Report to the CIGRE Australian Technical Council

Study Committee SC B1 and Australian Panel AU B1 Activities

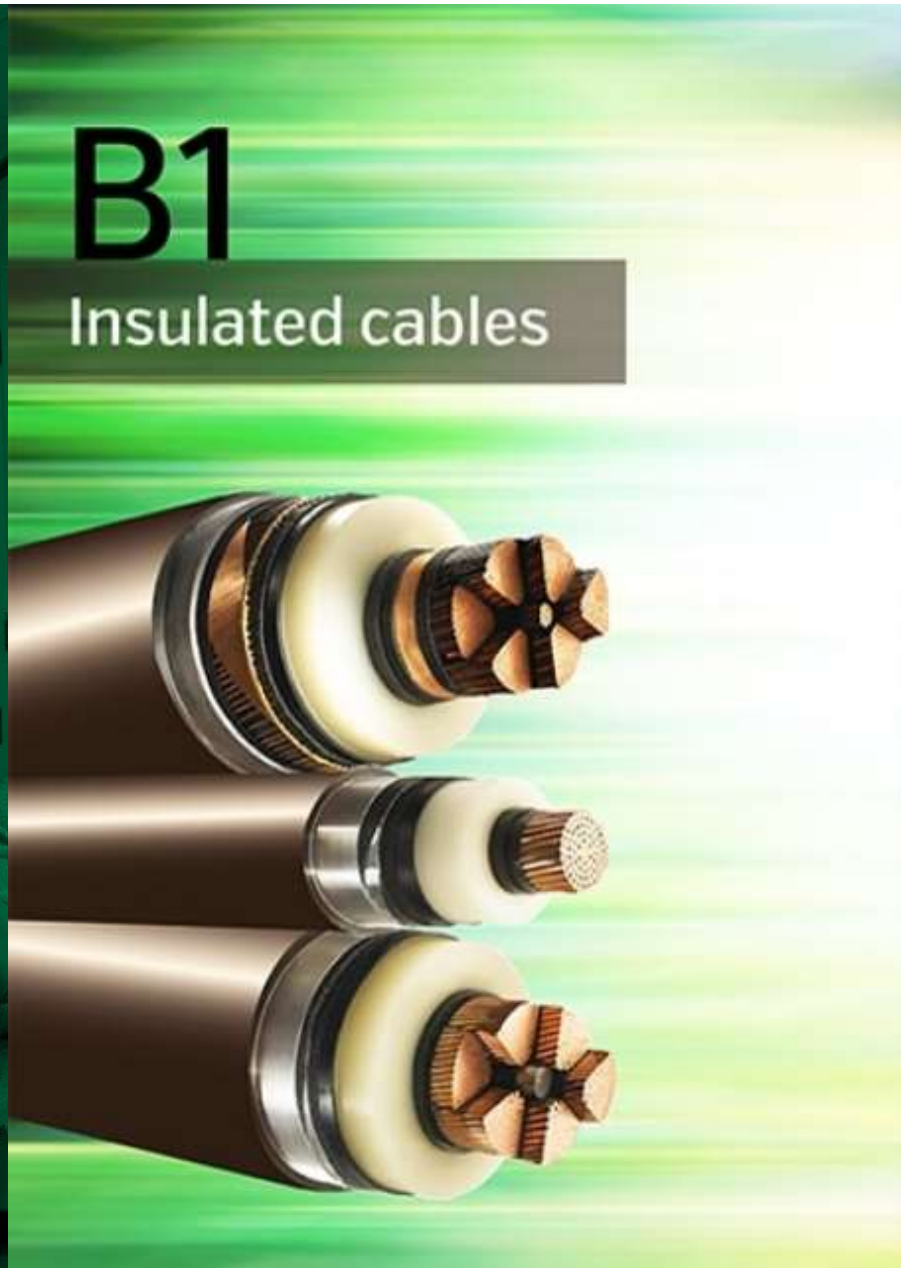
cigre
For power system expertise

Russell Wheatland

Convenor CIGRE AU B1

AU B1 Report 2023

russell.wheatland@ausnetservices.com.au



News from CIGRE B1 (Insulated Cables)

Geir Clasen, SC B1 Chair

April 2023

cigre

For power system expertise

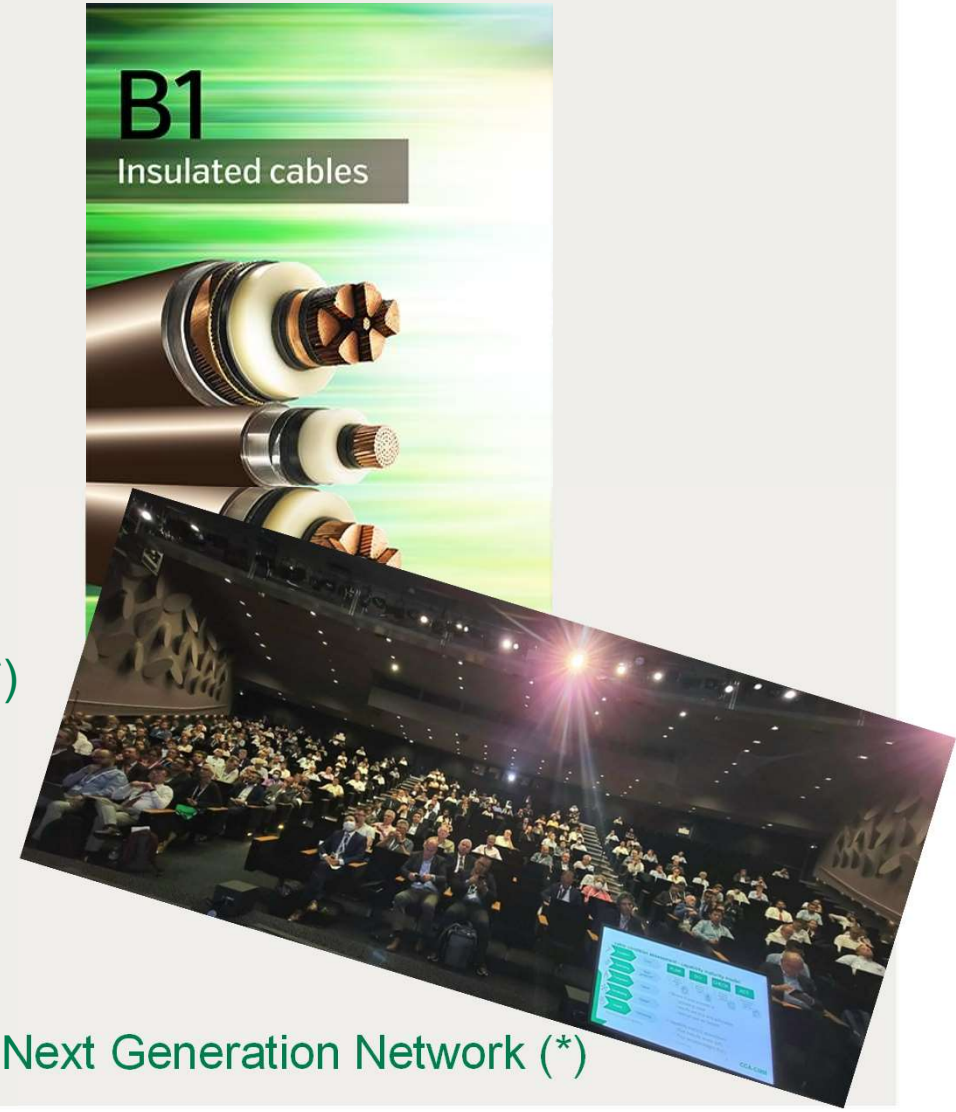
SC B1 at a glance

SC B1 is constituted as follows:

- A Chairman
- A secretary
- 24 regular members
- 15 observer members (→ 14 from 2022)
- 6 additional members (→ 5 from 2022)
- Conveners of AGs, WGs, TFs

Technical work performed through working bodies (*)

- 4 Advisory Groups
- 18 Working Groups
- 2 preparatory Task Forces
- 9 Joint Working Groups



With participation of approx. 450 experts, 26% from Next Generation Network (*)

(*) at Dec 31st 2022

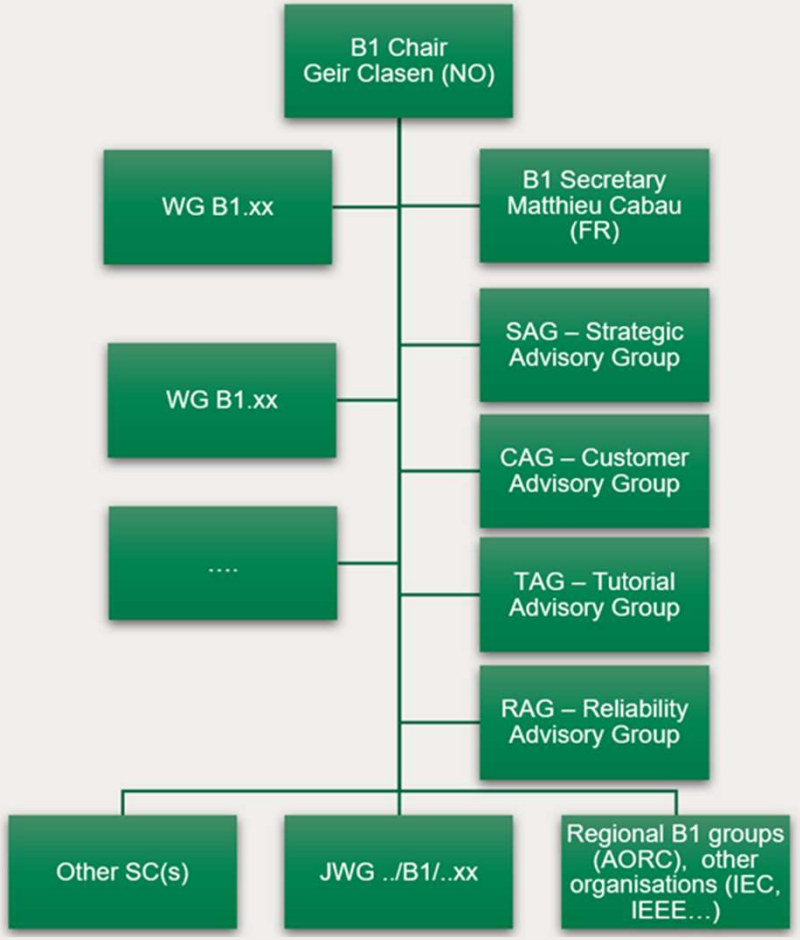
SC B1 Organizational Structure

4 Advisory Groups

- Listen and collect information from stakeholders.→ CAG
- Communicate with stakeholders through tutorials and other tools → TAG
- Collect and Prepare information on reliability of cable systems → RAG
- Steer the actions of the Study Committee → SAG

Relation with other organizations

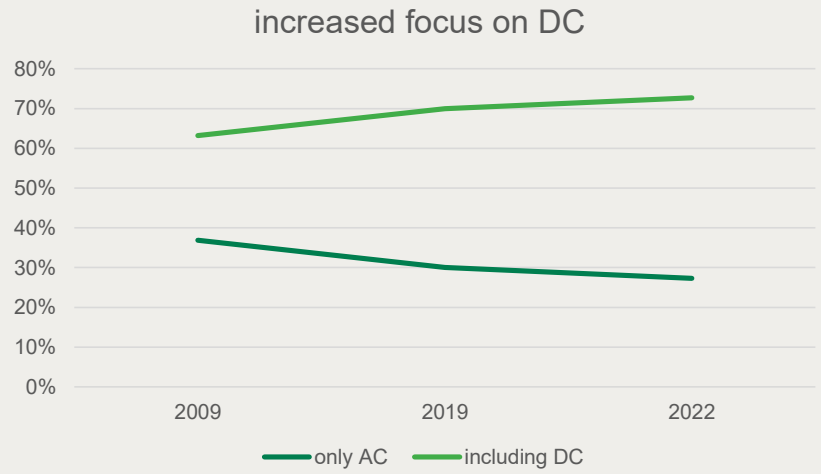
- People specifically responsible for relations with Cigre Regional Groups and with IEC, ICC/IEEE, CIRED

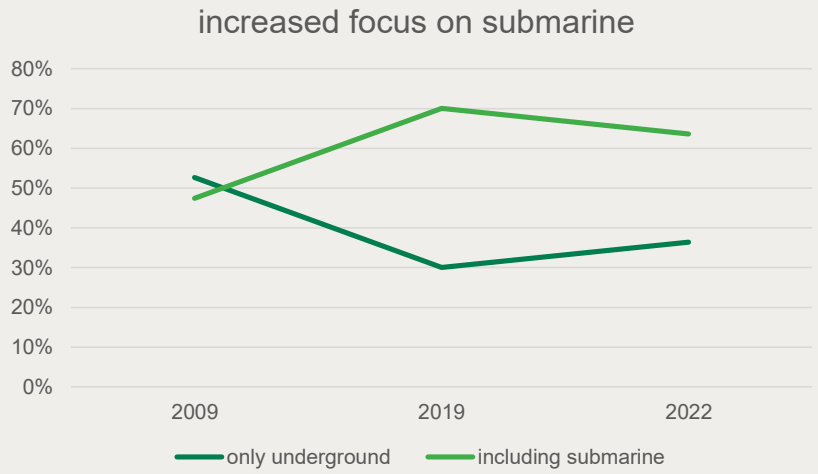


Main Technical Directions – Focus of WGs in SC B1

Evolution in past years has been driven by:

- Improvement of core technologies (covering all phases of cable life) and promote quality
- Focus on “Power Systems of the Future” and “Best Use of Existing Systems”
- WGs on Submarine and HVDC Cables increased, following (and often anticipating) market trends

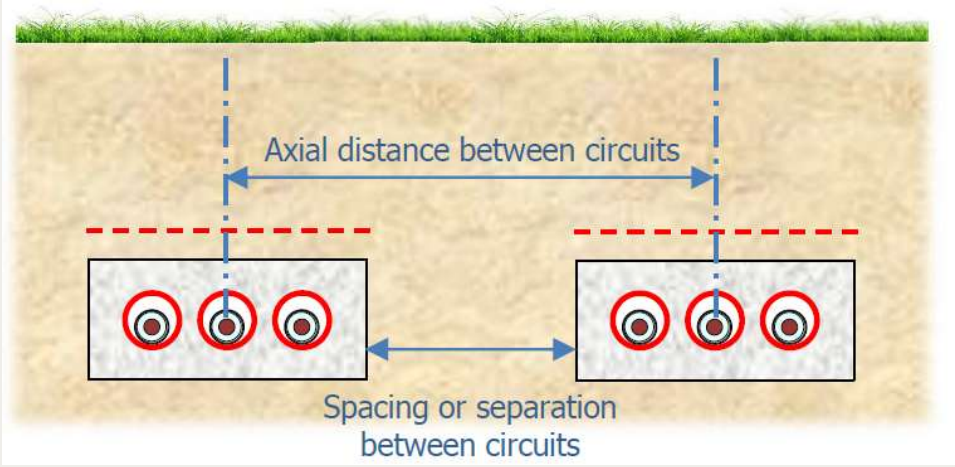




Main Technical Directions – Focus of WGs in SC B1

- ***Additional focus last years on calculations of cable ratings to utilize efficient power transfer***

Often copied to an IEC Standard.



Example of evolving from 2010:

B1.35 – Guide For ratings calculation (TB 640 - 2015)

B1.56 – Cable Rating verification (TB 880 – 2022)

B1.64 – Evaluation of Losses in armoured three core power cables

B1.67 – Loading Pattern on cables connected to windfarms

B1.72 – Cable Rating verification – part 2

B1.87 – Finite Element Analysis for cable rating calculations

B1.91 – Calculation of Cycling current rating (IEC 60853)

Main Technical Directions – Focus of WGs in SC B1

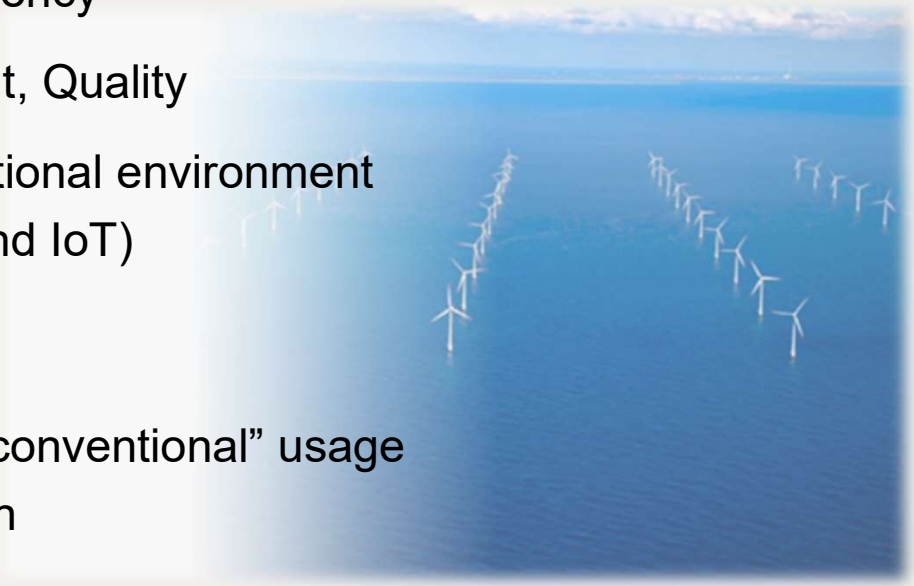
Current WGs are quite distributed around four phases of cable life:

- Design, including system aspects, component aspects, current ratings
- Construction, including manufacturing, installation, jointing
- Operation, including testing, maintenance, reliability
- Life Cycle, including upgrading/uprating, disposal

Main Technical Directions – Focus of WGs in SC B1

Future foreseen evolution and drivers:

- Sustainability, reduction of losses, systems efficiency
- Growing attention to Safety, Health, Environment, Quality
- Innovative cable systems in the changing operational environment (microgrids/supergrids, UHV, application of AI and IoT)



This translates to:

- Wide range of calculation tools, allowing for “unconventional” usage of cable systems as part of the Energy Transition
- Create robust cable solutions to allow for abnormal conditions
- Optimizing cable grid for inclusion of Distributed Energy Resources

Commitment to Quality and Efficiency

Deliverables of Cigre B1 Working Bodies are usually in the form of Technical Brochures that are highly considered and regarded as fundamental documents within the technical community.

- **Quality** of TBs shall be monitored and constantly perfected.
- **No Commercialism** is allowed. WG members represent their Country, not the employer. SC B1 Chair keeps the right to revise/change contents if needed

The time-to-market of SC B1 production shall improve, both in the preparation of final reports and in their revision and approval process.

- Preparatory **Task Forces** – 1 year from SC B1 approval to produce the ToR for future WGs
- **Working Groups** – 3 years from SC B1 approval to produce the Draft Final Report for SC B1
- **Revision Teams** (including SAG B1 reps and WGs members) – 6 months from presentation to SC B1 of Draft Final Report to publication and Tutorial

Recent publications

High focus on dissemination of work done in B1:

WG number	Name of the Publication	Publication details
TF B1.81 ➔ RAG	Cable Failure Statistics every 2nd year.	Future Connection – Sept 2022
WG B1.56	Power cable rating examples for calculation tool verification	TB 880 - Sept 2022
WG B1.63	Recommendations for mechanical testing of submarine cables for dynamic applications	TB 862 - Jan 2022
WG B1.65	Installation of Submarine Power Cables	TB 883 - Oct 2022
WG B1.61	Installation of underground cable systems	TB 889 – Jan 2023
WG B1.73	Recommendations for the use and the testing of Fibre Optic Cables used in land cable systems	TB 899 - Apr 2023

Upcoming publications

Technical Brochures under completion/review:

WG number	Name of the Publication	Publication details
WG B1.58	Asset management in MV cables networks	Expected Q2 2023
WG B1.54	Behaviour of cable systems under large disturbances (earthquake, storm, flood, fire, landslide climate change)	Expected Q2 2023
WG B1.64	Losses in Armoured three core power cables	Expected Q2 2023
WG B1.67	Loading Pattern on cables connected to windfarms	Expected Q3 2023
WG B1.68	Condition Evaluation and lifetime strategy of HV cable systems	Expected Q2 2023
JWG B1/C4.69	Recommendations for the insulation coordination on AC cable systems	Expected Q3 2023
WG B1.70	Recommendations for the use and the testing of optical fibres in submarine cable systems	Expected Q3 2023
JWG B1/B3.74	Recommendations for a performance standard of Polymer insulated busbars	Expected Q4 2023

Green Books progress:

- “Accessories for HV and EHV Extruded Cables – Vol. 2” is expected in June 2023.
- A proposal for a book on “Cable Rating” will be put forward for approval process within 2023.
- “HVAC Cable System Design” book may be proposed.

Tutorials and webinars

Year	Date	Type	Title
2020	9 January	Webinar	TB 722, Additional testing of XLPE 6-60 kV
2020	28 May	Webinar	TB 770, Trenchless technologies
2020	26.aug	Webinar	B1.35 - Cable ratings
2020	15.dec	Webinar	B1.52-TB 773 Fault location
2021	04.March	Webinar	TB 680 Long HV/EHV AC cable syst.
2021	04. June	Webinar	TB 610/B1.40 - Offshore generation cables
2021	27.aug	Webinar	B1.45/61/65 - Installation of land and sub. Cables
2021	November	Webinar	TB 825 - Maintenance HV cable sysst
2022	April	Webinar	TB 797 - Sheath bonding systems AC cables
2022	June	Webinar	TB 862 - Mechanical testing dynamic cables
2022	August	Tutorial	A new era of submarine power cables
2023	September	Tutorial	Fault Location on Land and Submarine Links (AC & DC)

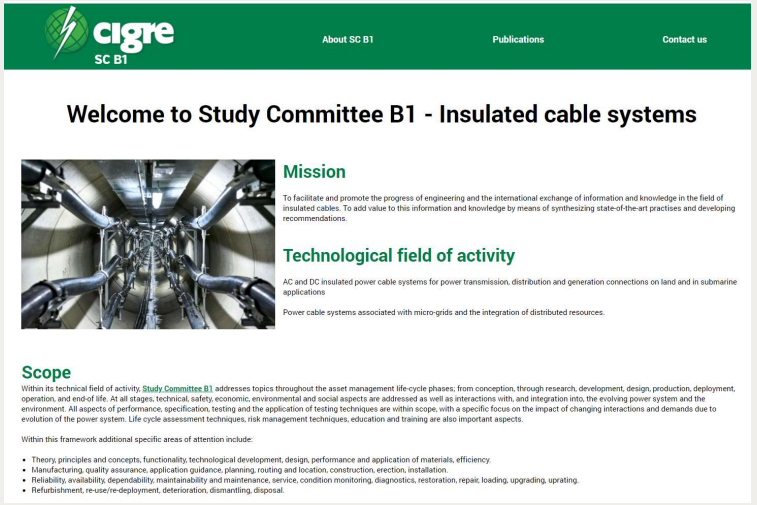
Most webinars are available at e-cigre.org as recordings

Next planned activities: See Event calendar at cigre.org

SC B1 website and KMS

Website

- New website from SCB1 now available (b1.cigre.org)
- Public access, basic information and references
- White book available (searcheable worksheet with indexed collection of B1 works, under «Publications» heading)



KMS

- Private workplace, access to members of specific groups (Study Committee, Advisory Groups, Working Groups)

Active B1 WGs and JWGs

- WG B1.54 Behavior of Cable Systems under Large Disturbances (Earthquake, Storm, Flood, Fire, Landslide, Climate change)
- WG B1.58 Asset Management in MV Cables Networks
- WG B1.64 Evaluation of losses in armoured three core power cables
- WG B1.67 Loading pattern on windfarm array and export cables
- WG B1.68 Condition evaluation and lifetime strategy of HV cable systems
- B1/C4.69 Recommendations for the insulation coordination on AC cable systems
- WG B1.70 Recommendations for the use and the testing of optical fibres in submarine cable systems
- WG B1.71 Guidelines for safety risk management in cable systems
- WG B1.72 Cable rating verification – application in complex situations
- B1/B3.74 Recommendations for a performance standard of insulated busbars
- B1/D1.75 Interaction between cable and accessory materials in HVAC and HVDC application
- WG B1.76 Enhancing Quality Assurance/Quality Control Procedures for (E)HV Cable Systems
- B1/B3/D1.79 Recommendations for dielectric testing of HVDC gas insulated system cable sealing ends
- WG B1.80 Guidelines for Site Acceptance Tests of Distributed Temperature Sensing (DTS) and Distributed Acoustic Sensing (DAS) Systems when used for power cable systems monitoring
- WG B1.82 MVDC Cable System Requirements
- WG B1.83 Grounding aspects for HVDC land cable connections
- WG B1.86 Assessment, Prevention and Mitigation of Safety Risk in Cable Systems
- WG B1.87 Finite Element Analysis for Cable Rating Calculations

New works / planned for B1 for 2023

WG	B1.88	Replacement gas for SF6 in cable term.	Pierre Mirebeau (FR)
WG	B1.89	Guidance for conducting cable systems failure analysis	Ross Wilson (UK)
WG	B1.90	Cable Characteristics - Update TB 531	Rachel Mosier (US)
WG	B1.91	Calculation of Cycling current rating (IEC 60853)	Frederic Lesur (FR)
TF	B1.92	Recommendations to additional test subm cables (> 72kV)	James Pilgrim (GB)
TF	B1.93	Robotic supervision of cable tunnels	Jianbin Fan (CN)
		Proposed by other SC's	
JWG	B2.B1.	Transition between overhead and underground lines	Antonio Useros (ES)
JWG	B4.B1…	Harmonization of voltages designation in HVDC compont.	Bruno Bisewski (CA)
WG	C4.74	Accurate line and cable models	Haoyan Xue (CN)
TF	D1.81	Common data file format for TDR instruments	Andrew Barclay (UK)

National B1 Committees/Panels could propose within June 30th additional topics to be considered.

SC B1 needs your input

Customer Advisory Group CAG B1 collects your views and needs

- What are the current industry issues?
- What challenges do you face?
- What should SCB1 be studying next?
- Email your ideas, with detailed description, to the Customer Advisory Group

cigre.scb1.cag@gmail.com

News from Central office

Many digital tools will be updated/introduced

- e-cigre
- Session Page
- WG management
- Session Registration Platform

2023 Events for B1

- Participation to CIGRE Symposium, led by SC C6 “The end-to-end electricity system: transition, development, operation and integration”, in Cairns (Australia), 4th - 7th September 2023

- SC B1 Meeting in Cairns (Australia), adjacent to CIGRE Symposium

Program and details: cigrecairns23.com.au
Many SC’s will participate:

A3 — Transmission and Distribution Equipment
B1 — Insulated cables
B3 — Substations and electrical installations
B5 — Protection and automation
C1 — Power system development and economics
C2 — Power system operation and control
C4 — Power system technical performance
C5 — Electricity markets and regulation
C6 — Active distribution systems and distributed energy resources
D1 — Materials and emerging test techniques
D2 — Information systems and telecommunication

- Participation to Jicable’23 (Lyon, 18 - 22 June)

Events after 2023

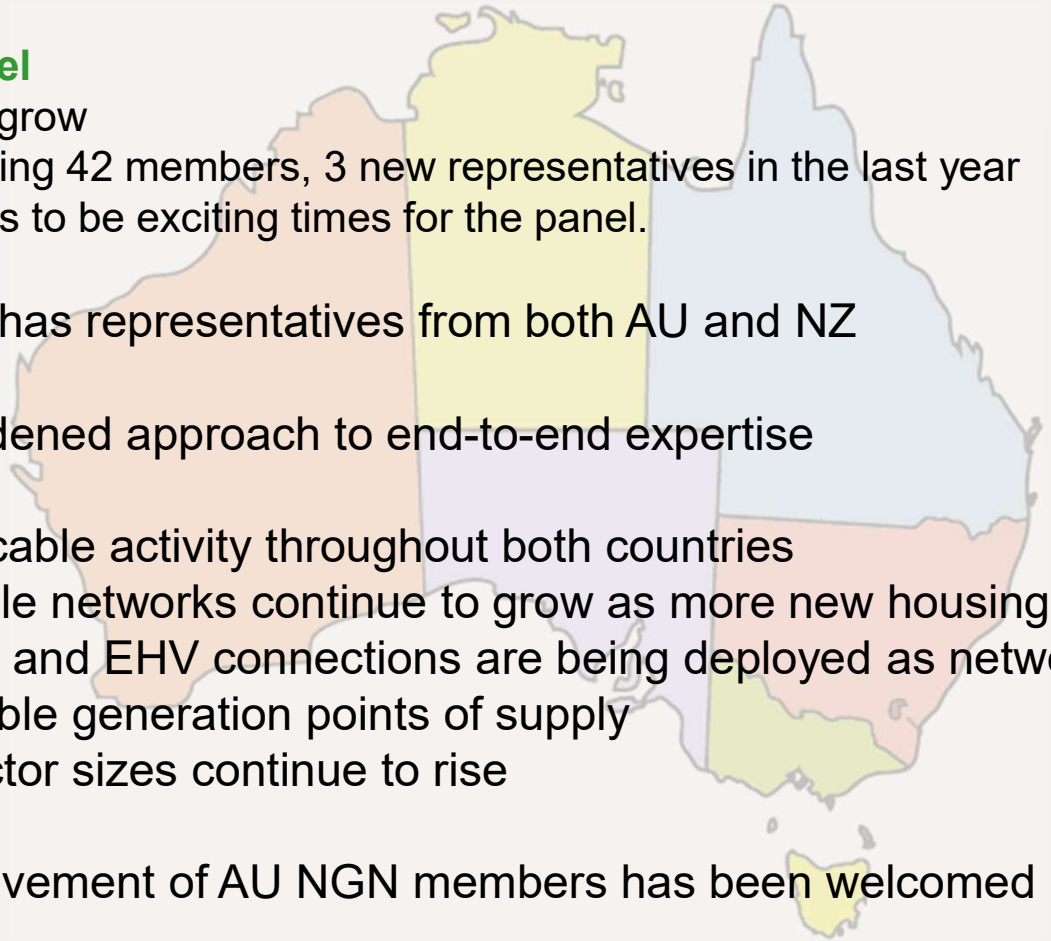
2024

- CIGRE Session in Paris

2025

- SC B1 Meeting, location, Europe
- Participation to CIGRE Symposia, Tel Aviv / Norway

Australian Panel AU B1 – Insulated Cables



The AU B1 Panel

- Continues to grow
- Currently having 42 members, 3 new representatives in the last year
- This continues to be exciting times for the panel.

The AU Panel has representatives from both AU and NZ

CIGRE's broadened approach to end-to-end expertise

Considerable cable activity throughout both countries

- MV cable networks continue to grow as more new housing estates are established
- MV, HV and EHV connections are being deployed as networks are expanded to capture renewable generation points of supply
- Conductor sizes continue to rise

Extended involvement of AU NGN members has been welcomed by the panel.

cigre
For power system expertise

Australian Panel AU B1 – Insulated Cables

Topics of interest raised during 2022/23 are :

- Distribution utilities keen on implementing more robust condition assessment electrical testing (Tanδ & PD) measurements to support managing MV cable assets. Guidelines on choosing equipment and services and integrating those with the asset management process
- ISO55001 is also of interest. Both AU and NZ utilities foresee that guidelines or specialist knowledge on integrating cable maintenance decisions with asset management
- The importance and benefits of maintenance programs
- Continued connections for Solar and Wind farms at MV, HV and EHV levels.
    - Lots of non-cable people becoming involved in cable related decisions
- Big Battery systems to harness renewable energy are being connected by cables (MV, HV and EHV)
- Continued growth in use of fibre optic cables for measuring and monitoring cable performance
- Off-shore windfarms - Submarine cables, DC links, long AC links
- 500kV cable is coming to Australia
- Large conductors for HV cables : 66kV up to 2500mm², Higher voltages to 3500-4000mm²

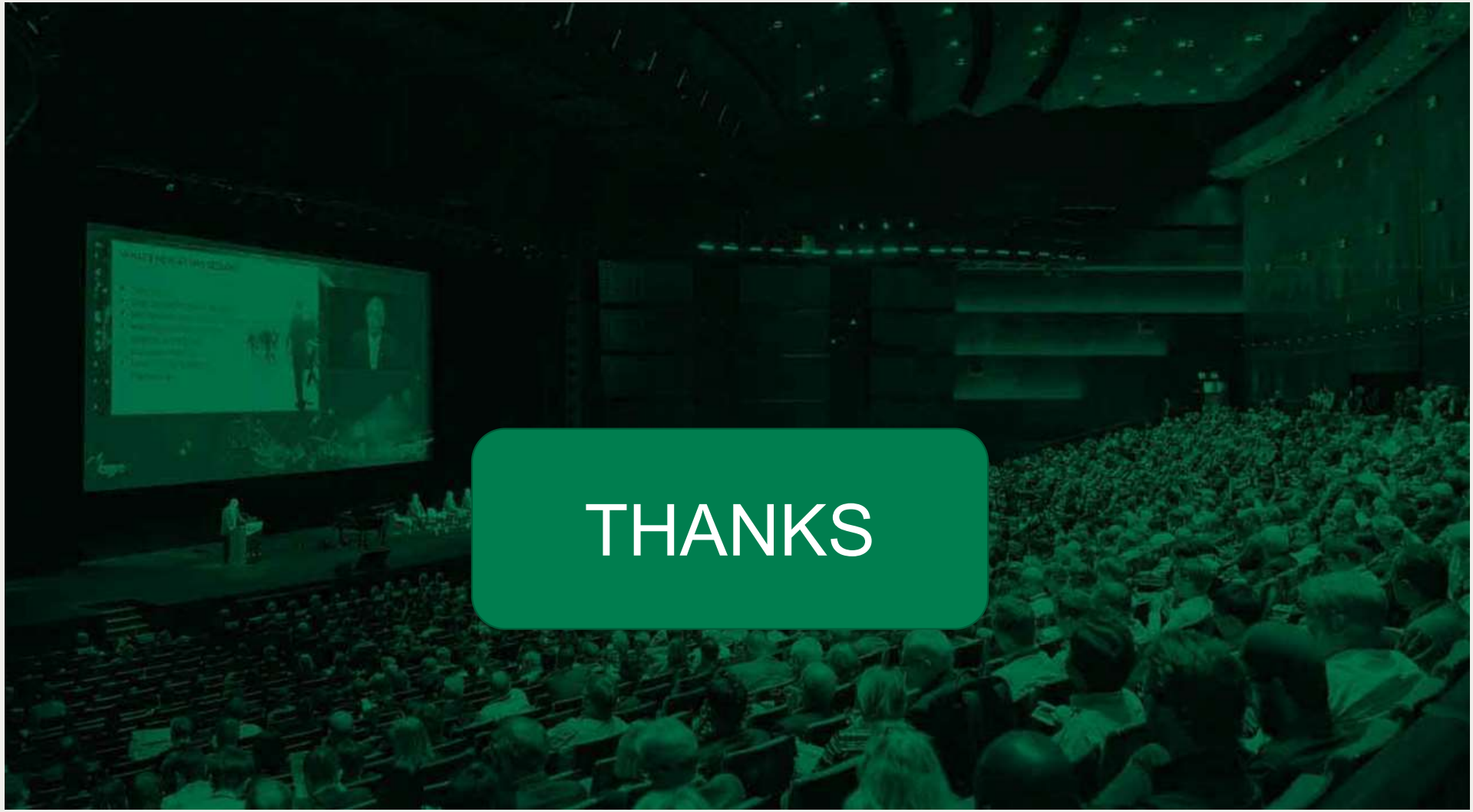
cigre
For power system expertise

Australian Panel AU B1 – Insulated Cables

AU B1 Members currently on Working Groups

WG/TF Number	WG/TF Title	AU B1 Rep
TF B1.93	Robotic supervision of tunnels	Samir MD Aris
TF B1.92	Qualification of Lead-free Submarine Cables at 72.5kV<Um<170 kV	No AU B1 rep
JWG B2/B1	Transition facilities between overhead and underground lines	Gian Moffa
WG B1.91	Transient Thermal Modelling of Power Cables (*update to IEC 60853*)	Rajitha Vitharana
WG B1.90	Cable Systems Electrical Characteristics (*Update of TB 531*)	Ryan Atkinson
WG B1.89	Guidance for conducting cable systems failure analysis	Rob Bradley
WG B1.87	from TF B1.84_1 Finite Element Analysis for Cable Rating Calculations	Chandima Ekanayake
WG B1.86	Guidelines for safety issues associated to cable systems	Nic Moffa
JWG B1/C3.85	Environmental impact of decommissioning of underground and submarine cables	Nimal G
WG B1.83	Grounding aspects for long HVDC land cable connections	Kerry P
WG B1.82	MVDC Cable system requirements/topics	Craig Harrison
WG B1.81	How to have statistics every 2 years? *2021 Decision :* extension 1 year with the TF, and then set an Advisory Group in 2022 to handle those statistics	Russell W
WG B1.80	Guidelines for Site Acceptance Test of DTS and DAS systems	Jeff Cairns
WG B1.76	Enhancing Quality Assurance/Quality Control Procedures for HV and EHV Cable Systems	Peter N
JWG D1/B1.75	Strategies and tools for corrosion prevention for cable systems (2019 – 2022)	Graeme B
WG B1.72	Cable ratings verification (2nd part) (2018 - 2020)	David S
JWG B1/C4.69	Recommendations for the insulation coordination on AC cable systems (2018 - 2021)	Tony Auditore
WG B1.68	Condition evaluation and lifetime strategy (2018 - 2021)	Rob B
WG B1.67	Loading pattern on cables connected to windfarms (2018 - 2021)	Kerry P
WG B1.58	Asset management in MV cables networks (2016-2019)	Dave L

cigre
For power system expertise


THANKS