

CIGRE Study Committees



Scope of Work & Activities 2016

INTERNATIONAL COUNCIL ON LARGE ELECTRIC SYSTEMS
Conseil International des Grands Réseaux Électriques



CIGRE Technical Committee

The Technical Committee is responsible for defining and managing the technical activities of CIGRE and it is at the very heart of the CIGRE organisation. The Technical Committee is principally made up of the 16 Study Committee Chairmen, all of who are established experts and leaders in their respective fields. These individuals, working with the Technical Committee Chairman, the CIGRE Secretary General and two representatives of the CIGRE Administrative Council are able to bring together the diverse range of issues and topics that are of interest to our stakeholders and establish the appropriate work programmes to deliver valuable outputs in the target areas.

Within the frameworks established by the Technical Committee each Study Committee, consisting of National Committee representatives and active experts such as Working Group convenors, has the responsibility to manage the programme of work within its area of responsibility. At the highest level, the framework for CIGRE's technical activities consists of four strategic directions.

- > Prepare the "strong and smart " power system of the future,
- > Make the best use of the existing equipment and system,
- > Promote excellent environmental performance,
- > Develop and communicate knowledge and information.

Delivery of the technical work of CIGRE, overseen by the Technical Committee, takes two main forms: publication of technical reports prepared by international Working Groups (Technical Brochures, ELECTRA articles) and preparation of technical events such as conferences, symposia, colloquia, tutorials & workshops.

Particular strengths of CIGRE are its well established Working Group structure and its wide international engagement. We typically have in excess of 230 active Working Groups and 3800 active experts engaged in CIGRE activities at any one time. Despite this success we have strong focus on broadening our appeal and creating a strong, sustainable organisation going forward with a particular focus on improving our engagement with women and those who are young or "young in career".

Mission statement

Efficient use of electric energy is at the heart of a sustainable future for our world. CIGRE will lead the shaping and delivery of this future vision by providing a truly worldwide platform for development, exchange and application of knowledge and information in the fields of generators, transmission, distribution and end-use of electric energy. CIGRE will be the pre-eminent organisation in its field, addressing technical, economic, environmental and social issues in a responsible and impartial manner.

We will exploit the enormous expertise of our stakeholders worldwide to drive innovation, to develop solutions and to provide trusted, impartial, non-commercial guidance and advice. We will engage with, and become a trusted advisor to, the widest possible range of individuals and organisations who themselves might influence, or be influenced by, the development of the electricity sector.

CIGRE's communications will be clear, readily accessible, unambiguous and appropriate to the intended audience and will continue to promote the value and importance of electrical engineering and the electric power industry within technical, political, business and academic arenas. We will develop our organisation to ensure that we are the leading platform for exchange of information and the adviser of choice for the electrical supply industry.

We will actively promote the development of skills and knowledge and provide a wide range of opportunities for stakeholders of all types to share knowledge and experience and to collaborate in the development of themselves and of the future of societies around the world.

Mark Waldron - CIGRE Technical Committee Chairman



CIGRE Study Committees Scope of Work & Activities 2016

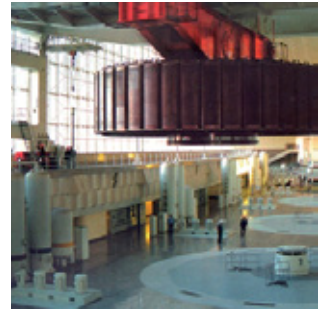
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CONTACT

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Rotating Electrical Machines

The SC is focused on the development of new technologies and the international exchange of information and knowledge in the field of rotating electrical machines, to add value to this information and knowledge by means of synthesizing state-of-the-art practices and developing guidelines and recommendations.



Main area of attention:
Study Committee A1 plays a pivotal role in the field

of rotating electrical machines. Besides expanding the interests in improving the performance of the machines, the utilization of polymer nano-composites as near-future HV electrical insulation and the influence of renewable energy machines as part of the development of smart grids, the SC A1 within its field of activity shall:

Serve all its customers involved in the process of generating electrical energy by means of:

- Providing a forum where suppliers and users can share and exchange experiences and information.
- Being aware of customer's needs.
- Monitoring and reporting on the international development.
- Promoting trends beneficial for its customers.
- Issuing guidelines and recommendations.
- Updating former reports due to recent developments in design, materials, insulation, cooling and bearings technology and improvements in efficiency and maintenance.

Promote innovative solutions and concepts considering all relevant factors (economical, technical, environmental and others). Actively promote and support international cooperation and conferences.

Promote Symposium/Colloquium during Study Committee meetings in odd years.

Participate in Regional Meetings with technical contributions.

Principal areas of interest

Asset Management to extend the life of existing generators or to recommend their replacement.

Machine monitoring, diagnosis and prognosis to perform maintenance when it is really required.

Renewable generation which may be connected directly to the transmission and distribution systems or even directly to consumers setting up the microgrids.

Enhancements in the construction of larger turbo and hydro-generators.

High efficiency electrical machines due to the development of new materials, improving cooling and insulation in generators and motors.

Large motors and high efficiency motors.

Current activities

One of the continuous drivers for the SC A1 Committee is the technological improvements in design, materials, insulation, cooling, bearings, availability, reliability, efficiency, monitoring and maintenance of electrical machines.

Assessment of electrical rotating machines management. improvements in monitoring, diagnosis and prognosis systems.

Key projects / forthcoming events

Evolution of Power System Planning to Support Connection of Generation, Distributed Resources and Alternative Technologies;

Philadelphia, USA – November 2 and 3, 2016.

SC A1 2017 annual meeting and colloquium, Vienna, Austria.

Other specific interest

Utilization of polymer nano-composites as near-future HV electrical insulation in rotating machines.

Increase the number of Tutorials and the participation of young and female engineers.



TOPICS OF WORKING GROUPS

WG A1.29	Guide on New Generator-grid Interaction Requirements
WG A1.31	State of the Art of Stator Winding Supports in Slot Area and Winding Overhang of Hydrogenerators
WG A1.33	Guide for the Proper Storage and Cleanliness of Turbogenerators and their Components
WG A1.34	Testing Voltage of Doubly-fed Asynchronous Generator-motor Rotor Windings for Pumped Storage
WG A1.36	Vibration and Stability Problems met in New, Old and Refurbished Hydro Generators, Root Causes and Consequences
WG A1.39	Application of Dielectric Dissipation Factor Measurements on New Stator Coils and Bars
WG A1.40	Survey on Hydrogenerator Instrumentation and Monitoring
WG A1.42	Influence of Key Requirements on the Cost of Hydrogenerators
WG A1.43	State of the Art of Rotor Temperature Measurement
WG A1.44	Guideline on Testing of Turbo and Hydrogenerators
WG A1.45	Guide for Determining the Health Index of Large electric motors
WG A1.46	Guide on Use of Premium Efficiency Motors and Carbon Credit Claim
WG A1.47	Technological Feasibility Studies for IE4 / IE5 Efficient Motors
WG A1.48	Guidance on the Requirements for High Speed Balancing / Overspeed Testing of Turbine Generator Rotors Following Maintenance or Repair
WG A1.49	Magnetic Core Dimensioning Limits in Hydro Generators
WG A1.50	Quality Assurance Testing Requirements for Turbo Generator Components
WG A1.51	Monitoring, Reliability and Availability of Wind Generators
WG A1.52	Wind Generators and Frequency-active Power Control of Power Systems
WG A1.53	Guide on Design Requirements of Motors for Variable Speed Drive Application
WG A1.54	Impact of flexible operation on large motors
WG A1.55	Survey on Split Core Stators
WG A1.56	Survey on Lap and Wave Winding and their Consequences on Maintenance and Performance

LATEST PUBLICATIONS

TB 641	Guide on Economic Evaluation of Refurbishment / Replacement Decisions on Generators
TB 621	Generator On-line Over and Under Excitation Issues
TB 582	Survey on Hydrogenerator Cleaning
TB 581	Guide: Corona Electromagnetic Probe Tests (TVA)
TB 574	Guide for Consideration of Duty on Windings of Generators
TB 573	Guide for Minimizing the Damage from Stator Winding Ground Faults in Hydrogenerators
TB 558	Guide for the Monitoring, Diagnosis and Prognosis of Large Motors
TB 552	Guide of Methods for Determining the Condition of Stator Winding Insulation and their Effectiveness in Large Motors
TB 551	Feasibility of updating from Class F to Class H the Electrical Insulation Systems in Electrical Rotating Machines
TB 522	Generator Stator Winding Stress Grading Coating Problem
TB 517	Guide for Prevention of Overfluxing of Generators
TB 503	State of the Art and Capacity for Robotic Inspection of Turbogenerators
TB 491	Generator end-Winding Retaining Rings - A Literature Survey and Care Guideline
TB 480	Guide on Stator Water Chemistry Management
TB 470	Life Extension of Large Electric Motors in Nuclear Power Plants
TB 469	State of the Art in Efficiency of Hydrogenerators Commissioned since 1990
TB 454	Hydrogenerator Fire Protection Update
TB 437	Guide for On-line Monitoring of Turbogenerators
WR A1.19	Motor Failure Survey
WR A1.21	Bearing Segments with Plastic Lining: Operating and Maintenance Experience
WR A1.27	Adjustable Speed Drives and High-efficiency Motors Applications in Power Plants
WR A1.30	Usage of Magnetic Slot Wedges in Hydrogenerators

WR: Working Group Report - TB: Technical Brochure.

All of the above TBs are available for download from www.e-cigre.org

CONTACT

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Transformers

The scope of SC A2 covers the whole life cycle of all kind of power transformers, including HVDC transformers, phase shifters, shunt reactors and all transformer components as bushing and tap-changers.



2016 SCOPE OF WORK

In the past, SC A2 (known as SC 12) activities were focussed on design problems related to the rapid increase of rated voltage and power.

Today, the two strategic directions for A2 activities are :

- Services to customers (Reliability, life management, economics, tutorials...).
- Technology Issues (Safety, new technologies and new concepts, electrical environment, pre-standardisation work...).

The key domains of SC A2 are:

- Transformer technologies: specifications, procurement, economics, design, manufacturing and testing.
- Transformer utilisation: operation, reliability, safety and environment, maintenance, diagnostic, monitoring and repair.

Current activities

- Reliability of transformers and its components.
- New tools for modelling: thermal, highfrequency, etc.
- New Diagnostics tools and interpretation techniques.
- Transportation, maintenance and monitoring technologies.
- Asset management, end of life estimation and life extension.
- Transformer specifications: audible noise requirement, efficiency, DC bias capability, etc.

Key projects / forthcoming events

Next SC A2 Colloquium,

October 1st to 6th, 2017, Cracow, Poland; India in 2019.



TOPICS OF WORKING GROUPS

WG A2.38	Transformer Thermal modelling
WG A2.42	Guide on Transformer Transportation
WG A2.43	Bushing Reliability
WG A2.45	Transformer failure investigation and post-mortem analysis
JWG A2/D1.46	Field experience with transformer solid insulating ageing markers
WG A2.48	Technology and utilization of oil insulated high voltage shunt reactors
WG A2.49	Condition assessment of power transformers
WG A2.50	Effect of the distributed energy sources on T&d transformers
JWG A2/D1.51	Improvement to partial discharge measurements for Factory and site Acceptance Tests of power Transformers
JWG A2/C4.52	High-frequency transformer models
WG A2.53	FRA Interpretation
WG A2.54	Audible Sound Requirement
WG A2.55	Life Extension
WG A2.56	Power Transformer Efficiency
WG A2.57	Effects of DC bias on power transformers

LATEST PUBLICATIONS

TB 655	Technology and Utilisation of Oil-immersed Shunt Reactors
TB 646	HVDC Transformer Insulation: Oil Conductivity
TB 642	Transformer Reliability Survey
TB 630	Guide on Transformer Intelligent Condition Monitoring (TICM) Systems
TB 625	Copper Sulphide Long Term Mitigation and Risk Assessment.
TB 577	Transient interaction between Transformers & power system
TB 537	Guide for Fire safety
TB 530	Guide for Factory Capability Assessment
TB 529	Guide for design review
TB 528	Guide for specifications
TB 445	Guide on Transformer maintenance
TB 436	Experience in service with new insulating liquids
TB 407	HVDC Transformers - guidelines for design review
TB 406	HVDC Transformers - Test, ageing, reliability in service
TB 393	Thermal performances
TB 378	Copper sulphide in Transformer insulation

All of the above TBs are available for download from www.e-cigre.org

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High Voltage Equipment

The scope of the SC A3 covers theory, design, construction and operation for all devices for switching, interrupting and limiting currents, surges arresters, capacitors, busbars, equipment insulators and instrument transformers used in transmission and distribution systems.



2016 SCOPE OF WORK

SC A3 is responsible for the collection of information, technical evaluation of power system studies and technical analyses of both AC and DC equipment from distribution through transmission voltages.

The SC covers all switching devices, surge arresters, instrument transformers, insulators, bushings, capacitors, fault current limiters, shunt and series capacitor banks and diagnostic and monitoring techniques.

SC A3 continuously provides the information on new technologies, improved specifications, reliability, and lifecycle management of transmission and distribution equipment.

This scope is well suited to the various technical needs of utilities that require technical and sustainable solutions for emerging problems and challenges in changing network conditions.

SC A3 also increases its educational and tutorial activities on all relevant subjects not only within the CIGRE community but also to IEEE, IEC, and many related international conferences and exhibitions.

This supports a greater internal and external visibility of CIGRE and provides new relationships with other dealing with power engineering.

Principal areas of interest

Innovative technologies (e.g. dC circuit-breakers). Requirements for equipment in changing network conditions. Incorporation of intelligence into hv equipment (e.g. Controlled switching). Monitoring and diagnostics of transmission and distribution equipment.

New and improved test techniques.

Reliability assessment, end-of-life management of ageing equipment.

Mitigation methods for overstressing and overloads.

Current activities

MO varistors and surge arresters for emerging system conditions. Capacitor bank switching and impact on equipment.

Vacuum switchgear for transmission use. Technical requirements for uhv equipment (gCB, ds, hsgs, es, mosA*).

Deterioration and ageing of hv substation equipment.

Overstressing of substation equipment.

Non-conventional instrument transformers.

Non-intrusive condition monitoring.

Equipment for series and shunt compensation.

DC switchgears including dC - Circuit Breakers.

Multi-physic simulation for temperature rise test.

11 active Working groups and 3 advisory groups.

Key projects / forthcoming events

2017 CIGRE SC A3, B4 & D1 Colloquium & Tutorial, 2 - 6 October, 2017, Winnipeg, Canada.

2019 CIGRE SC A3 Colloquium, September or October 2019, Bucharest, Romania.

(*) GCB: Gas Circuit Breaker - DS: Disconnecting Switch - HSGS: High Speed Grounding Switch - ES: Earthing Switch - MOSA: Metal Oxide Surge Arrester.



TOPICS OF WORKING GROUPS

WG A3.25	MO varistors and Surge Arresters for Emerging System Conditions
WG A3.29	Deterioration and Ageing of HV Substation Equipment
WG A3.30	Overstressing of Substation Equipment
WG A3.31	Non-conventional Instrument Transformers
JWG A3.32/Cired	Non-intrusive Condition Monitoring
WG A3.33	Equipment for Series and Shunt Compensation
JWG A3/B4.34	DC Switchgears including DC Circuit Breakers
WG A3.35	Controlled Switching
WG A3.36	Multi-physic Simulation for Temperature Rise Test
JWG A3/B5/C4.37	Out-of-phase Experience
WG A3.38	Shunt Capacitor Switching in Distribution and Transmission Systems

LATEST PUBLICATIONS

TB 624	Influence of Shunt Capacitor Bank on CB Fault Interruption Duties
TB 602	Tools for Simulation of the Internal Arc Effects in HV & MV Switchgear
TB 589	Vacuum Switchgears at Transmission Voltages
TB 570	Switching Phenomena for EHV and UHV Equipment
TB 544	Metal Oxide (MO) Surge Arresters - Stresses and Test Procedures
TB 514	Reliability of High Voltage Equipment - Part 6: GIS Practices
TB 513	Reliability of High Voltage Equipment - Part 5: Gas Insulated Switchgear
TB 512	Reliability of High Voltage Equipment - Part 4: Instrument Transformers
TB 511	Reliability of High Voltage Equipment - Part 3: DS & Earthing Switches
TB 510	Reliability of High Voltage Equipment - Part 2: SF6 Circuit Breakers
TB 509	Reliability of High Voltage Equipment - Part 1: General Matters
TB 497	Applications and Feasibility of Fault Current Limiters in Power Systems
TB 456	Background of Technical Specifications for Substation Equipment > 800 KV
TB 455	Application of Composite Insulators to High Voltage Apparatus
TB 408	Line Fault Phenomena and their Implications for 3-phase SLF/LLF Clearing
TB 394	State of the Art of Instrument Transformer
TB 368	Operating Environment of Voltage Grading Capacitors applied to HV Circuit Breaker
TB 362	Technical Requirements for Substation Equipment Exceeding 800 KV AC
TB 339	Guideline on the Impact of FCL devices on Protection System
TB 336	Changing Network Conditions and System Requirements Part 2
TB 335	Changing Network Conditions and System Requirements Part 1
TB 319	Failure Survey on Circuit Breaker Controls Systems
TB 305	Guide for Application of IEC 62271-100 & 62271-1 - Part 1
TB 304	Guide for Application of IEC 62271-100 & 62271-1 - Part 2

All of the above TBs are available for download from www.e-cigre.org

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Insulated Cables

The scope of SC B1 covers the whole Life Cycle of AC and DC Insulated cables for Land and Submarine Power Transmission, which means theory, design, applications, manufacture, installation, testing, operation, maintenance, upgrading and uprating, diagnostics techniques. It has been focused on HV & EHV applications for a long time. Nowadays MV applications are more and more taken into consideration.



2016 SCOPE OF WORK

The activities of CIGRE Study Committee B1 cover all types of AC and DC insulated cable systems for land and submarine power connections.

Within this field of activities, all issues concerning all steps of the whole life cycle of cable systems are addressed: theory, design, applications, manufacture, installation, testing, operation, maintenance, remaining life management, upgrading and removal.

At the end of 2015, more than 320 experts worldwide are participating to the work of SC B1.

The main areas of attention are:

- HVDC Cable Systems, for both VSC and LCC Technologies and at higher Voltage levels.
- Onshore and offshore generation cable connections and their specific issues.
- Submarine cables with extruded insulation: recommendations for electrical and mechanical testing.
- New Testing Techniques.
- New materials.

Principal areas of interest

Superconducting Cables.
HVDC Extruded Cables for LCC and VSC Systems.
Onshore and Offshore Generator Connections.

Current activities

Preparation of Recommendations for further Standardization by IEC.
Preparation of Guide for Implementation of HV/EHV Long Cable Systems.
Life Cycle Analysis and Environmental Impact Assessment.
Tutorials for Technical and Non-Technical Audiences.

Key projects / forthcoming events

Reference Books on Accessories and Cable Systems Design.
Celebration of **SC B1 90th Anniversary** in 2017.

Other specific interest

Modeling of Cables, New Installation Techniques.
Prevention of Third Party Damage, Asset management.



TOPICS OF WORKING GROUPS

WG B1.28	On-site Partial Discharge Assessment of HV and EHV Cable Systems
WG B1.34	Mechanical Forces in Large Cross Section Cable Systems

For these two groups, the work has been achieved and final report will be soon available on e-cigre.

WG B1.36	Life Cycle Assessment and Environmental Impact of Underground Cable Systems
WG B1.38	After Laying Tests on AC and DC Cable systems with New Technologies
WG B1.41	Long Term Performance of Soil and Backfill of Cable Systems
WG B1.44	Work under Induced Voltages or Currents
WG B1.45	Thermal Monitoring of Cable Circuits and Grid Operators' use of Dynamic Rating Systems
WG B1.46	Conductor Connectors: Mechanical and Electrical Tests
WG B1.47	Implementation of Long AC HV and EHV Cable Systems
WG B1.48	Trenchless Technologies for Underground Cables
JWG B1 / B3.49	Standard Design of a Common, Dry Type Plug-in Interface for GIS and Power Cables up to 145 KV
WG B1.50	SVL and Bonding Systems (Design, Testing, Operation and Monitoring)
WG B1.51	Fire Issues for Cable installed in Air
WG B1.52	Fault Location on Land and Submarine Links (AC and DC)
WG B1.54	Behavior of Cable Systems under Large Disturbances (Earthquake, Storm, Flood, Fire, Landslide, Climate change)
WG B1.55	Recommendations for Additional Testing for Submarine Cables from 6 KV (UM = 7.2 KV) up to 60 KV
WG B1.56	Cable Ratings Verification
WG B1.57	Update of Service Experience of HV Underground and Submarine Cable Systems

LATEST PUBLICATIONS

TB 652	Guide for Operation of Fluid Filled Cable Systems
TB 640	A guide for Rating Calculations of Insulated Cables
TB 623	Recommendations for Mechanical Testing of Submarine Cables
TB 622	Testing of Transition Joints between HVDC Cables with Lapped and Extruded Insulation up to 500 KV
TB 610	Off shore generation cable connections
TB 606	Upgrading and Uprating of Existing Cable Systems
TB 605	Feasibility of a common, dry type interface for GIS and Power cables of 52 KV and above
TB 560	Guidelines for maintaining the Integrity of XLPE Cable Accessories
TB 559	Impact of EMF on Current ratings and Cable Systems
TB 538	Recommendations for testing of Superconductive cables
TB 531	Cable systems Electrical Characteristics
TB 496	Recommendations for Testing DC Extruded Cable Systems for Power Transmission at a Rated Voltage $\leq$ 500 KV
TB 490	Recommendations for testing of long AC submarine cables with extruded insulation for System Voltage above 30(36) to 500(550) KV
TB 476	Cable Accessory Workmanship on Extruded High Voltage Cables

All of the above TBs are available for download from www.e-cigre.org

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Overhead Lines

The scope of the Study Committee SC B2 covers all aspects of the design and refurbishment of overhead power lines. The Study Committee's strategic goals include: increased acceptance of overhead lines; increased utilization of existing overhead lines; improved reliability and availability of overhead lines.



2016 SCOPE OF WORK

The Study Committee covers all aspects of overhead line design, construction and maintenance, including modification of existing lines,

Specific areas of interest are

Electrical Performance, Towers, Insulators and Foundations, Conductors and Fittings and Asset Management.

Electrical Performance deals with utilization of new and existing overhead power lines including modification of existing lines to allow increased power flow and economic design of new lines.

Towers (AC & DC), Insulators and Foundations seek to improve diagnostic tools and modeling of in-service insulators, both dynamic and static foundation & structure loads, repair of corrosion in structures, and evaluation of new materials for line supports.

Conductors and Fittings covers conductor fatigue and endurance capability, protection against wind induced vibrations, assessment of aged fittings and support in the preparation of standards, e.g. for fittings, conductor self-damping and conductor fatigue.

Asset management considers electrical and civil aspects of line reliability and availability of overhead lines including climatic loads, electrical clearances and live-line working.

Principal areas of interest

- Route selection
- Optimized line design
- Line maintenance & service life
- Refurbishment of existing lines
- Design specifications
- Life cycle assessment
- Step potential rise
- Wind induced vibrations and galloping
- Increased power flow of existing lines
- Asset management guidelines
- Real-time monitoring systems
- Minimizing the impact of lines

Current activities

CIGRE Paris 2016 Session.

New Green Book of Overhead Lines.

Key projects / forthcoming events

Experiencing the Future Power System.... Today, April 2017, Dublin, Ireland.

CIGRE international Colloquium on EHV/UHV, April 2019, Japan.

Other specific interest

Strong emphasis on tutorials for industry professionals and young engineers.



TOPICS OF WORKING GROUPS

WG B2.24	Qualification of HV and UHV Overhead Line Supports under Static and Dynamic Loads
WG B2.40	Calculations of the Electrical Distances between Live Parts and Obstacles for Overhead Lines
WG B2.45	Bushfire Characteristics and Potential Impacts on Overhead Line Performance
WG B2.47	Remedial Actions for Aged Fittings and Repair of Conductors
WG B2.48	Experience with the Mechanical Performance of New Conductor Types
WG B2.50	Safe Handling of Fittings and Conductors
WG B2.52	The Use of Robotics in Assessment and Maintenance of Overhead Lines
WG B2.53	Management Guidelines for Outsourcing Overhead Line Technical Expertise
WG B2.55	Conductors for the Uprating of Existing Overhead Lines
WG B2.56	Ground Potential Rise at Overhead AC Transmission Line Structures During Faults
WG B2.57	Survey of Operational Composite Insulator Experience and Application Guide for Composite Insulators
WG B2.58	Vibration Modeling of High Temperature Low Sag Conductors - Self-damping Characterization
WG B2.59	Forecasting Dynamic Line Ratings
WG B2.60	Affordable Overhead Transmission Lines for Sub-Saharan Countries
WG B2.61	Transmission Line Structures with Fibre Reinforced Polymer (FRP) Composites
WG B2.62	Design of Compact HVDC Overhead Lines
WG B2.63	Compact AC Transmission Lines
WG B2.64	Inspection and Testing of Equipment and Training for Live-Line Work on Overhead Lines
WG B2.65	Detection, Prevention and Repair of Sub-surface Corrosion in Overhead Line Supports, Anchors and Foundations
JWG C3/B2/B1.13	Environmental Issues of High Voltage Transmission Lines for Rural and Urban Areas

LATEST PUBLICATIONS

TB 653	Safe Design Tension for Single Conductors Fitted With Elastomer Cushioned Suspension Units
TB 645	Meteorological Data for Assessing Climatic Loads on Overhead Lines
TB 643	Guide to the Operation of Conventional Conductor Systems above 100°C
TB 638	Guide to Overall Line Design
TB 631	Coatings for Protecting Overhead Power Network Equipment in Winter Conditions
TB 601	Guide for Thermal Rating Calculations of Overhead Lines
TB 585	Guidelines for the management of risk associated with severe climatic events and climate change on overhead lines
TB 583	Guide to the Conversion of Existing AC Lines to DC Operation
TB 561	Live Work - A Management Perspective
TB 545	Assessment of In-service Composite Insulators by using Diagnostic Tools
TB 516	Geotechnical Aspects of Overhead Transmission Line Routing - An Overview
TB 515	Mechanical Security of Overhead Lines Containing Cascading Failures and Mitigating their Effects
TB 498	Guide for Application of Direct Real-Time Monitoring Systems
TB 485	Overhead Line Design Guidelines for Mitigation of Severe Wind Storm Damage
TB 482	State of the Art for Testing Self-damping Characteristics of Conductors for Overhead Lines
TB 481	Guide for the Assessment of Composite Insulators in the Laboratory after their Removal from Service
TB 477	Evaluation of Aged Fittings

All of the above TBs are available for download from www.e-cigre.org

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Substations

The scope of work for SC B3 includes the design, construction, maintenance and ongoing management of transmission and distribution substations, and the electrical installations in power stations, but excluding generators.



2016 SCOPE OF WORK

Transmission and Distribution substations play a central role within electrical networks in providing reliable energy with high availability.

Study Committee B3 (SC B3) serves a broad range of target groups in the electric power industry whose needs include the technical, economic, environmental and social aspects of Substations.

The SC B3 mission is to:

- Facilitate and promote the progress of substation engineering and the international exchange of information and knowledge in the substations field.
- Add value to this information and knowledge by synthesizing state-of-the-art practices and developing related recommendations.

Major objectives for SC B3 include improving plant reliability and availability, optimizing asset management, minimizing environmental impact and the recognition of social needs and priorities in facilitating the sustainable development of Substations.

SC B3 constitutes a bridge between the "system" study committees (the C-committees) and the more specialized "equipment" committees (the A-committees), and has working relationships with most of the other Study Committees.

Principal areas of interest

- New substation concepts including the integration of new approaches to grid automation.
- Life-cycle management of substations, including renovation, maintenance, monitoring, reliability and sustainability issues.
- The impact of new communication standards and smart grids on new and existing substations.
- Special purpose substations such as off-shore substations and also low cost and fast deployment substations.
- The management of risk in the design, installation and operation of substations.

Current activities

SC B3 has over 300 experts in 12 active Working Groups, focusing on activities in 4 different topic streams relating to the following substation technical and operational areas:

- Substation Concepts and Developments.
- Gas insulated substations (includes gas insulated lines).
- Air Insulated Substations.
- Substation Management.

Key projects / forthcoming events

CIGRE "Reference Book" Series, Substations and SF₆.

CIGRE Session 46, including Tutorials on 22 August 2016, Paris.

"Building Smarter Substations", CIGRE Mexican National Committee and Study Committees B3, B5 and D2, 14-16 November 2016, Mexico City, Mexico.

Regular Working Group and other meetings.

Other specific interest

SC B3 maintains close relationships with SC A3 - High Voltage Equipment and D1 - Materials and Emerging Test Techniques.

SC B3 members support CIGRE work and activities in "Future Grid" developments, and the impact on substation design and functionality.



B3 Substations

TOPICS OF WORKING GROUPS

WG B3.32	Saving through optimized maintenance of Air insulated Substations
WG B3.34	Expected impact of future grid concept on substation management
WG B3.24	Benefit of PD diagnosis on GIS condition assessment
WG B3.35/CIRE	Substation earthing system design optimisation through the application of quantified risk analysis
WG B3.37	Internal arc effects in medium voltage switchgear (1-52kV) – mitigation techniques
WG B3.38	Management of risk in Substations
WG B3.39	Impact of NCIT applications on HV Gas Insulated Switchgear
WG B3.40	SF ₆ Gas Measurement Guide
WG B3.41	Mobile Substations Incorporating HV GIS - Design Aspects
WG B3.42	Reliability Analysis and Design Guidelines for LV AC/DC Auxiliary Systems
WG B3.43	Contemporary Solutions for Low Cost Substations
WG B3.44	Substation Servicing and Supervision Using Mobile Devices and Smart Sensing

Go to <http://www.cigre.org/Technical-activities/Study-Committees-Working-Groups> for latest info

LATEST PUBLICATIONS

TB 605	Feasibility of a Common Dry Type Interface for GIS and Cables >52kV
TB 607	Contracts for Outsourcing
TB 612	AC Substations with HVDC connected Wind Power Plants
TB 614	Air Insulated Substation Design for Severe Climatic Conditions
TB 639	Factors for Investment Decision for GIL vs. Cable

All of the above TBs are available for download from www.e-cigre.org

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HVDC and Power Electronics

The scope of SC B4 covers High Voltage Direct Current systems and Power Electronics for AC networks and Power Quality improvement. Overhead lines or cables, which may be used in HVDC systems are not included in the scope, but are the responsibility of SC B2 and SC B1 respectively. The members of B4 come from Manufacturers, Utilities, transmission system operators (TSOs), Consultants and Research Institutes. SC B4 is active in recruiting young engineers to participate in its activities.



2016 SCOPE OF WORK

Status of the HVDC and Power Electronics Technology and Markets

The HVDC market has been driven by the increasing requirement for more electrical power demand in many countries and the need to connect large scale remote wind power in Europe and North America. It is also on the rise because of interconnections between countries.

The HVDC technology and market encompasses, the Line Commutated Converter (LCC) HVDC and the Voltage Source Converter (VSC) HVDC.

The LCC which is based on the use of Thyristor valves, has now reached $\pm 800\text{kVdc}$, and dc power of 8000 MW for a single transmission link. Ratings of LCC of up to 10GW, and $\pm 1100\text{kVdc}$ on a single bipole is being considered.

The VSC which is based on the use of Insulated Gate Bipolar Transistors (IGBT) can be based on a Symmetrical monopole configuration or a bipolar configuration. The MMC converter both as a half bridge and full bridge is being utilized. Converters up to 500 KV are in operation.

The Flexible AC Transmission System (FACTS) market is also active with Static Var Compensator (SVC) and Static Synchronous Compensators (STATCOM) projects being implemented to support the transmission of AC power from remote wind farms, and the change of generation patterns within the ac networks.

Another active area is the refurbishment of both HVDC installations and SVC installations. Several approaches are seen in the industry, complete replacement with increased ratings, and partial replacement of the critical components such as thyristor valves, control and protection, and converter transformers.

Also to increase power transmission capability of existing corridors, conversion of existing AC lines in to DC is being actively considered.

Key projects / forthcoming events

Tutorial: HVDC tutorial during the session on August 22nd, 2016.

Workshop: Connection of wind farms to weak AC system on August 25th, 2016.



B4 HVDC and Power Electronics

WORKING GROUPS

WG B4.53	Guidelines for Procurement and Testing of STATCOMs
WG B4.56	Guidelines for the Preparation of "Connection Agreements" or "Grid Codes" for HVDC Grids
WG B4.58	Devices for Load Flow Control and Methodologies for Direct Voltage Control in a Meshed HVDC Grid
JWG B4/B5.59	Control and Protection of HVDC Grids
WG B4.60	Designing HVDC Grids for Optimal Reliability and Availability Performance
WG B4.61	General Guidelines for HVDC Electrode Design
WG B4.62	Connection of Wind Farms to Weak AC networks
WG B4.63	Commissioning of VSC HVDC Scheme
WG B4.64	Impact of AC System Characteristics on the Performance of HVDC Schemes
JWG B4/C1.65	Recommended voltages for HVDC Grids
WG B4.66	Implications for Harmonics and Filtering of the Staggered Installation of HVDC Converter Stations in Proximate Locations
WG B4.67	Harmonic Aspects of VSC HVDC and Appropriate Harmonic Limits
WG B4.68	Revision of Technical Brochure 92 – DC Harmonics and Filtering. This is an update of Technical Brochure 92 published in 1994. It is necessary because our Knowledge of the Subject has a Come a long Way and it is Time to Reflect such Knowledge.
WG B4.69	Minimizing Loss of Transmitted Power by VSC during Overhead Line Faults
WG B4.70	Guide for Electromagnetic Transient Studies involving VSC Converters
WG B4.71	Application guide for the Insulation Coordination of Voltage Source Converter HVDC (VSC HVDC) stations
WG B4.72	DC Grid Benchmark Models for System Studies
JWG B4/B1/C4 73	Surge and Extended Overvoltage Testing of HVDC Cable Systems

LATEST PUBLICATIONS

TB 649	Guidelines for life extension of existing HVDC systems
TB 657	Guidelines for the preparation of "connection agreements" OR "Grid codes" for multi-terminal - terminal dc schemes and dc grids

CONTACT

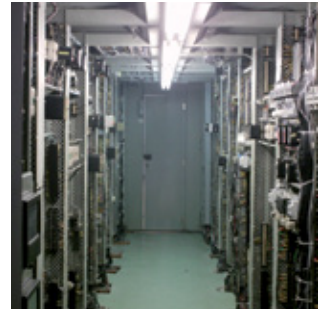
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Secretary: Jingxuan (Joanne) Hu - j.hu@rbjengineering.com



Protection and Automation

The scope of the Committee covers the principles, design, application and management of power system protection, substation control, automation, monitoring, recording and metering – including associated internal and external communications and interfacing for remote control and monitoring.



2016 SCOPE OF WORK

Main area of attention are: **New technological solutions:**

- Suitable technical recommendations and support for standardization process of protection and automation systems;

New concepts of Protection and Automation:

- Innovative techniques for design and testing.
- New possibilities of enhanced communications; clarification of requirements from users.
- Experience and feedback in IEC 61850; awareness of engineering roles and responsibilities.
- Implementation and exploitation of process buses.
- New requirements and specification for metering.

Reliability improvements of Protection and Automation

Improved methods to maintain supply reliability; new approaches, tools and system to eliminate human errors; new tools and methods for protections coordination; standardization of schemes and functions of protection; and innovative methods for maintenance.

Protection implications of New Network Requirements

Protection and automation requirements in the network of the future; and protection and automation requirements for distributed generation.

Principal areas of interest

Improved concepts of Substation Automation Systems.
New requirements and concepts for metering and monitoring.
Technical recommendations and applications for standard IEC 61850.
Methods to improve the performance of protection systems.
Protection implications of new generation technologies and system requirements.
Wide-Area Protection, Metering and Monitoring.

Current activities

Analysis of protection and automation requirements for Distributed Energy Resources.
Improvement in education and tutorials for young protection and automation engineers.

Key projects / forthcoming events

Reference book about standard IEC 61850.

Standardization of tutorials about protection and automation.

SC B5 2017 Colloquium in New Zealand.

Other specific interest

Software tools for specification, test, maintenance and operation of protection and automation.
Remote access and managing of protection and automation.



TOPICS OF WORKING GROUPS

WG.B5.50	IEC 61850 Based Substation Automation Systems – Users Expectations and Stakeholders Interactions
WG.B5.53	Test Strategy for Protection, Automation and Control (PAC) functions in a full digital substation based on IEC 61850 applications
WG.B5.24	Protection Requirements on Transient Response of Voltage and Current Digital Acquisition Chain
WG.B5.44	Protection Schemes for Special Transformers
WG.B5.47	Network Protection Performance Audits
WG.B5.48	Protection for developing network with limited fault current capability of generation
WG.B5.49	Protection & Automation of Shunt Capacitors
WG.B5.52	Analysis and comparison of fault location systems in Substation Automation Systems
WG.B5.14	Wide Area Protection & Control Technologies
WG.B5.41	Investigation of possibilities to improve metering systems for billing purposes in substations
WG.B5.42	Experience concerning availability and reliability of DSAS
WG.B5.51	Requirements and Use of Remotely Accessed Information for SAS Maintenance and Operation
WG.B5.54	Protection and Automation Issues of Islanded Systems during System Restoration/Black Start
WG.B5.55	Application of Travelling Wave Technology for Protection and Automation
WG.B5.56	Optimization of Protection Automation and Control Systems
WG.B5.57	New challenges for frequency protection
WG.B5.58	Faster protection and network automation systems: implications and requirements
WG.B5.59	Requirements for Near-Process Intelligent Electronic Devices
C6.25/B5/CIRE	Control and Automation Systems for Electricity Distribution Networks of the Future
JWG C4/B5.41	Sub-synchronous resonance in existing and future networks - detection and mitigation
JWG B4/B5.59	Control and Protection of HVDC Grids
JWG A3/B5/C4.37	System conditions for and probability of Out-of-Phase

LATEST PUBLICATIONS

B5.45	Acceptance, Commissioning and Field Testing Techniques for Protection and Automation Systems
B5.43	Coordination of Protection and Automation for Future Networks
WG.B5.40	Education, Qualification and Continuing Professional Development of Engineers in Protection and Control
B5.39	Documentation requirements from design to operation to maintenance for Digital Substation Automation Systems
B5/C6.26/CIRE	Protection of Distribution System with Distributed Energy Resources
WG.B5.23	Short circuit protection of circuits with mixed conductor technologies in transmission networks
B5.46.D2	Application and management of cyber security measures for Protection & Control systems
TB 432	Protection Relay Coordination
TB 431	Modern Techniques for Protecting Busbars in HV Networks
TB 427	The Impact of Implementing Cyber Security Requirements using IEC 61850
TB 424	New Trends for Automated Fault and Disturbance Analysis
TB 421	The Impact of Renewable Energy Sources and Distributed Generation on Substation Protection and Automation
TB 411	Protection, Control and Monitoring of Series Compensated Networks
TB 404	Acceptable Functional Integration In HV Substations
TB 479	International Guide on the Protection of Synchronous Generators
TB 465	Modern Techniques for Protecting and Monitoring of Transmission Lines
TB 463	Modern Techniques for Protecting, controlling and monitoring power transformers
TB 448	Refurbishment Strategies based on Life Cycle Cost and Technical Constraints
TB 466	Engineering Guidelines for IEC 61850 Based Digital SAS
TB 464	Maintenance Strategies for Digital Substation Automation Systems
TB 584	Implications and Benefits of Standardised Protection and Control Schemes
TB 546	Protection, Monitoring and Control of Shunt Reactors
TB 540	Applications of IEC 61850 Standard to Protection Schemes
TB 539	Life-time Management of Relay Settings

All of the above TBs are available for download from www.e-cigre.org

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System Development and Economics

The SC's work includes issues, methods and tools related to the development and economics of power systems, including the drivers to: invest in expanding power networks and sustaining existing assets, increase power transfer capability, integrate distributed and renewable resources, manage increased horizontal and vertical interconnection, and maintain acceptable reliability in a cost-efficient manner. The SC aims to support planners to anticipate and manage change.



2016 SCOPE OF WORK

- M**ain focus areas:
- System planning**
 - Methods and tools for steady state and dynamic analysis in system planning.
 - New approaches that address evolving stakeholder expectations when applying power system planning criteria and assessing security and adequacy of supply.
 - Planning methods, tools, criteria and constraints in competitive and regulated markets with increased non-utility stakeholder involvement.
 - Risk-based security assessment and advanced information, communication and power-electronics technology to improve system stability and dynamic performance.
 - Future requirements, sources and economics associated with ancillary services.
 - System planning and technology issues in specific contexts e.g. off-shore wind.

Asset management

- High level asset management strategies in defining sustainable policies and optimal practices.
- Using total life cycle cost of asset ownership to inform investment.
- Risk-based analysis aimed at identifying existing assets that require attention.

Business management

- Impact of business models on system development (investment prioritisation across projects/programs, merchant lines, public-private partnerships).
- Impact of market design and regulation on transmission and distribution planning and investment.
- Scenarios and methodologies for quantitative studies on future power systems.

Interconnections – horizontal/vertical

- System planning issues and best practice for scenarios related to long-distance/continental-scale systems.
- Interface and allocation issues in planning and delivery of multi-party/cross-jurisdiction projects.
- Planning regulated/non-regulated transmission assets in parallel, optimal sizing of interconnectors.
- Coordinated planning with evolving smart and active distribution systems.

Principal areas of interest

- Methods and practices for system development.
- Business investment.
- Interface and allocation issues in multi-party/cross-jurisdictional projects.
- Asset management.

These are especially needed during the on-going electricity system paradigm shift brought about by rapid evolution in generation patterns and economics, demand response, ICT, and in social, environmental and regulatory frameworks and expectations.

Current activities

- New power system solutions and planning techniques at country, regional and global level.
- Securing investment in transmission networks against a backdrop of increasing uncertainty.
- Reviewing best practice in the management of interface and allocation issues in multi-party/cross-jurisdictional projects.
- Reviewing application of enhanced asset management methodologies.
- Global electricity network feasibility study.

Key projects / forthcoming events

Symposium "Experiencing the Future Power System... Today", 29 May - 2 June, 2017, Dublin, Ireland.

Other specific interest

To inform a broad stakeholder group on issues, challenges and solutions relating to power system planning, investment, development and asset management.



TOPICS OF WORKING GROUPS

WG C1.15	Review the Drivers for Transmission Investment Decisions and the Role of Technical Planning Criteria in Transmission Investment
WG C1.22	New Investment Decision Processes and Regulatory Practices required to deal with Changing Economic Drivers
WG C1.23	Transmission Investment Decision Points and Trees
WG C1.27	Definition of Reliability in Light of new Developments in Various Devices and Services which offer Customers and System Operators new Levels of Flexibility
WG C1.29	Joint Cired/Cigre WG Planning Criteria for Transmission Network in Presence of Active Distribution Systems
WG C1.30	Technical Risks and Solutions from Periodic, Large Surpluses or Deficits of Available Renewable Generation in a Particular Area
JWG C1/C3.31	Including Stakeholders in the Investment Planning Process
WG C1.32	Establishing Best Practice Approaches for Developing Credible Electricity Demand and Energy Forecasts for Network Planning
WG C1.33	Interface and Allocation Issues in Multi-party and/or Cross-jurisdiction Power Infrastructures Projects
WG C1.34	ISO Series 55000 Standards: General Process Assessment Steps and Information Requirements for Utilities
WG C1.35	Global Electricity Network Feasibility Study
JWG B4/C1.65	Recommended Voltages for HVDC Grids

LATEST PUBLICATIONS

TB 523	System complexity and dynamic performance
TB 527	Coping with limits for very high penetrations of renewable energy
TB 536	Influence of embedded HVDC Transmission on system security and AC Network performance
TB 541	Asset management decision making using different risk Assessment methodologies
TB 547	Planning issues for newly industrialised and developing countries (Africa)
TB 564	Review of Transmission planning Access requirements
TB 572	Tools for economically optimal transmission development plans
TB 579	Green field network, designing future networks ignoring existing constraints
TB 585	Circuit configuration optimisation
TB 597	Transmission asset risk Management – progress in application

All of the above TBs and Articles are available for download from www.e-cigre.org

CONTACT

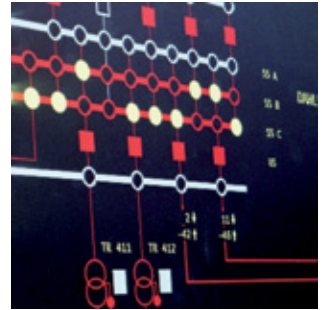
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System Operation and Control

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



2016 SCOPE OF WORK

The main area of attention are:

Control and switching of apparatus and devices,

voltage control, frequency control by balancing generation versus demand, monitoring of loading limits and implementing actions to avoid capacity violations (congestion management). Reserves and emergency strategies, management of disturbance and restoration situations, interaction between the system and power plants. Short term operational planning and coordination of system capacity needs with maintenance of the physical assets.

Evaluation and benchmarking of the system performance

(operations performance indices) in terms of fault frequency, interruptions, power quality, operational and maintenance efficiency, both from the technical and economical points of view.

Impact on system operation targets, methods and performance from new institutional structures of System Operators (TSO or ISO), regulators, market actors, trading mechanisms and contracted ancillary services.

Requirements, methods, tools (simulators) and performance indices for training of operators.

Development and use of power system analysis and security assessment functionalities within operational planning and the computer and telecommunication systems supporting the control centres and the operators.

Principal areas of interest

Wide area Control and supervision: Integration of regional and national grids into large Control areas and organisation at Continental, Regional and Local level.

Impact on system operation from dispersed generation, demand response, storage and changes in electrical loads behaviour.

Increase ability to control two way flows and information from generation to consumption, taking into account intermittent energy sources (i.e. wind, solar energy).

Adapt Control Centres processes and organisation to large implementation of new technology and automated processes.

Emerging Operational Issues for Transmission and Distribution Interaction.

Current activities

Managing new challenges in operational planning and real-time operation of Electric Power Systems.

Emerging Operational Issues for Transmission and Distribution Interaction.

Key projects / forthcoming events

Symposia, Colloquia, Workshops, Tutorials.

Workshop on Large Disturbances during CIGRE Session in Paris.

CIGRE International Symposium, Dublin, Ireland: 29th May - 2nd June 2017.



TOPICS OF WORKING GROUPS

WG C2.13	Voltage and Var Support in System Operation
WG C2.16	Challenges in the Control Centre (EMS) due to Distributed Generation and Renewables
WG C2.22	Application of Resilience Engineering to Safety Management Principles in Control Centers
WG C2.23	System Restoration Procedure and Practices
WG C2.34	Capabilities and Requirements of a Control Centre in the 21st Century - Functional and Human Resources View
WG C2.35	Operations Performance, Training goals and Operator Performance Measurement
JWG C2/C5-05	Developments and Changes in the Business of System Operators
JWG C2/C6.36	System Operation Emphasising DSO/TSO Interaction and Co-Ordination
JWG C2/C4.37	Recommendations for Systematic Framework Design of Power System Stability Control

LATEST PUBLICATIONS

The C2.21 WG published a technical brochure and an Electra article on Lessons Learnt from Recent Emergencies and Blackout Incidents

Electra article (VIU/TSO/RTO Operations Performance: Goals, KPI's, their Quantification and Use at Different Levels of Decision Making) in No.281 in August 2015 issue (ELT_281_1)

TB 626 Market operators - Their Evolution, Current Organisation and Future Structure published July 2015

All of the above TBs are available for download from www.e-cigre.org

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System Environmental Performance

The scope of this Study Committee is focused on the identification and assessment of electric power systems environmental impacts and the methods used for assessing and managing these impacts during the all life cycle on the power system assets.



2016 SCOPE OF WORK

Main areas of attention are:
Following the research developments relevant to the assessment of any potential human health risk of 50/60 Hz electric and magnetic fields.

Identifying procedures and methods to evaluate and assess the "external costs" for power lines.

Defining procedures and methods that apply to environmental aspects of corridor management, including overhead (and underground) lines and land assets.

Developing sustainability performance indicators to enhance standardization and transparency on reporting.

Defining harmonized procedures and methods for accounting and reporting greenhouse gas (GHG) emissions from transmission and distribution activities.

Assessing how transmission and distribution companies plan, design, build, maintain and operate their lines and other assets near rural and urban areas.

Identifying best practices regarding prevention, investigation and remediation of environmental damage and the possible impact (practical and financial) for transmission and distribution companies.

Investigation of stakeholder management and identifying the key ingredients for success in public acceptance.

Principal areas of interest

Environmental impacts of power system development and operation, considering all lifecycle phases of the assets.

Global environmental changes and trends and its impact on the power system.

Stakeholders engagement and public acceptance of power system infrastructures.

Current activities

Identification of environmental impacts of integrating RES (especially wind power) into our grids.

Identification and assessment of the various impacts on the natural environment arising in electric power systems, and the recommendation of appropriate monitoring, management and compensatory measures.

Integration of power system infrastructures and facilities on its local and regional environment, including protected areas.

Other specific interest

Environmental implications of energy storage technologies.

Power System efficiency and environment.

Sustainability of the system, CIGRE's responsibility.



C3 System Environmental Performance

TOPICS OF WORKING GROUPS

WG C3.01	EMF and Health
WG C3.08	External costs for Power Lines
WG C3.09	Corridor Management
WG C3.12	Methodologies for Greenhouse Gas Inventory and Reporting for T&D Utilities
JWG C3.13/ B1/B2	Environmental Issues of High Voltage Transmission Lines for Rural and Urban Areas
WG C3.14	Impact of Environmental Liability on Transmission and Distribution Activities
WG C3.15	Best Environmental and Socio-economic Practices for Improving Public Acceptance of High Voltage Substations
WG C3.16	Grid and Wildlife

LATEST PUBLICATIONS

TB 616	Externalities of Overhead High Voltage Power Lines
TB 650	Sustainable Development Performance Indicators for Electric Power Generation
TB 548	Stakeholder Engagement Strategies in Sustainable Development - Electricity Industry Overview
TB 487	Strategic Environmental Assessment for Power Developments
TB 383	Sustainable Development Performance Indicators for Transmission System Operators
TB 340	Utilities Practices toward Sustainable Development

All of the above TBs are available for download from www.e-cigre.org

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Technical Performance

The scope of SC C4 covers system technical performance phenomena that range from nanoseconds to many hours. SC C4 has been engaged in the following topics: Power Quality, EMC/EMI, Insulation Coordination, Lightning, and Power systems performance models and numerical analysis.



2016 SCOPE OF WORK

Study Committee C4 deals with methods and tools for analysis related to power systems, with particular reference to dynamic and transient conditions and to the interaction between the power system and its apparatus/sub-systems, between the power system and external causes of stress and between the power system and other installations.

Specific issues related to the design and manufacturing of components and apparatus are not in the scopes of SC C4, as well as those specifically related to planning, operation and control, apart from those cases in which a component, apparatus, or subsystem behavior depends on, or significantly interacts with, the performance of the nearby power system.

The SC C4 scope covers system technical performance phenomena that range from nanoseconds to many hours, this includes: Power Quality, Electromagnetic Compatibility and Electromagnetic Interference (EMC/EMI), Insulation Coordination, Lightning, and Power systems performance models and numerical analysis.

SC C4 has also been engaged in the development of new tools, models, methods and techniques for assessing and analyzing the power systems.

Principal areas of interest

Power Quality, Electromagnetic Compatibility and Electromagnetic Interference (EMC/EMI).
Insulation Coordination.
Lightning.
Power Systems Performance Models and Numerical Analysis.

Current activities

Evaluation of Power Quality Performance in Transmission Systems.
Evaluation of Lightning Performance of Power Systems.
Understanding of the Geomagnetic Storm Environment.
Modelling and Dynamic Performance of Inverter Based Generation.

Key projects / forthcoming events

CIGRE Lund Symposium 2015, as a supporting Study Committee.

Other specific interest

Evaluation of System Technical Performance of Traditional Power Systems.
Development of Advanced System Analysis Tools for Smart Grids.



TOPICS OF WORKING GROUPS

WG C4.503	Numerical techniques for the Computation of Power Systems, from Steady-State to Switching Transients
WG C4.23	Guide to Procedure for Estimating the Lightning Performance of Transmission Lines
JWG C4.24/CIRED	Power Quality and EMC Issues Associated with Future Electricity Networks
WG C4.25	Issues related to ELF Electromagnetic Field Exposure and Transient Contact Currents
WG C4.26	Evaluation of Lightning Shielding Analysis Methods for EHV and UHV DC and AC Transmission-Lines
WG C4.27	Benchmarking of Power Quality Performance in Transmission Systems
WG C4.28	Extrapolation of Measured Values of Power Frequency Magnetic Fields in the Vicinity of Power Links
JWG C4/C6.29	Power Quality Aspects of Solar Power
WG C4.30	EMC in Wind Generation Systems
JWG C4.31/CIRED	EMC between Communication Circuits and Power Systems
WG C4.32	Understanding of the Geomagnetic Storm Environment for High Voltage Power Grids
WG C4.33	Impact of Soil-Parameter Frequency Dependence on the Response of Grounding Electrodes and on the Lightning Performance of Electrical Systems
WG C4.34	Application of Phasor Measurement Units for Monitoring Power System Dynamic Performance
JWG C4/C6.35/CIRED	Modelling and Dynamic Performance of Inverter Based Generation in Power System Transmission and Distribution Studies
WG C4.36	Winter Lightning – Parameters and Engineering Consequences for Wind Turbines
WG C4.37	Electromagnetic Computation Methods for Lightning Surge Studies with Emphasis on the FDTD Method
JWG A2/C4.52	High-Frequency Transformer Models for Non-Standard Waveforms
JWG A3/B5/C4.37	System Conditions for and Probability of Out-of-Phase
JWG C4/B4.38	Network Modelling for Harmonic Studies
WG C4.39	Effectiveness of line surge arresters for lightning protection of overhead transmission lines
JWG C4.40/CIRED	Revisions to IEC Technical Reports 61000-3-6, 61000-3-7, 61000-3-13, and 61000-3-14
JWG C4/B5.41	Challenges with series compensation application in power systems when overcompensating lines
JWG C4.42/CIRED	Continuous assessment of low-order harmonic emissions from customer installations
JWG A1/C4.52	Wind generators and frequency-active power control of power systems
JWG C2/C4.37	Recommendations for Systematic Framework Design of Power System Stability Control
WG C4.43	Lightning Problems and Lightning Risk Management for Nuclear Power Plants
JWG B4/B1/C4.73	Surge and Extended Overvoltage Testing of HVDC Cable Systems

LATEST PUBLICATIONS

TB 648	Analytical Techniques and Tools for Power Balancing Assessments
TB 633	Lightning Striking Characteristics To Very High Structures
TB 600	Protection of the High Voltage Power Network Control Electronics against Intentional Electromagnetic Interference (IEMI)
TB 596	Guidelines for Power Quality Monitoring-measurement Locations, Processing and Presentation of Data
TB 592	Guide for Assessment of Transferred EPR on Telecommunication Systems due to Faults in A.C. Power Systems
TB 578	Lightning Protection of Wind Turbine Blades
TB 577	Electrical Transient Interaction between Transformers and the Power System

All of the above TBs are available for download from www.e-cigre.org

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Electricity Markets and Regulation

The scope of the Study Committee is “to analyze the different market approaches and solutions and their impact on the electric supply industry in support of the traditional economists, planners and operators within the industry as well as the new actors such as regulators, traders, technology innovators and Independent Power producers.



2016 SCOPE OF WORK

Areas of attention :

Emerging Technologies:

Technology innovations in such areas as storage, smart buildings, adaptive consumption, and demand aggregation provide opportunities and options within the power system. A number of these innovative technologies require adaptations to current market processes to allow these technologies to compete within the framework of the respective power system's need, infrastructure and Regulatory directives.

New Demand Side Management (DSM) and Demand Response (DR) solutions and their integration into existing markets: DSM and DR mechanisms have become a priority in the transition to low carbon energies. These mechanisms and their unique solutions within industrial activities, services and households must be monitored.

Risk Obligations: Market designs (Power Markets, Capacity Markets, and Ancillary Service Markets) address a general shift from long-term investments to shorter-term financial drivers. This shift of investment risk from the rate payers to the market participants requires industry attention.

Affordability of Electric Service: Reliability and environmental responsibility are important. However affordability of electric service is also an important dimension of electric service provision. Cost components, cost allocation, and trends in customer's rates over time in regulated and competitive market environments must be analyzed.

Principal areas of interest

Market structures and products (Market design, Physical/Financial markets and interaction, isolated and interconnected systems).

Market Approaches and Tools (Demand/Price forecasting, Financial risk management, Demand management and Active Customer Integration).

Regulations (Regulatory objectives, Regulatory approaches, Transmission pricing, Ancillary Service pricing, Reliability and Economic.

Current activities

Major activities are assessment of impact and requirements of introducing intermittent generation, flexible loads and distributed resources into a market environment.

This involves regulatory issues due to incentives for investments in transmission capacity, innovation in operation, demand side and risk management as well as market design and pricing of unbundled services.

Key projects / forthcoming events

Active distribution systems and distributed resources impact on market design and market operation with focus on regulatory issues and pricing of services.

Participate in The CIGRE International Colloquium on the Evolution of Power System Planning to Support Connection of Generation, Distributed Resources and Alternative Technologies, Philadelphia, PA, USA, November 2016.

Symposium in Dublin, Ireland, May 2017.

Other specific interest

The impact of emerging technologies on system operations. Market clearing procedures, techniques and principles used to take advantage of the flexibility of aggregating large numbers of end-users.



C5 Electricity Markets and Regulation

TOPICS OF WORKING GROUPS

WG C5.14	Regulatory Incentives for Innovation in Electricity Networks
WG C5.15	Risk Management in Evolving Regulatory Frameworks
WG C5.16	Costs of Electric Service, Cost Allocation Methods, and Residential Rate Trends
WG C5.18	Market price signals and regulated frameworks for regional coordination of grid investments.
WG C5.20	Drivers for Major Changes in Electricity Markets
WG C5.21	Impacts of Environmental Regulations on Power Markets
JWG C2/C5.05	Developments and Changes in the Business of System Operators

LATEST PUBLICATIONS

TB-651	Report on Regulatory Aspects of the Demand Response within Electricity Markets
TB-647	Capacity Mechanisms: Needs, Solutions and State of Affairs
TB-626	Market Operators – Their Evolution, Current Organisation and Future Structure
TB-580	Generator Market Power Mitigation Measures in Electricity Markets
TB-565	Regulatory Incentives for Capital Investments in Electricity
ELT 279	Emerging Technologies
ELT 274	Generator Market Power Mitigation Measures in Electricity Markets Executive Summary

All of the above TBs are available for download from www.e-cigre.org

CONTACT

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Secretary:	Alain Taccoen - alain.taccoen@edf.fr



Distribution Systems and Dispersed Generation

SC C6 facilitates and promotes the progress of engineering, and the international exchange of information and knowledge in the field of distributions systems and dispersed generation. The experts contributes to the international exchange of information and knowledge by the rizing state of the art practices and developing recommendations.



2016 SCOPE OF WORK

Main areas of attention are:

- **Distribution level** needs more "smartness".
- **The coordination of a large number of small resources** imposes technical challenges that require application of decentralized, intelligent control techniques.
- **Big data:** implementation of smart metering and demand-side response metering as information collectors for distribution networks automation, home energy management and electric vehicles.
- **Novel distribution network architectures** that include microgrids and multi-energy systems.
- **New coordination and control schemes** of distributed generators, such as in virtual power plants, interact with distribution grid operation.
- **Direct current for medium voltage distribution systems.**

Principal areas of interest

Assessment of the technical impacts which a more widespread adoption of distributed/dispersed generation could impose on the planning and operation of the whole energy system. Timing of the related technical impacts and requirements.

Current activities

Working groups develop technical recommendations and best practices for above topics with focus on grid codes, impact of energy storage on the distribution system, big data for demand side management, use of power electronics in all voltage levels, multi-energy applications in urban infrastructures including electric vehicles and rural electrification.

Forthcoming events

International Colloquium "Evolution of Power System planning to support connection of generation, distributed resources and alternative technologies", November 2-3, 2016, Philadelphia, USA.

CIGRE Symposium "Experiencing the future power system... today" May 29 - June 2, 2017, Dublin, Ireland.



TOPICS OF WORKING GROUPS

WG 6.31	Medium Voltage Direct Current (MVDC) Grid Feasibility Study
JWG C6/D2-32	Utilization of data from smart meter system
WG C6.28	Hybrid Systems for off-grid power supply
WG C6.23	Capacity of Distribution Feeders for Hosting DER
WG C6.30	The Impact of Battery Energy Storage Systems on Distribution Networks
WG C6.27	Asset Management for Distribution Networks with High Penetration of Distributed Energy Resources
JWG C6.25/B5/CIRE	Control and Automation Systems for Electricity Distribution Networks of the Future
WG C6.21	Smart Metering - State of the art, Regulation, Standards and Future Requirements

MEMBERSHIP PROFILE

Distribution system operators, mainly engineers from asset management, system planning and system operation
 Power consultants
 Technology providers
 Countries with different levels of integrating renewables
 Rural electrification experts
 Information and communication technology experts
 Academia on respective topics

LATEST PUBLICATIONS

TB 591	Planning and Optimization Methods for Distribution Systems
TB 635	Microgrids 1 Engineering, Economics, & Experience
TB 632	Integration of Electric Vehicles In Electric Power Systems
TB 586	Capacity of distribution Feeders for hosting distributed energy resources
TB 575	Benchmark systems for Network integration of smart and renewable and distributed energy resources

All of the above TBs are available for download from www.e-cigre.org

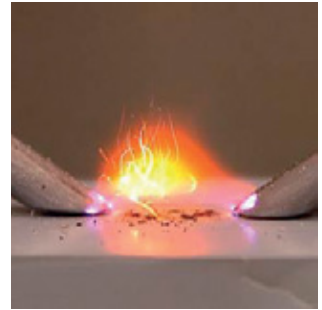
CONTACT

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Secretary: Christine Schwaegerl - christine.schwaegerl@hs-augsburg.de



Materials and Emerging Test Techniques

The scope of Study Committee D1 covers new and existing materials for electrotechnology, diagnostic techniques and related knowledge rules, as well as emerging test techniques with expected impact on power systems in the medium to long term.



2016 SCOPE OF WORK

The Study Committee deals with the performance of materials and electrical insulation systems (EIS) with respect to electrical, thermal, mechanical, chemical and environmental stresses. Based on this knowledge, test and measurement procedures are evaluated and developed, if necessary.

These procedures can be applied to generate new diagnostic tools for asset management of electrical apparatus to aid the work of equipment, subsystem and system committees. Special attention is paid to the area of emerging UHVAC and UHVDC technologies.

The Study Committee strives to facilitate and promote the progress of engineering and the international exchange of information and knowledge. This is achieved through the synthesis of state-of-the-art practices and developing recommendations and guidelines.

To support the development of international standards the Study Committee seeks to establish close cooperation with standardisation bodies and provides the relevant technical information as well as the scientific background.

Principal areas of interest

Insulating gases and gaseous insulation systems.
Liquid and liquid impregnated insulation systems.
Solid materials.
High voltage and high current testing and diagnosis.

Current activities

Characterisation of materials and electrical insulation systems (EIS).
Study of emerging test and diagnosis techniques for HVDC.
Development of diagnostic tools and related knowledge rules.

Key projects / forthcoming events

A3/B4/D1 Colloquium & SC D1 Meeting, 2017 in Winnipeg.

Other specific interest

Give guidance in the performance and use of materials in electrical insulation systems.
Dissemination of knowledge, e.g. by tutorials.



TOPICS OF WORKING GROUPS

WG D1.44	Testing of Naturally Polluted Insulators
JWG D1/A2.47	New frontiers of Dissolved Gas Analysis (DGA) Interpretation for Power Transformers and their Accessories
WG D1.48	Properties of Insulating Materials under VLF Voltages
JWG D1/B1.49	Harmonised Test for the Measurement of Residual Inflammable Gases in Insulating Materials by Gas Chromatography
WG D1.50	Atmospheric and Altitude Correction Factors for Air Gaps and Clean Insulators
WG D1.51	Dielectric Performance of Eco-friendly Gas Insulated Systems
WG D1.52	Moisture Measurement in Insulating Fluids and Transformer Insulation - An Evaluation of Solid State Sensors and Chemical Methods
WG D1.53	Ageing of Upgraded Cellulose and Cellulose Impregnated in Ester Liquids and other Liquids (Revision of Technical Brochure No 323)
WG D1.54	Basic Principles and Practical Methods to Measure the AC and DC Resistance of Conductors of Power Cables and Overhead Lines
WG D1.56	Field grading in electrical insulation systems
JWG D1/B3.57	Dielectric Testing of Gas-insulated HVDC Systems
WG D1.58	Evaluation of Dynamic Hydrophobicity of Polymeric Insulating Materials under AC and DC Voltage Stress
WG D1.59	Methods for Dielectric Characterisation of Polymeric Insulating Materials for Outdoor Applications
WG D1.60	Traceable Measurement Techniques for very fast Transients
WG D1.61	Optical Corona Detection and Measurement
WG D1.62	Surface Degradation of Polymeric Insulating Materials for Outdoor Applications
WG D1.63	Partial Discharge Detection under DC Voltage Stress
WG D1.64	Electrical Insulation Systems at Cryogenic Temperatures
WG D1.65	Mechanical Properties of Insulating Materials and Insulated Conductors for Oil Insulated Power Transformers
JWG A2/D1.46	Field Experience with Transformer solid Insulating Ageing Markers
JWG A2/D1.51	Improvement to Partial Discharge Measurements for Factory and Site Acceptance Tests of Power Transformers

LATEST PUBLICATIONS

TB 593	Past, present and future of IEC and IEEE high-voltage and high-current testing standards
TB 595	Fingerprinting of polymeric insulating materials for outdoor use
TB 611	Feasibility study for a DC Tracking & Erosion test
TB 620	Radiation ageing of polymeric insulating materials and relevant testing
TB 627	Condition assessment for fluid-filled insulation in AC cables
TB 634	Impact of rain on insulator performance
TB 636	Diagnostics and accelerated life endurance testing of polymeric materials for HVDC application
TB 644	Common characteristics and emerging test techniques for high temperature superconducting power equipment
TB 654	UHF Partial Discharge Detection System for GIS: Application Guide for Sensitivity Verification

All of the above TBs are available for download from www.e-cigre.org

CONTACT

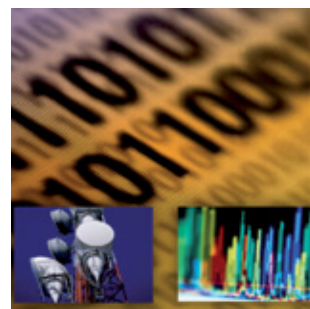
Incoming Chairman: Ralf Pietsch - pietsch@highvolt.de
Outgoing Chairman: Josef Kindersberger - josef.kindersberger@tum.de
Secretary: Johannes Seiler - johannes.seiler@tum.de



Information Systems and Telecommunication

The scope of this SC is focused on the fields of information systems and telecommunications for power systems.

SC D2 contributes to the international exchange of information and knowledge, adding value by means of synthesizing state of the art practices and drafting recommendations.



2016 SCOPE OF WORK

Main areas of attention are:
Studying and considering the evolution of

telecommunication technologies

and the adoption of new network architectures to cope with the new requirements of the Power Network of the Future including Smart Grids. In this area, optical multiplexing, the deployment of all-optical networks and new networking technologies are thoroughly analysed to determine how they may respond to the new challenges and requirements. Other aspects such as Technologies and architecture to assure business continuity and disaster recovery are also being assessed.

Deploying new technologies and implementing new services will require the revision of maintenance scope, techniques and tools.

Overcoming security threats is a key issue in the deployment of the networks of the future and especially in the future Smart Grids. Assessing security risks, defining the proper security framework, architecture and best practices in the scope of legal requirements and other internal practices of the power utility is a key area of interest for SC D2. The review of international standards and their applicability to Power Utilities is also an aspect to be considered as well as issuing recommendations to tackle their maintenance.

Principal areas of interest

Telecommunication Technologies for the Network of the Future, applicability of new technologies.

Disaster recovery, maintenance and operation.

Information technologies to support business operation.

Cyber Security and Access Control. Secure remote access to critical infrastructure. Secure management of customer data and services.

Current activities

Identify IT & Telecom technologies that will become the foundations of the Network of the Future.

Define network and services architecture as well as security aspects to respond to the challenges of Smart Grid deployment.

Key projects / forthcoming events

Define a Cyber Security framework for the Power Utility environment.

Green Book. Utility Communication Networks and Services.

Joint SC B3/B5/D2 Colloquium on "Building Smarter Substations".

Other specific interest

Identify best practices, trends and new technologies to facilitate the active participation of customers as stakeholders of the Power System.



TOPICS OF WORKING GROUPS

WG.D2.34	Telecommunication and Information Systems for Assuring Business Continuity and Disaster Recovery
WG.D2.36	Communication Solutions for Information Exchange in the Smart Delivery of Electrical Energy
WG.D2.38	A Framework for Electric Power Utility (EPU) Operators to manage the Response to a Cyber-initiated Threat to their Critical Infrastructure
JWG.D2/B2.39	Design, Deployment and Maintenance of Optical Cables associated to Overhead HV Transmission Lines
WG.D2.40	Cyber Risks and Cyber Security for the Next Generation of Digital Systems in Electrical Power Utilities
JWG.D2/C2.41	Advanced Utility Data Management and Analytics for Improved Situational Awareness of EPUs Operations
JWG.C6/D2.32	Utilization of Data Form Smart Meter System
WG.D2.42	Synchronization and Time Distribution in Communication Networks for Time-sensitive Distributed Operational Applications in the Power Grid

LATEST PUBLICATIONS

TB-507	Communication Architectures for IP-based Substation Applications
TB-521	Line and System Protection using Digital Circuit and Packet Communications
TB-615	Security Architecture Principles for Digital Systems in EPUs
TB-618	Scalable Communication Transport Solutions over Optical Networks

All of the above TBs are available for download from www.e-cigre.org

CONTACT

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Outgoing Chairman:	Carlos Samitier - carlos.samitier@pullnet.com
Incoming Secretary:	Jöel Nouard - joel.nouard@rte-france.com
Outgoing Secretary:	Maurizio Monti - maurizio.monti@rte-france.com





Technical Committee Statistics

In a nutshell, on January 1, 2016 CIGRE was:
193 Working Groups and 37 Joint Working Groups involving several Study Committees (28) or CIGRE and CIRED (9).

Involving more than 3800 experts coming from 64 different countries representing 5000 positions in the Working Groups as some experts are involved in more than one Working Body.

Publishing over 40 unbiased Technical Brochures per year.

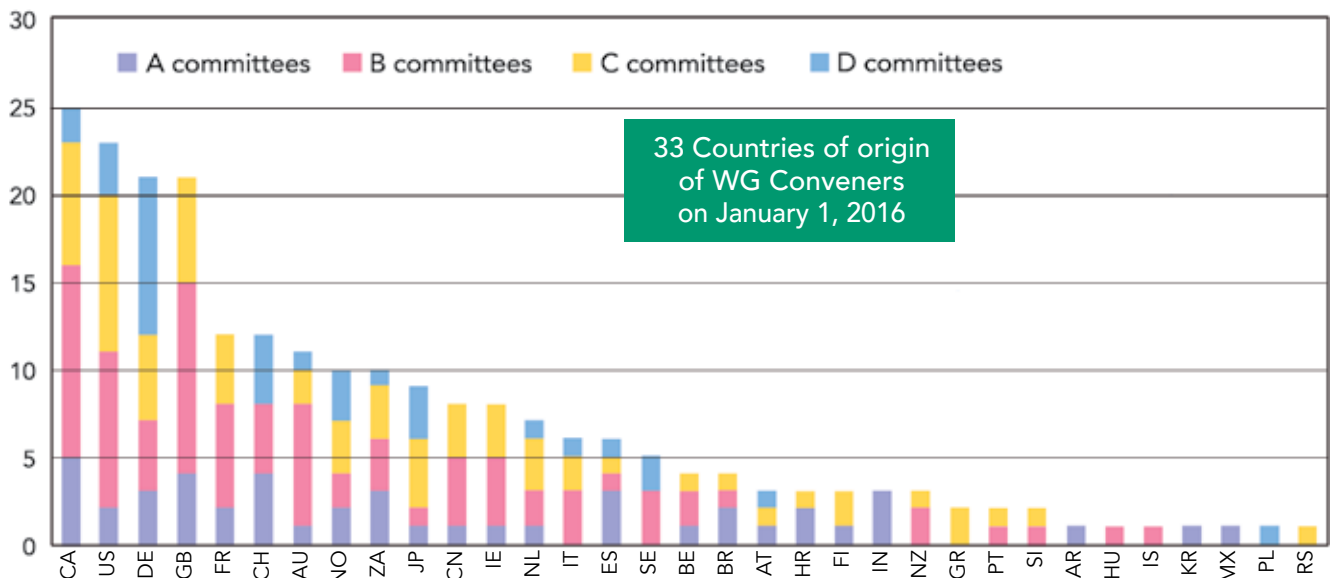
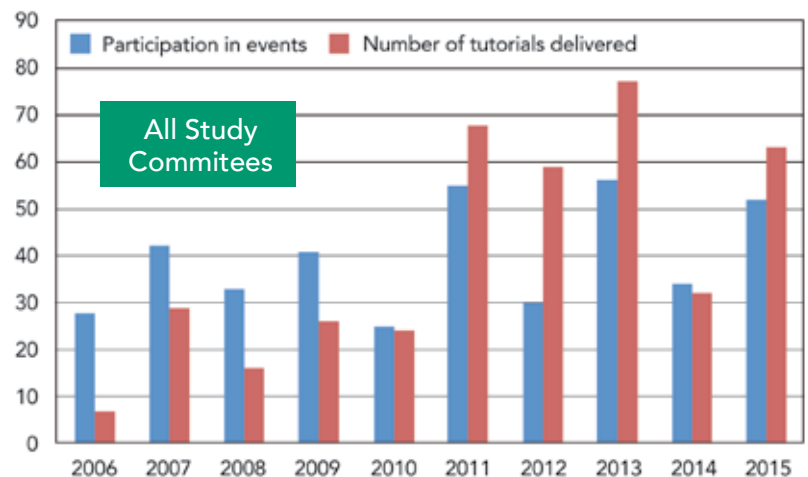
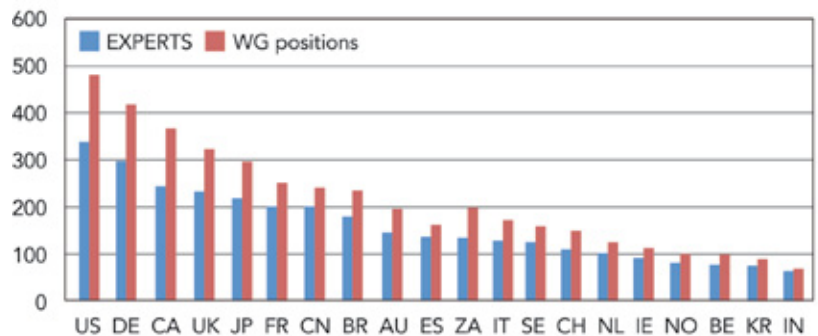
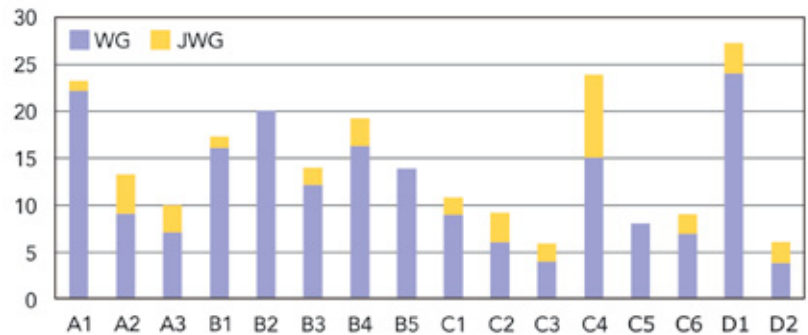
The 230 Conveners leading these Working Bodies come from 33 different countries.

Half of the Working Bodies deal with the Strategic Direction "Network of the Future".

The 16 Study Committees participated in 2015 in several international events all around the world during which they delivered 63 tutorials.

Women presently make up 8% of CIGRE's experts including 1 SC Chairwoman, 16 Working Group Conveners, 4 Study Committee Secretaries and around 300 experts. Following the Paris 2016 Session, these numbers will be enhanced by an additional Study Committee Chairwoman.

Yves Maugain,
 Technical Committee Secretary



CIGRE Study Committees Scope of Work & Activities 2016

About CIGRE

Founded in 1921, CIGRE, the **International Council on Large Electric Systems**, is an international non-profit Association for promoting collaboration on a national and international level.

With more than **9100 individual members** including student, researchers, academics, engineers, technicians, CEOs and other decision makers, and with more than **1100 collective members** (companies and universities), CIGRE allows experts from around 94 different countries, to share and join forces in order to improve existing systems and build the electrical power systems of the future.

CIGRE, who counts National Committees in 58 different countries, achieve its mission through the work of its specialized 16 Study Committees and 230 Working Groups, and through Events (Session, Symposia).

To know more about CIGRE: www.cigre.org

CIGRE Secretary General:
Philippe Adam (France).

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