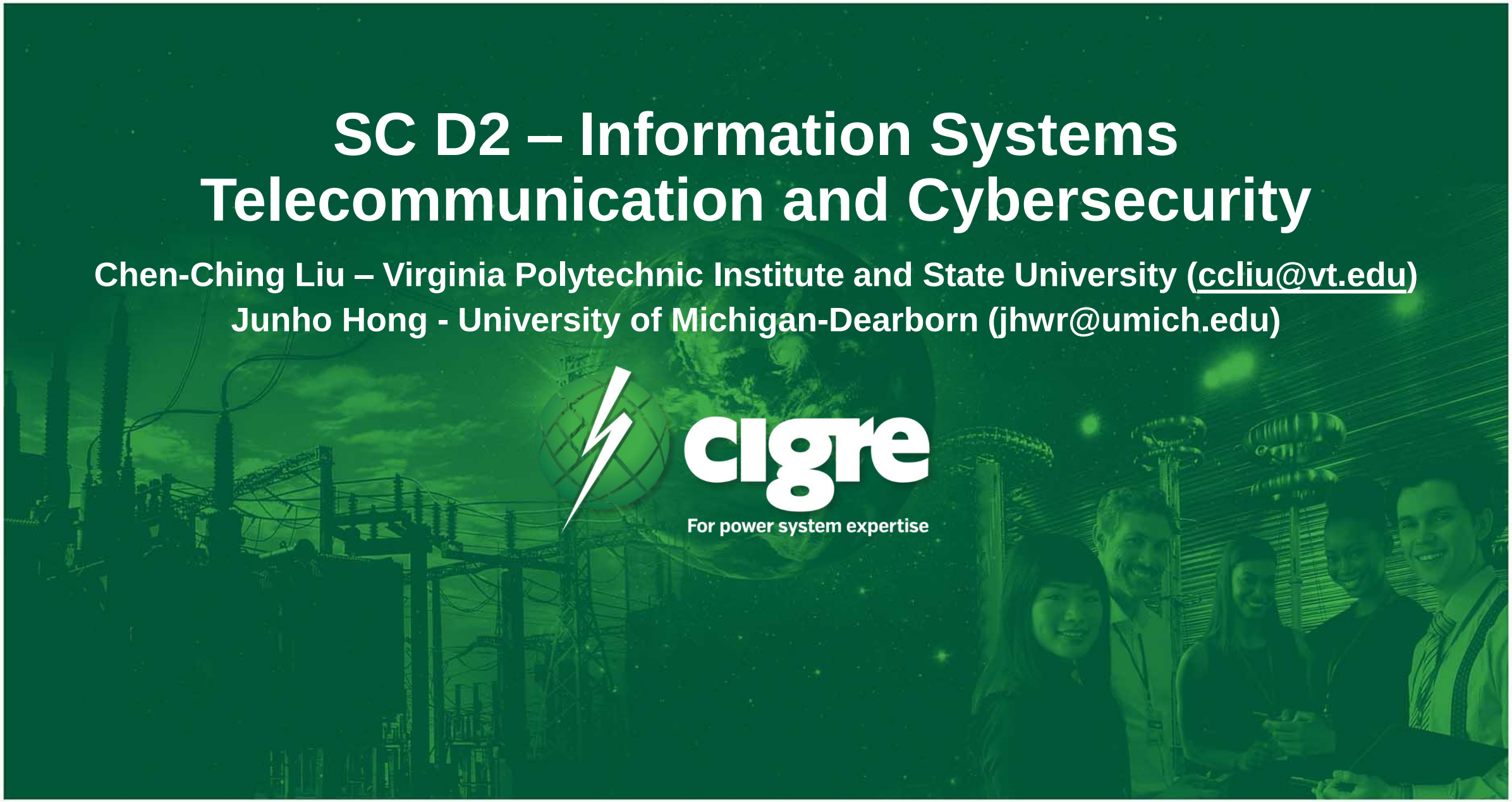

Mission and Scope of SC D2

- **Mission**
  - SC D2 aims to facilitate and promote the progress of engineering on information and telecommunications systems for electric power systems, as well as the international exchange of information and knowledge in those fields.

- **Scope of SC D2**
  - ICT applied to digital networks from UHV to distribution (smart meter, IoT, big data, EMS, etc...).
  - Communication solutions for information exchange in the smart delivery of electrical energy
  - Interoperability and data exchange (file format, frequency, etc.) between network operators, market players, off-grid premises
  - Cyber security issues from field equipment to corporate IT (Governance constraints, system design, implementation, testing, operation and maintenance…)
  - Technologies and architecture to ensure business continuity and disaster recovery
  - IT systems to support the decision-making process in Asset Management

D2 Preferential Subjects for GS 2024

- **D2 - Information Systems, Telecommunication and Cybersecurity**
- **PS 1 IT/OT Solutions to Improve the Efficiency and Resilience of Electric Power Systems**
  - Internet of Things (IoT) architectures and applications in improving the resilience of electric power systems
  - Applications and platforms of artificial intelligence, big data, and analytics in operational technology
  - Improving efficiency and resilience of power utilities with cloud technologies.
- **PS 2 Cybersecurity in emerging application domains and technologies for securing energy organizations**
  - Cybersecurity for DER, microgrid, and energy communities' control infrastructures
  - Cybersecurity for electric vehicle charging and discharging control
  - Cybersecurity in cloud-based applications of power utilities.
- **PS 3 Meeting the challenges of energy transition with reliable, scalable, and efficient telecommunications networks**
  - Building scalable and resilient networks with management, automation, and orchestration solutions and methods
  - Integration of current and new wireless technologies in meeting the requirements of power utility applications
  - Techniques and methods in building resilient networks and migrating legacy networks to support critical utility applications

Study committees: D2 Information systems, telecommunications, and cybersecurity

Tuesday 27 August
14:00 to 16:00
WORKSHOP
Consumer-Side Energy Resource Management - Market, Control and Information Systems Perspectives
Room 251 , level 2

Thursday 29 August
08:30 to 10:20
TUTORIAL
5G Application for Power Utilities
Kunlun Gao
Room MAILLOT, level 2
14:00 to 18:00
POSTER SESSIONS
SC D2 Poster Session - Information systems telecommunications and cybersecurity
HALL TERNES , room 1, level 1

Friday 30 August
GROUP DISCUSSION MEETINGS
08:45 to 16:00
SC D2 Group Discussion Meeting - Information systems telecommunications and cybersecurity
HAVANE, level 3

SC D2 – Information Systems Telecommunication and Cybersecurity
Chen-Ching Liu (Virginia Tech) and Junho Hong (U Michigan-Dearborn)

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Status of D2 Working Groups

WG	Title	Convenor	Supervising AG	2020 S1	2020 S2	2021 S1	2021 S2	2022 S1	2022 S2	2023 S1	2023 S2	2024 S1	2024 S2	2025 S1	2025 S2	2026 S1	2026 S2
WG D2.44	Usage of public or private wireless communication infrastructures for monitoring and maintenance of grid assets and facilities	A. PINHEL (BR)	AGD2.03	Convener changed in 2023													
JWG D2/C6.47	Advanced consumer side energy resource management systems	A.A. NEBERA (RU)	AGD2.01										Published in April 2024				
JWG D2/C2.48	Enhanced information and data exchange to enable future transmission and distribution interoperability	G. TAYLOR (GB)	AGD2.01														
JWG B2/D2.72	Condition Monitoring and Remote Sensing of Overhead Lines	Y. CHEN (CN) A. KULKARNI (GB)	AGD2.01							No report in 2023							
WG D2.49	Augmented reality to support EPUs operation and maintenance	C. VILLASANTI (PY)	AGD2.01	Convener changed in 2023													
WG D2.51	Implementation of Security Operations Centers (SOC) in Electric Power Industry as Part of Situational Awareness System	Br. LARGE (AU)	AGD2.02	Convener changed in 2023													
WG D2.52	AI Application and Technology on Power Industry	KUN LUN GAO (CN)	AGD2.01														
WG D2.53	Technology and Applications of Internet of Things in Power Systems	ZHENGYUN SUN (CN)	AGD2.01														
WG D2.54	Regulatory approaches to enhance EPU's cybersecurity frameworks	E. RAGAZZI (IT) U. FINARDI (IT)	AGD2.02	Convener changed in 2022													
WG D2.55	Application of 5G Technology to Smart Grids	KUN LUN GAO (CN)	AGD2.03	created in 2022													
WG D2.56	Interdependence and Security of Cyber-Physical Power System	QINGLAI GUO (CN)	AGD2.01	created in 2022													
WG A2/D2.65	Transformer Digital Twin – concept and future perspectives	P. PICHER (CA)	AGD2.01	created in 2022													
WG B3/D2.62	Life-long Supervision and Management of Substations by use of Sensors, Mobile Devices, Information and Communication Technologies	N. FANTANA (DE)	AGD2.01	created in 2022													
WG D2.57	CIM (Common Information Model) Methodology	R. BOGOMOLOV (RU)	AGD2.01	created in 2022													
WG D2.58	Monitoring, Maintenance and Control of Packet Networks & Services – From Situational Awareness to Network Control	B. SHEZI (ZA)	AGD2.03	created in 2023													


Thank you!
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