CIGRE Study Committees

2014

Scope of Work & Activities

International Council on Large Electric Systems
Conseil International des Grands Réseaux Électriques

CIGRE Study Committees

Scope of Work & Activities 2014

>>> Contact

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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,
> Answer the environmental concerns,
> Develop 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 200 active Working Groups and 2500 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*

Rotating Electrical Machines

2014

SCOPE OF WORK

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 areas of attention are: Study committee A1 shall continue to play a pivotal role in the field of rotating 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 customers 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 co-operation 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 for power stations.

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

Technical and economic evaluation of generator refurbishment / replacement, Generator-Grid interaction requirements.

SC A1 2015 annual meeting and colloquium, Madrid, Spain.

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 engineers.

TOPICS OF WORKING GROUPS

WG A1.05	Generator Economic Evaluation of Generator Refurbishment / Replacement
WG A1.24	Literature survey on Diagnostics Trends for Wind Generators for Reliability Improvement
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 A1.32	A Survey on Small Hydro Power Plants Considering Technical and Strategic Aspects: Present Status and Future Outlooks
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 System
WG A1.35	Hydroelectric Generators Behaviour under Abnormal Operating Conditions
WG A1.36	Vibration and Stability Problems Met In New, Old and Refurbished Hydro Generators, Root Causes and Consequences
WG A1.37	Turbogenerator Stator Winding Support System Experience
WG A1.38	Guide for Generator On-Line Over and Under Excitation Operating Issues
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 A1.41	Inventory of Main Maintenance Interventions on Turbogenerators
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

LATEST PUBLICATIONS

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

2014

SCOPE OF WORK

Design, construction, manufacturing and operation for all kinds of power transformers, including industrial, DC converters and phase-shift transformers and for all types of reactors and transformer components (bushing, tap-changer...).

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 in the context of the new network.

New tools for modelling and diagnostics.

Transportation, maintenance and monitoring.

Transportation, asset management and end of life estimation.

KEY PROJECTS / FORTHCOMING EVENTS

Next SC A2 Colloquium,
20-25 September, 2015, Shanghai, China.

TOPICS OF WORKING GROUPS

WG A2.37	Transformer Reliability Survey
WG A2.38	Transformer Thermal Modelling
WG A2.40	Copper sulphide long-term mitigation and risk assessment
JWG A2/D1.41	HVDC transformer insulation - Oil conductivity
WG A2.42	Guide on Transformer Transportation
WG A2.43	Bushing Reliability
WG A2.44	Transformer Intelligent Condition Monitoring
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 for non-standard waveforms

LATEST PUBLICATIONS

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
TB 349	Moisture Equilibrium within Transformer Insulation
TB 343	Recommendation for Condition Monitoring & Assessment
TB 342	Mechanical Condition Assessment of Xfo Windings

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

CONTACT

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High Voltage Equipment

2014

SCOPE OF WORK

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.

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 & 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

New technologies (e.g. DC circuit-breakers).
Requirements of equipment in changing network conditions.
Incorporation of intelligence into HV equipment (e.g. Controlled switching).
Monitoring and diagnostics of transmission & 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 subsation 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.
14 active Working groups and 3 advisory groups.

KEY PROJECTS / FORTHCOMING EVENTS

2015 CIGRE SC A3 & B3 Colloquium & Tutorial,
28 September - 2 October, 2015, Nagoya, Japan.
2015 CIGRE SC A2 Colloquium with common subjects for SC A3 & B3,
20-25 September, 2015, Shanghai, China.

(*) 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 A3.24	Simulating internal arc and current withstand testing
WG A3.25	MO varistors and surge arresters for emerging system conditions
WG A3.26	Capacitor bank switching and impact on equipment
WG A3.27	Vacuum switchgear for transmission use
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

LATEST PUBLICATIONS

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 Part2
TB 335	Changing Network Conditions and system requirements Part1
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

CONTACT

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Insulated Cables

2014

SCOPE OF WORK

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 is focused on HV & EHV applications and MV applications are now more and more considered.

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 2013, more than 300 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 INTERESTS

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

TOPICS OF WORKING GROUPS

WG B1.11	Upgrading and Uprating of existing Cable Systems
WG B1.28	On-site Partial Discharge Assessment of HV and EHV cable systems
JWG B1/B3.33	Feasibility of a common, dry type interface for GIS and Power cables of 52 kV and above

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

WG B1.34	Mechanical forces in large cross section cable systems
WG B1.35	Guide for rating calculations of HV cables
WG B1.36	Life cycle assessment and environmental impact of underground cable systems
WG B1.37	Guide for operation of fluid filled cable systems
WG B1.38	After laying tests on AC and DC cable systems with new technologies
WG B1.39	On shore generation cable connections
WG B1.40	Off shore generation cable connections
WG B1.41	Long term performance of soil and backfill of cable systems
WG B1.42	Testing of transition joints between HVDC cables with lapped and extruded insulation up to 500 kV
WG B1.43	Recommendations for mechanical testing of submarine cables
WG B1.44	Work under induced voltages or currents (Technical Direction 1)
WG B1.45	Thermal Monitoring Hardware of Cable Circuits & Man Machine Interface
WG B1.46	Conductor Connectors: Mechanical and Electrical Tests
WG B1.47	Implementation of Long AC HV & 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
JWG B3/B1.27	Factors of investment decision of GIL vs. Cables for AC Transmission
JWG C3/B2/B1.13	Environmental issues of high voltage transmission lines for rural and urban areas

LATEST PUBLICATIONS

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 <= 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
TB 446	Advanced design of metal laminated coverings: recommendation for tests, guide to use, operational feedback
TB 415	Test Procedures for HV Transition Joints for rated Voltages 30kV(Um=36kV) to 500kV (Um=550kV)
TB 403	Cable Systems in Multi-Purpose Structures
TB 398	Third-Party Damage to Underground and Submarine Cables
TB 379	Update of Service Experience of HV Underground and Submarine Cable Systems
TB 358	Remaining Life Management of existing AC Underground Lines
TB 347	Earth Potential Rises in specially bonded Screen Systems
TB 338	Statistics of AC Underground Cables in Power Networks
TB 303	Revision of qualification procedures for HV and EHV AC extruded underground cable systems

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

CONTACT

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Overhead Lines

2014

SCOPE OF WORK

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.

The Study Committee is interested in all aspects of new overhead power line design and modification of existing lines. Specific areas of interest are Electrical Performance, Towers, Insulators and Foundations, Conductors and Conductor Fittings, and Asset Management.

Electrical Performance - improved design, analysis and 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, 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 capabilities, protection against wind induced vibrations, assessment of aged fittings, and support in the preparation of standards, such as 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 vibration and ice galloping.

Increased power flow with existing lines.

Asset management guidelines.

Real-time monitoring systems.

Minimizing the impact of lines.

CURRENT ACTIVITIES

CIGRE Paris 2014 session.

KEY PROJECTS

1st CIGRE Reference Book on Overhead Lines.

FORTHCOMING EVENTS

CIGRE Colloquium on Overhead Lines with **GRIDTECH Exhibition,** April 2015, New Delhi.

CIGRE Symposium: The development of electricity infrastructures in sub-saharan Africa, October 2015, Cap Town.

CIGRE International Colloquium on EHV/UHV, Spring 2016, Montreal.

OTHER SPECIFIC INTERESTS

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 B2.28	Meteorological data for assessing climatic loads. Update of IEC TR 61774
WG B2.38	Evaluation of high Surge Impedance Load solutions for increased natural transmission capacity of Overhead Lines
WG B2.40	Calculations of the electrical distances between live parts and obstacles for Overhead Lines
WG B2.42	Guide to operation of conventional conductor systems above 100°C
WG B2.43	Guide for thermal rating calculations for Overhead Lines with high temperatures and realtime weather and load data
WG B2.44	Coatings for protecting overhead power network equipment in winter conditions
WG B2.45	Bushfire characteristics and potential impacts on Overhead Line performance
WG B2.46	Wind induced motion on bundle conductors (excluding ice galloping)
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 B2.49	Safe design tension for conductors fitted with elastomer cushioned suspension units
WG B2.50	Safe handling of fittings and conductors
WG B2.51	Methods for optimized design of Overhead Transmission Lines
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 B2.54	Management of risk associated with severe climatic events and climate change on Overhead Lines
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
JWG C3/B2/B1.13	Environmental issues of high voltage transmission lines for rural and urban areas

LATEST PUBLICATIONS

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
TB 471	Working Safely while Supported on Aged Overhead Conductors
TB 438	Systems for Prediction and Monitoring of Ice-Shedding, Anti-Icing and De-Icing for Overhead Power Line Conductors and Ground Wires
TB 429	Engineering Guidelines relating to Fatigue Endurance Capability of Conductor/Clamp Systems
TB 425	Increasing Capacity of Overhead Transmission Lines: Needs and Solutions

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

CONTACT

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Substations

2014

SCOPE OF WORK

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.

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 approximately 390 experts in 16 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 SF_6.

CIGRE Session 45, including SF_6 Workshop on 29 August, 2014, Paris.

Joint **SC B3 and A3 Colloquium,** 28 September - 2 October, 2015, Nagoya, Japan.

Together with SC A3, preparation of the **CIGRE Position paper on SF_6** published in Electra.

Regular Working Group and other meetings.

OTHER AREAS OF INTERESTS

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.

TOPICS OF WORKING GROUPS

JWG B1/B3.33	Common Dry Type interfaces for GIS connection above 52kV (dry type/plug-in type for AC cables)
JWG D1/B3.57	Dielectric Testing of gas-insulated HVDC systems
JWG B3/B1.27	Factors for investment decision of GIL vs. Cables for AC Transmission
WG B3.13	Reducing replacement time of HV equipment
WG B3.24	Benefit of PD diagnosis on GIS condition assessment
WG B3.30	Guide to minimize the use of SF_6 during routine testing of electrical equipment
WG B3.31	Air Insulated Substations Design for Severe Climate Condition
WG B3.32	Saving through optimized maintenance of Air insulated Substations
WG B3.34	Expected impact of future grid concept on substation management
WG B3.35	Substation earthing system design optimisation through the application of quantified risk analysis
WG B3.36	Special Considerations for AC Collector Systems and Substations associated with HVDC connected Wind Power Plants
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

LATEST PUBLICATIONS

TB 585	Circuit Configuration Optimisation
TB 576	IT Strategies for Asset Management of Substations - General Principles
TB 567	SF_6 Analysis for AIS, GIS and MTS Condition Assessment
TB 562	Field Tests for UHV Stations
TB 532	Substation Uprating and Upgrading
TB 499	Residual Life Concepts Applied to HV GIS
TB 486	Integral Decision Process for Substation Equipment Replacement
TB 483	Guidelines for the Design and Construction of AC Offshore Substations for Wind Power Plants
TB 472	Primary / Secondary system interface modelling for total asset performance optimization
TB 462	Obtaining Value from On-Line Substation Condition Monitoring
TB 439	Turnkey Substations
TB 430	SF_6 Tightness Guide
TB 400	Technical Requirements for substations exceeding 800kV

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

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HVDC and Power Electronic Systems

2014

SCOPE OF WORK

The scope of SC B4 covers High Voltage Direct Current (HVDC) systems and Power Electronics for AC networks, called Flexible AC Transmission System (FACTS) equipment, which is used to provide fast power flow control of ac lines and reactive power compensation of AC systems.

HVDC systems are increasingly being used to connect remote renewable and other generation, and also for interconnectors to enable energy to be shared over larger areas. LCC HVDC systems using thyristors are now in service at ratings up to 7200MW at ±800 kVdc, and ±1100kVdc systems are under development.
In Europe, USA and China there is strong interest in HVDC Grids. SC B4 has 12 WGs in the area of HVDC, with 7 in the area of HVDC Grids working to lay the foundations for the design and standards for HVDC Grids.

The VSC HVDC market is growing rapidly, with ±320kVdc, 900MW schemes under construction, and a total rating of >15GW in service or under construction.

FACTS technologies enable increased loading of existing AC lines and improved power flow control in AC systems, making higher utilization of the existing AC transmission assets and longer AC power transmission lines possible.
SC B4 has 2 WGs in the area of FACTS.

PRINCIPAL AREAS OF INTEREST

SC B4 provides un-biaised information about HVDC and FACTS systems for use by engineers, scientists, regulators and the public in regards to design, operation and evaluation of existing and future AC and HVDC transmission systems.

This includes power semiconductors used in converter valves, the control and protection systems, the required AC and DC harmonic filters, environmental aspects of HVDC and FACTS, and other unique components.

UPCOMING EVENTS

2015 Symposium, Across Borders HVDC Systems and Market Integration, 27-28 May, 2015, Lund, Sweden.

SC B4 Annual Meeting,
Includes a Colloquium on HVDC and FACTS, and a tour to a ±800 kVdc HVDC station, 21-26 September, 2015, Agra, India.

TOPICS OF WORKING GROUPS

WG B4.51	Study of Converter Voltage Transients Imposed on the HVDC Converter Transformers The TB is expected to be completed late 2014
WG B4.53	Guidelines for procurement and testing of STATCOMs The TB is expected to be completed late 2014
WG B4.54	Guidelines for Life Extension of Existing HVDC Systems The TB is expected to be completed late 2014
WG B4.55	HVDC connected Wind Power Plants The TB is expected to be completed late 2014
WG B4.56	Guidelines for the preparation of "connection agreements" or "Grid Codes" for HVDC Grids The TB is expected to be completed late 2014
WG B4.57	Guide for the development of models for HVDC converters in a HVDC Grid The TB is expected to be completed late 2014
WG B4.58	Devices for load flow control and methodologies for direct voltage control in a meshed HVDC Grid - The TB is expected to be completed late 2014
JWG B4/B5.59	Control and Protection of HVDC Grids. The TB is expected to be completed in 2015
WG B4.60	Designing HVDC Grids for Optimal Reliability and Availability performance The TB is expected to be completed late 2014
WG B4.61	General Guidelines for HVDC Electrode Design The TB is expected to be completed late 2014
WG B4.62	Connection of Wind Farms to Weak AC networks The work started in 2013
WG B4.63	Commissioning of VSC HVDC Schemes The work started in 2013
WG B4.64	Impact of AC System Characteristics on the Performance of HVDC schemes The work started in 2013
JWG B4/C1.65	Recommended voltages for HVDC Grids. This work started in 2013

Further details of the above WGs can be found in the SC B4 Annual Report, which was published in the June 2014 issue of Electra.

LATEST PUBLICATIONS

TB 563	"Modelling and Simulation Studies to be performed during the lifecycle of HVDC Systems" WG B4-38 was published in December 2013
TB 554	"Performance evaluation and Application Review of existing TCSCs" - WG B4.49, was published in October 2013
TB 553	"Special Aspects of AC Filter Design for HVDC Systems", WG B4.47, was published in October 2013. This report is an Addendum to "Guide to the specification and design evaluation of AC harmonic filters for HVDC systems" TB 139, 1999.
TB 533	"HVDC Grid Feasibility Study" - WG B4.52 was published in 2013, and has been one of the most downloaded TBs. It concludes that whilst there are many technical issues to be resolved, HVDC Grids are technically feasible.
TB 508	"HVDC Environmental Planning Guidelines" - WG B4.44 was published in 2012
TB 492	"Voltage Source Converter (VSC) HVDC for Power Transmission - Economic Aspects and Comparison with other AC and DC Technologies" - WG B4.46 was published in 2012
TB 473	"Electric Field and Ion Current Environment of HVDC Overhead Transmission Lines" JWG B4/C3/B2.50 was published in 2011
TB 447	"Components Testing of VSC System for HVDC Applications" - B4.48 was published in 2011

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

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Protection and Automation

2014

SCOPE OF WORK

The scope of the study Committee SC B5 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.

SC B5 main's areas 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 & 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 systems 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 2015 colloquium in China.

OTHER SPECIFIC INTERESTS

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.B5.39	Documentation requirements from design to operation to maintenance for Digital Substation Automation Systems
WG.B5.40	Experience concerning availability and reliability of DSAS
WG.B5.45	Acceptance, Commissioning and Field Testing Techniques for Protection and Automation Systems
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.B5.23	Short circuit protection of circuits with mixed conductor technologies in transmission networks
WG.B5.24	Protection Requirements on Transient Response of Voltage and Current Digital Acquisition Chain
WG.B5.40	Education, Qualification and Continuing Professional Development of Engineers in Protection and Control
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.B5.43	Coordination of Protection and Automation for Future Networks
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
JWG B5/C6.26/CIRED	Automation of Distribution Future Networks
JWG C6/B5.25/CIRED	Protection of Distribution System with DER
JWG B4/B5.59	Control and Protection of HVDC Grids
JWG A3/B5/C4.37	Conditions & probability of Out-of-Phase
JWG B5/D2.46	Application and management of cyber security measures for Protection and Control systems

LATEST PUBLICATIONS

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 401	Functional Testing of IEC 61850 Based Systems
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

2014

SCOPE OF WORK

Issues, methods and tools related to the development and economics of power systems, including the drivers for investment in power networks, to increase power transfer capability, integrate distributed and renewable resources, and to maintain acceptable reliability.

Main areas of attention are:
- Impact on system development of new solutions and technologies in fields such as generation (particularly renewables and distributed generation) and demand side management.
- Planning in competitive and regulatory structures.
- Progress and new approaches in applying power system planning criteria and reliability assessment, including effects of smart grid and large data capabilities.
- Enhancing capacity by using risk-based security assessment and advanced information, communication and power-electronics technology for improving system stability and dynamic performance.
- Future dependence, requirements and economy of ancillary services for frequency and voltage control, inertia and other system needs.
- The impact of pricing and tariff methods for transmission services on system development.
- Asset management strategies in defining optimal policies for issues such as maintenance and procurement.
- Planning issues related to long-distance and UHV transmission and international interconnections.
- System planning, economics and electrification issues in newly industrialised and developing countries.
- Methods and tools for power system static and dynamic analysis.

PRINCIPAL AREAS OF INTEREST

System development, business investment and asset management incorporating technical aspects of power systems, requirements and expectations of customers, new technologies that lower cost or improve performance technically or environmentally, total asset lifetime issues and overall business impacts.

CURRENT ACTIVITIES

New system solutions and planning techniques.

Securing investment in transmission networks with increasing uncertainties.

Reviewing application of enhanced asset management methodologies.

KEY PROJECTS / FORTHCOMING EVENTS

Symposium "Across Borders - Integrating Systems and Markets" and C1 meeting, 27 and 28 May, 2015, Lund, Sweden.

OTHER SPECIFIC INTEREST

To inform a broad stakeholder group of issues, challenges and solutions in long term development and asset management of power systems.

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 C1.20	Accommodating high load growth and urban development in future plans
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 C1.25	What are the factors and information that need to be considered for asset management decision making in the context of a low-carbon future? (Part 2)
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 C1.32	Establishing best practice approaches for developing credible electricity demand and energy forecasts for network planning
JWG B4/C1.65	Recommended voltages for HVDC grids

LATEST PUBLICATIONS

TB 579	Green field network, designing future networks ignoring existing constraints
TB 572	Tools for Economically Optimal Transmission Development plans
TB 564	Review of Transmission Planning Access Requirements
TB 547	Planning issues for newly industrialised and developing countries (Africa)
TB 541	Asset Management Decision Making using different Risk Assessment Methodologies
TB 536	Influence of Embedded HVDC Transmission on System Security and AC Network Performance
TB 527	Coping with limits for very high penetrations of renewable energy
TB 523	System complexity and dynamic performance
TC Position Paper	Disaster Recovery within a CIGRE Strategic Framework: Network Resilience, Trends and Areas of Future work.

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

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System Operation and Control

2014

SCOPE OF WORK

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.

The main areas 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, 27-28 May, 2015, Lund, Sweden.

TOPICS OF WORKING GROUPS

JWG C2/C5-05	Developments and changes in the Business of System Operators
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 C2.21	Lessons learnt from recent Emergencies and Blackout Incidents
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

LATEST PUBLICATIONS

TB 534	Interaction between principles of transfer capacity calculation and market activity for enhanced system utilization
TB 524	Control Centre Operator Requirements, Selection, Training and Certification
TB 504	Voltage and Var Support in System Operation

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

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System Environmental Performance

2014

SCOPE OF WORK

The scope of this Study Commitee 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.

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.

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.

Power System efficiency and environment.

CURRENT ACTIVITIES

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.

OTHER SPECIFIC INTERESTS

Environmental implications of energy storage technologies.

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

TOPICS OF WORKING GROUPS

WG C3.01	EMF and Health
WG C3.08	External costs for Power Lines
WG C3.09	Corridor management
WG C3.10	Sustainable development Performance Indicators - Power Generation
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

LATEST PUBLICATIONS

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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System Technical Performance

2014

SCOPE OF WORK

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, Power systems performance models and numerical analysis.

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 Symposium 2015,
as a supporting Study Committee,
Lund, Sweden.

OTHER SPECIFIC INTERESTS

Evaluation of System Technical Performance of Traditional Power Systems.

Development of Advanced System Analysis Tools for Smart Grids.

TOPICS OF WORKING GROUPS

WG C4.111	Review of LV and MV Compatibility Levels for Voltage Fluctuation
WG C4.112	Power Quality Monitoring in Flexible Power Networks
WG C4.206	Protection of the High Voltage Power Network Control Electronics against Intentional Electromagnetic Interference (IEMI)
JWG C4.207/CIRED	EMC with Communication Circuits, Low Voltage Systems and Metallic Structures in the Vicinity of Power Systems
WG C4.305	Practices in Insulation Coordination of Modern Electric Power Systems Aimed at the Reduction of the Insulation Level
WG C4.410	Lightning Striking Characteristics to Very High Structures
WG C4.503	Numerical Techniques for the Computation of Power Systems, from Steady-State to Switching Transients
WG C4.603	Analytical Techniques and Tools for Power Balancing Assessments
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 C4/B4.38	Network Modelling for Harmonic Studies
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

LATEST PUBLICATIONS

TB 578	Lightning Protection of Wind Turbine Blades
TB 569	Resonance and Ferroresonance in Power Networks
TB 568	Transformer Energization in Power Systems: A Study Guide
TB 566	Modelling and Aggregation of Loads in Flexible Networks
TB 556	Power System Technical Performance Issued related to the Application of Long HVAC Cables
TB 555	Artificial Pollution Test for Polymer Insulators: Results of Round Robin Test
TB 550	Lightning Protection of Low-Voltage Networks
TB 549	Lightning Parameters for Engineering Applications
TB 543	Guide for Numerical Electromagnetic Analysis Methods: Application to Surge Phenomena and Comparison with Circuit Theory-based Approach
TB 542	Insulation Coordination for UHV AC Systems
TB 536	Influence of Embedded HVDC Transmission on System Security and AC Network Performance
TB 535	EMC within Power Plants and Substations
TB 518	Outdoor Insulation in Polluted Conditions: Guidelines for Selection and Dimensioning Part 2: The DC Case

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

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Electricity Markets and Regulation

2014

SCOPE OF WORK

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, and Independent Power producers.

Main areas of attention are:

- Emerging Technologies (storage, smart buildings, adaptive consumption, demand aggregation) provide varying degrees of opportunities and options within the Power System. A number of these technologies are innovative and may require different market processes to allow them to compete within the framework of the Power Systems need, infrastructure and Regulatory directives.
- New Demand Side Management and Demand Response solutions and their integration into existing market and mechanisms has become a priority in the transition to low carbon energies. To monitor new solutions within industrial activities, services and households is focused.
- Monitor various market designs (Power Markets, Capacity Markets, and Ancillary Service Markets) to address a general shift from long-term investments to shorter-term financial drivers and the shifting of investment risk from the rate payers to the market participants.
- Reliability and environmental responsibility are important. However affordability of electric service is another dimension of electric service provision. Cost components, cost allocation, and trends in customer's rates over time in regulated and competitive market environments.

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 Economics).

CURRENT ACTIVITIES

Major activities are assessment of impact and requirements of introducing intermittent generation and flexible loads 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 services.

KEY PROJECTS / FORTHCOMING EVENTS

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

SC B4/C1/C2/C4/C5 2015 Symposium, Lund, Sweden.

OTHER SPECIFIC INTERESTS

The impact of emerging technologies on the system operation.

Techniques and principles for including the flexibility of a large number of end-users into market clearing procedures (aggregation).

TOPICS OF WORKING GROUPS

JWG C2/C5-05	Development and Changes in the Business of System Operators
WG C5.13	Interaction of Markets and Regulation Actions with Emerging Technologies
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 C5.17	Capacity markets: needs, solutions and state of affairs
WG C5.18	Market price signals and regulated frameworks for regional coordination of grid investments
WG C5.19	Regulatory aspects of Demand Response and Demand Side Management for integration within Electricity Markets

LATEST PUBLICATIONS

TB 580	Generator Market Power Mitigation Measures in Electricity Markets
TB 565	Regulatory Incentives for Capital Investments in Electricity
TB 557	Market design for large scale integration of intermittent renewable energy sources

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

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Secretary: Alain Taccoen - alain.taccoen@rte-france.com

Distribution Systems and Dispersed Generation

2014

SCOPE OF WORK

The scope of this Study Committee is focused on the fields of distribution systems and dispersed generation. SC C6 contributes to the international exchange of information and knowledge in the field, adding value and knowledge by means of synthesizing state of the art practices and developing recommendations.

Main areas of attention are:

- Distribution level needs more 'smartness' - massive penetration of distributed energy resources (generation, storage and intelligent loads) imposes the need for their control and coordination.
- The coordination of a large number of small resources imposes technical challenges that require application of decentralized, intelligent control techniques.
- Massive 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.
- New coordination and control schemes of distributed generators, such as in virtual power plants, interact with distribution grid operation.

PRINCIPAL AREAS OF INTEREST

Dispersed Energy Resources connection and integration.

Dispersed Energy Resources control and coordination in distribution systems operation and planning (Microgrids and Active Distribution Networks).

Demand management and Active Customer Integration.

Rural electrification.

CURRENT ACTIVITIES

Assessment of technical impact and requirements which new distribution features impose on the structure and operation of the power system of the feature, i.e. widespread integration of dispersed generation, application of energy storage devices and active demand participation.

KEY PROJECTS / FORTHCOMING EVENTS

Evolution of active distribution networks resulting in bidirectional power and data flows within distribution level and to the upstream network.

SC C6 2015 Colloquium, Vienna, Austria.

OTHER SPECIFIC INTERESTS

Assess the potential of Energy Storage both centralized and distributed to facilitate operation and planning of the Distribution Networks.

Identify best practices, trends and new technologies for Rural Electrification.

TOPICS OF WORKING GROUPS

WG C6.19	Planning and optimization methods for active distribution systems
WG C6.20	Integration of electric vehicles in electric power systems
WG C6.21	Smart Metering - **state of the art, regulation, standards and future requirements**
WG C6.22	Microgrids Evolution Roadmap
WG C6.23	Terminology Working Group
JWG C6/B5.25/CIRED	Control and Automation Systems for Electricity Distribution Networks of the Future
JWG B5/C6.26/CIRED	Protection of Distribution System with Distributed Energy Resources
WG C6.27	Asset management for distribution networks with high penetration of distributed energy resources
WG C6.28	Hybrid systems for off-grid power supply
JWG C4/C6.29	Power quality and PVs
WG C6.30	Impact of battery energy storage
JWG C4/C6/CIRED.35	Modelling and dynamic performance of inverter based generation in power system transmission and distribution studies

LATEST PUBLICATIONS

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

Incoming Chairwoman: Britta Buchholz - britta.buchholz@de.abb.com
Outgoing Chairman: Nikos Hatziargyriou - nh@power.ece.ntua.gr
Secretary: Christine Schwaegerl - christine.schwaegerl@hs-augsburg.de

Materials and Emerging Test Techniques

2014

SCOPE OF WORK

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.

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 diagnostics.

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

D1 Colloquium 2015, Rio de Janeiro, Brazil.

OTHER SPECIFIC INTERESTS

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 D1.23	Diagnostics and accelerated life endurance testing of polymeric materials for HVDC application
WG D1.25	Application guide for PD detection in GIS using UHF or acoustic methods
WG D1.29	Partial Discharges in Transformers
WG D1.31	Dielectric Performance of insulating liquids for transformers
WG D1.36	Special requirements for dielectric testing of Ultra High Voltage (UHV) equipment
WG D1.37	Maintenance and evaluation of measuring procedures for conventional and unconventional partial discharge testing
WG D1.38	Emerging Test Techniques Common to High Temperature Superconducting (HTS) Power Applications
WG D1.39	Methods for Diagnostic/Failure Data Collection and Analysis
WG D1.40	Functional Nanomaterials for Electric Power Industry
WG D1.42	Radiation Ageing of Polymeric Insulating Materials
WG D1.43	Rotating machine insulation voltage endurance under fast, repetitive voltage transients
WG D1.44	Testing of naturally polluted insulators
WG D1.45	Testing of insulator performance under heavy rain
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 D1.55	Partial discharge detection under DC stress
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
JWG A2/D1.41	HVDC transformer insulation - Oil conductivity
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 571	Optimized Gas-Insulated Systems by Advanced Insulation Techniques
TB 526	Oxidation Stability of Insulating Fluids
TB 525	Risk Assessment on Defects in GIS based on PD Diagnostics
TB 520	Material properties of solid HVDC insulation systems
TB 519	Very Fast Transient Overvoltages (VFTO) in Gas-Insulated Substations
TB 506	Gas Insulated Systems for HVDC: DC stress at DC and AC systems
TB 502	High-Voltage on-site testing with partial discharge measurement
TB 501	Basic principles to determine methane content in cross-linked solid extruded insulation of MV and HV cables
TB 494	Furanic compounds for diagnosis
TB 493	Non-destructive water-tree detection in XLPE cable insulation

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

CONTACT

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Secretary: Johannes Seiler - johannes.seiler@tum.de

Information Systems and Telecommunication

2014

SCOPE OF WORK

The scope of the SC D2 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.

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

SC D2 2015 Colloquium, Define a Cyber Security framework for the Power Utility environment.

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 D2.31	Security Architecture Principles for Digital Systems in Electrical Power Utilities
WG D2.32	Optical Cables Links in Power Utilities - Mounting, Commissioning, Maintenance and Management
WG D2.33	Operation & Maintenance of Telecom network and associated information systems in the Electrical Power Utility
WG D2.34	Telecommunication and Information Systems for Assuring Business Continuity and Disaster Recovery
WG D2.35	Scalable Communication Transport Solutions over Optical Networks
WG D2.36	Communication solutions for information exchange in the smart delivery of electrical energy
WG D2.37	Guidelines for outsourcing managed security services using Cloud Technologies
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 B5/D2.46	Application and management of cyber security measures for Protection & Control systems

LATEST PUBLICATIONS

TB 521	Line and System Protection using Digital Circuit and Packet Communications
TB 507	Communication Architectures for IP-based Substation Applications
TB 495	Communication Access to Electrical Energy Consumers and Producers
Electra Magazine	Strategic Priorities for Information Systems Issues

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

CONTACT

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Secretary: Maurizio Monti - maurizio.monti@rte-france.com

Technical Committee Statistics

In a nutshell, on March 19, 2014, CIGRE was:

201 Working Groups and 27 Joint Working Groups involving several Study Committees (20) or CIGRE and CIRED (7).

Involving more than 3400 experts coming from 64 different countries representing 4600 positions in the Working Groups as some experts are involved in more than one Working Body.

Publishing over 40 unbiased Technical Brochures per year.

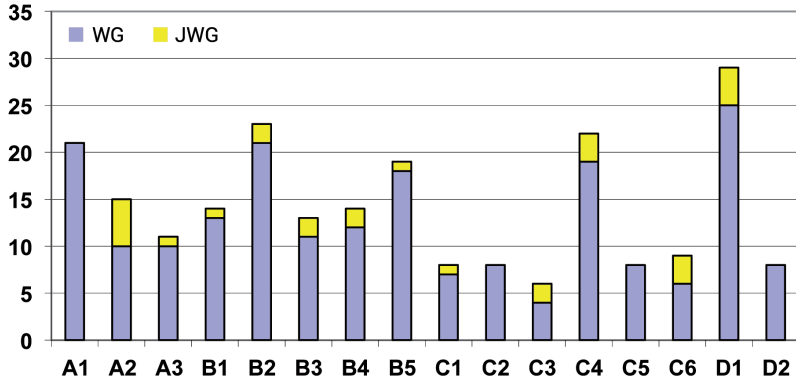
The 228 Conveners leading these Working Bodies come from 32 different countries.

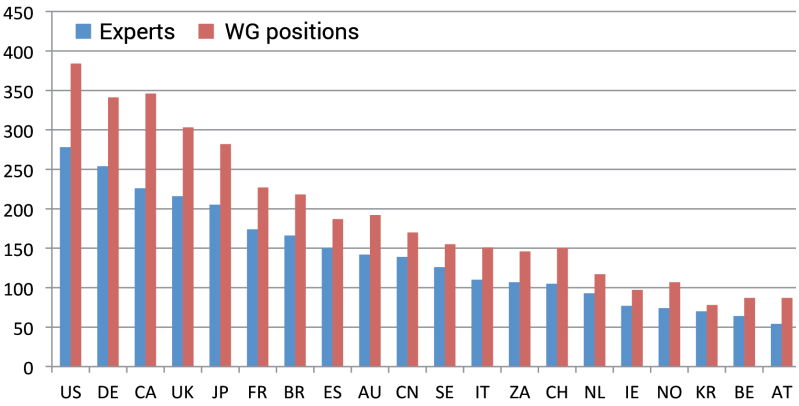
Half of the Working Bodies deal with the Strategic Direction "Network of the Future".

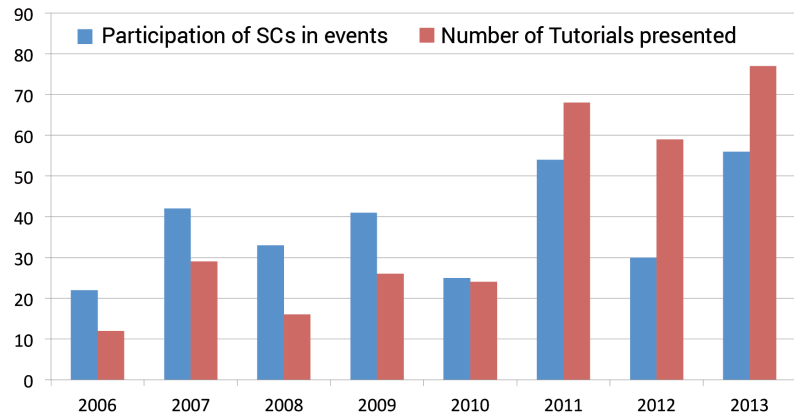
The 16 Study Committees participated in 2013 in several international events all around the world during which they delivered 77 tutorials.

Women presently make up 7% of CIGRE's experts including 19 Working Group Conveners and 3 Study Committee Secretaries. Following the Paris 2014 Session, these numbers will be enhanced by an additional Study Committee Secretary and a Chairwoman of a Study Committee.

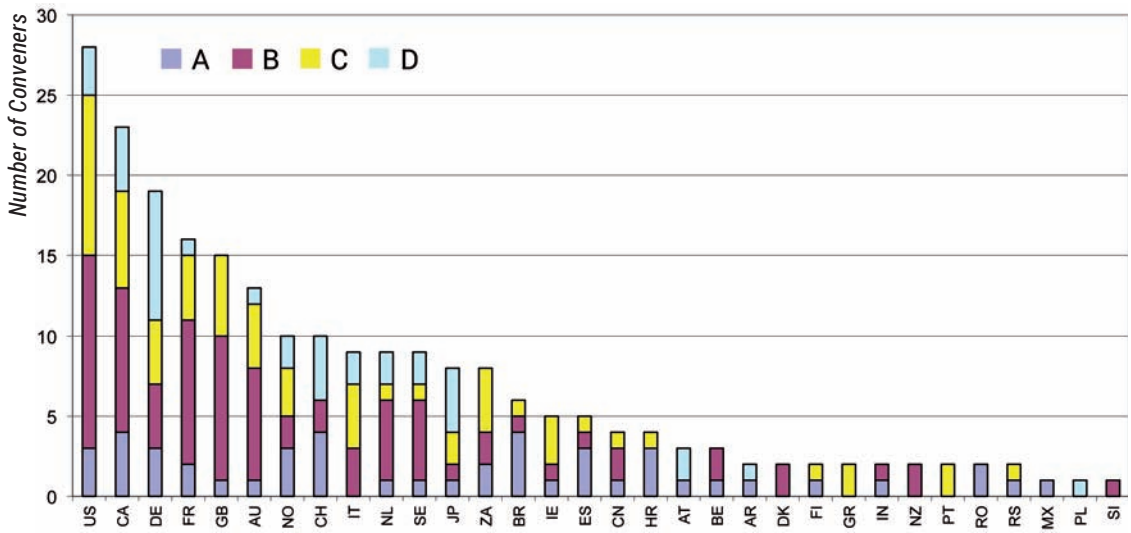
Yves Maugain,
Technical Committee Secretary







All Study Committees.



32 Countries of origin of SC WG Conveners.

CIGRE Study Committees
Scope of Work & Activities 2014

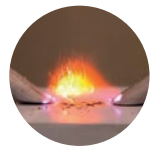














About CIGRE

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 **13600 equivalent members** composed of researchers, academics, engineers, technicians, CEOs and other decision makers, CIGRE allows experts from around 81 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 228 Working Groups, and through Events (Session, Symposia).

To know more about CIGRE: **www.cigre.org**

CIGRE elected officers

President: **Klaus Fröhlich** *(Switzerland).*

Technical Committee Chairman: **Mark Waldron** *(United Kingdom).*

Treasurer: **Richard Bevan** *(Australia).*

CIGRE Secretary General

Philippe Adam *(France).*

International Council on Large Electric Systems

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