

**CIGRE STUDY COMMITTEE B2**  
**OVERHEAD LINES**  
**2011 REPORT**

**Our Field of Activities**

Design, study of electrical and mechanical characteristics and performance, route selection, construction, operation, service life, maintenance, refurbishment uprating and upgrading of overhead lines and their components including: conductors, earth wires, insulators, towers, foundation and earthing systems.

**Objectives of the Study Committee**

- To promote exchange of information on all aspects within the field of our field of activities.
- To organize and conduct studies for the progress of technique and knowledge.

**TC Strategic Direction 2010-2020**

The Technical Committee Strategic Direction (2010-2020) is posted on the CIGRE website.

The 4 Major Strategic Directions are:

- Direction 1: The electrical power system of the future
- Direction 2: Focus on environment and sustainability
- Direction 3: Making the best use of the existing power system
- Direction 4: Interactive communication with the public and political decision makers
- Major items for SCB2 are following:
  - Firstly concern of the public about the impact of the system to the environment, such as EMF, noise emission, aesthetic issue.
  - Secondly, issues where the environment influences the power system are to be taken into account. Increasing frequency and severity of extreme weather conditions can be observed, more to be expected.
  - On the transmission level, an urgent global need for increased transportation capacity is thus obvious. HVDC – and AC transmission at the highest at the highest voltage levels are/will have to be implemented and combination of AC and HVDC systems (Hybrids) too. All these aspects should be taken into account in the proposition of new WG by TAG convenors.

**TC Projects**

Two TC projects are identified:

- Network of the future
- Power system efficiency

### **Convenors**

Since the last meeting, 11 new WG have been created and their Conveners are:

#### **WG B2.44 *Coatings for protecting power network equipment in winter conditions* (M. Farzaneh, convenor)**

- July 2011: WG established and proceedings defined
- November 2011: Accomplishment of review and analysis of the major icing events and their impact (to be discussed and approved at a meeting)
- Year 2012: Review and classification of active and passive coatings and their characterization

#### **WG B2.45 *Bushfire Characteristics and the Potential Impacts on Overhead Line performance* (H.F.Vosloo, convenor)**

- Compile and agree on the structure of the TB. (October 2011)
- Assign contributors for each section (November 2011)
- Compile each section in preparation for the Paris meeting.
- Review progress at Paris meeting and decide on action

#### **WG B2.46 *Wind induced motion on bundled conductors* (Giorgio Diana, convenor)**

- The aim is to assist overhead line engineers to improve line protection by better being able to predict line behaviour with respect to bundle configuration and wind conditions
- Produce an ELECTRA report by the Paris 2014 meeting, produce a Tutorial to follow in 2014/15

#### **WG B2.47 *Remedial actions for aged fittings and repair of conductors* (Kjell Halsan, convenor)**

Needs of target Group:

- Look at experience with means of improving line reliability by reviewing current practice with repair and remedial action for aged fittings/conductor systems. The aim is to assist overhead line engineers to improve line reliability and restoring integrity.

Activities planned in 2011 (after SCB2 meeting) and for 2012:

- Define work “Remedial actions for aged fittings and repair of conductors”. 2011
- Develop structure of questionnaire with input from utilities and manufacturer. 2011 – 2012
- Distribution of questionnaire: 2012

#### **WG B2.48 *Experience with the mechanical performance of new conductor types* (Brian Wareing, convenor)**

No information at this stage.

**WG B2.49 Safe design tension for conductors fitted with elastomer cushioned suspension clamps (Dave Sunkle, convenor)**

No information at this stage.

**WG B2.50 Safe handling of fittings and conductors (Peter Dulhunty, convenor)**

No information at this stage.

**WG B2.51 Method for Optimised Design of OHL (R.Stephen, convenor) UK Rep Jeremy Crew**

2012 Activities

- To initiate the questionnaire to update the cost of line components
- To draft the sections explaining the interaction between line components
- To draft the sections dealing with means to optimise the overall line design.

**WG B2.52 The use of robotics in assessment and maintenance of OHL (André Leblond, convenor) UK Rep Andrew Pestana**

Review the existing and developing robotic technologies for effective implementation, assessment and maintenance of OHL.

Activities planned in 2011 and for 2012:

- Define work "The Use of Robotics in Assessment and Maintenance of OHL" – 2011
- State-of-the-art review on robotics – 2012
  - Input from the first Conference on Applied Robotics for the Power Industry (CARPI) held in 2010
  - Update of present knowledge

**WGB2.53 Management guidelines for outsourcing OHTL technical expertise (Keith Lindsey, convenor)**

Scope: Management considerations and guidelines for balancing outsourcing and maintaining in-house technical expertise.

2012 Activities planned:

- Establishment of the WG and definition of the proceeding (2012)
- Completion of review and analysis (September 2013)
- Preparation of 1st draft report and recommendations (2013)
- Final report and presentation of results (CIGRE Session 2014)

**WGB2.54 Management of risk associated with severe climatic events and climate change on overhead lines (Henry Hawes, convenor)**

Technical Brochure and Electra Reports - Sept /Oct 2014

Supporting TB to assist in further education - Paris Session 2014

Tutorial presentation to SCB2 Technical Meeting - Paris Session 2014

**Working Group Activities**

### **WG B2.21 *Insulators* (F. Schmuck, convenor)**

F. Schmuck presented the work performed by WG21:

- The report on “Evaluation of advanced tools for composite insulators diagnostics services” is 70% completed for July 2011.
- The second report on “Survey on the experience of composite insulator application” will be finished by the end of 2011.
- Finally the Report for “Guide for assessment of composite insulators after service” will be published by the end of 2011.

### **WG B2.22 *Mechanical security of OHL (anti-cascading structures)* (G. McClure, convenor)**

- Their work plan is: Completion of TB by electronic exchanges in 2011; Nomination of TB reviewers in Iceland;
- TB review completed before the Paris Meeting and document ready in August 2012 for final publication;
- Final publication of TB & Electra report after 08-12; WG B2.22 to be dismantled in summer 2012 (prior to Paris meeting);
- Tutorial planned in 2013 during SCB2 annual meeting;

### **WG B2.23 *Foundation* (N. Cuer, convenor)**

- Continuing work on Dynamic loads on Foundations  
First draft Geotechnical Aspects of OHL Routing circulated for comment
- Activities planned in 2011 (after SCB2 meeting) and for 2012  
To be advised after WG meeting 3 & 4th July 2011

### **WG B2.24 *Qualification of HV and UHV Overhead Line Supports Under Static and Dynamic Loads* (Leon Kempner Jr, convenor)**

The progress report was presented by the convenor. Their action plan is to:

- Have a working group meeting in Canada late 2011.
- Prepare the final draft for Paris meeting for revision.

### **WG B2.25 *State of the art testing self-damping characteristics of stranded conductors for OHL* (U. Cosmai, convenor)**

The report was presented by U. Cosmai. The report is reviewed and is expected to be completed for September 15<sup>th</sup>. All the documents will be sent to N. Bell before October 2011.

### **WG B2.27 *Live Working* (K Lindsey, convenor)**

Mr R Meijers presented the work performed by the JWG B2.27. Final draft will be sent November 2011.

Work plan for 2011:

- Completion of TB;
- Send out to reviewers: E. O'Connor & R. Rendina;
- TB review completed before the Paris Meeting and document ready in December 2011 for final publication;

- Present in Paris 2012

**WG B2.28 *Meteorological data for assessing climatic loads* (Svein M. Fikke, convenor)**

2012 activities planned:

- Spring meeting 2012 in Moscow or Vancouver
- Optional meeting in Oslo (for editing final draft)
- Meeting in Paris August 2012 to complete TB

**WGB2.34 *Line configuration on EMF for HV line* (P.Rodriguez, convenor)**

Progress Report presented by the new convenor. Their action plan is to:

- First draft of TB (end 2011)
- Final draft expected end of 2012.

**WG B2.36 *Real time monitoring system* (R. Stephen, convenor)**

- Publication expected in 2011
- Good collaboration with SC C2...
- Final publication of TB 2011& Electra report in 09-11
- Reviewers appointed
- Tutorial possible

**WG B2.38 *HSIL solutions for increased capacity of OHL* (O. Regis, Convenor)**

Their action plan is:

- Final draft of TB (Spring 2011)
- Questionnaire with WG34

**WG B2.39 *Design guidelines for High Intensity wind storm* (H. Hawes, convenor)**

Their action plan is:

- Overhead design guidelines for mitigation of sever wind storm damage – August/September 2011.
- Electra Report – August/September 2011.
- Supporting TB to assist in further education and training in the application of material – September 2011.
- Tutorial presentation to SCB2 Technical meeting – Paris Session 2012

**WG B2.40 *External clearance* (R. Lake, convenor)**

Main Targets for 2011/2012:

- Finalise questionnaire;
- Get approval and issue questionnaire – mid 2011;
- Target for responses – October 2011;
- Review of responses – April 2012;
- Prepare draft recommendations for revision of standards – July 2012; and,

- Prepare Technical Brochure – August 2012

### **WG B2.41 Guide to the conversion of existing AC lines to DC operation (Jan Lundquist, convenor)**

*Their action plan is:*

- Final publication of TB & Electra article in 2013
- Need for reviewers at end of 2012

### **WG B2.42 High Temperature Operation of Lines (Len Custer, convenor)**

Needs of target group:

- Safely operate lines at their thermal limit.
- Provide more reliable lines.

Final publication of TB & Electra report in 2012

Tutorial planned in 2012 with IEEE

### **WG B2.43 Guide for Thermal Rating Calculations for OHL with high temperatures and real-time weather & load data (Javier Iglesias, convenor)**

*Their action plan is:*

- Final publication of TB & ER in 2013
- Needs of reviewers by end 2012 / beginning 2013
- Tutorial planned by 2014 (to be decided)

### **JWG B2/B3.27 Live Working (K. Lindsey, convenor)**

R Meijers presented the work performed by this work group.

Final draft will be sent in November 2011.

## **Technical Advisory Group Activities**

### **TAG04 Electric performances (D. Douglass, convenor)**

Present WG assoc with TAG 4

- WG B2.38 Evaluation of HSIL Solutions for Increased Natural Capacity of OHTL OSWALDO REGIS (BRA) Draft report complete 12/09 – completion date 12/10
  - WG Activities:
- WG 38 – High SIL line design (completion 2011)
- WG 41 - Ac/dc Conversion of lines incl Tri-pole (2013)
- WG 43 – Thermal Rating Calculations (2012)
- WG 42 – Operation of Conductors >100C (2012)
- WG 51 – Optimal Line Design (2013)

### **TAG05 Towers, foundations and insulators (J. Da Silva, convenor)**

Ongoing projects:

- Towers
  - WG B2.24 - “Qualification of HV and UHV Overhead Line Supports Under Static and Dynamic Loads”- Convenor: Leon Kempner Jr – USA.

- Insulators:
  - WG B2.21: Arc protection and diagnosis for composite string insulators – (Convener: Frank Schmuck – DE ) TAG 04
  - Evaluation of Advanced Tools for Composite Insulator Diagnostics in Service.
  - Preparation of a Guide for the Assessment of Composite Insulators after Service.
- Foundations:
  - WG B2.23: Geotechnical and structural design of the foundations of HV & UHV Lines (Convener: Neil Cuer - UK)
  - Static and Dynamic Loading on Foundations
  - Geotechnical Consequences of the Support Location in      Respect of Foundations Design.
  - Foundation Refurbishment and Upgrading.

### **TAG06 *Mechanical Behaviour of Conductors and Fittings* (W. Troppauer, convenor)**

There are 5 new workgroups associated to this workgroup:

- WG B2.46 – Wind induced motions on bundled conductors
- 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 clamps
- WG B2.50 – Safe handling of fittings and conductors

The AG provides a pool of experts from utilities, TSOs, manufacturers, consultants and university academics to meet and exchange experience, present papers and discuss and review technical trends in the field of the mechanical behaviour of OHTL conductors and fittings.

### **TAG07 *Asset management, Reliability, Availability* (J. Rogier, convenor)**

New work groups:

- WG B2.44 – Coatings for protecting overhead power network equipment in winter conditions
- WG B2.45 – Bushfire characteristics and the potential impacts on OH line performance
- WG B2.51 – Methods for the optimized design of OHTL
- WG B2.52 – The use of robotics in assessment and maintenance of OH lines
- WG B2.53 – Management guidelines for outsourcing OHTL technical expertise
- WG B2.54 – Management of risk associated with severe climatic events and climate change on OH lines

Ranking of CAG items:

1. Improved Bushfire performance of OHL. Effects of veldfires on phase to ground clearances, mitigations (WG B2.45)



2. Use of robotics, new maintenance techniques, multipurpose use (Update of WG13 TB 175) (WG B2.52 & new TOR to be established by Japan/US?)
  3. Survey of costs of OHLs and their components (see xx)
  4. OHLs and environment JWG with C3 (Update of WG14 TB147) (for JWG C3/B2/B1)
  5. Anticipating climate change impacts (WG B2.54)
- x Tutorial on OHL design (for young engineers)(TOR: E. Ghannoum)
- xx Optimization of OHL (WG B2.51)

### **UK B2 Liaison Meeting held at University of Manchester November 2010.**

#### **The following tutorials were given since the last report:-**

##### **□ TAG 05: Tower, foundation and insulator (J. Da Silva, conv.)**

- The Challenges of the New Transmission Lines Systems - Rio de Janeiro, 24 May, 2011, 45 participants.
- The Challenges of the New Transmission Lines Systems -Cochabamba/Bolivia, 6<sup>th</sup> May 2011, 280 participants.

##### **□ TAG06: Mechanical behaviour of conductor and line equipment (W. Troppauer, conv.)**

- Spring meeting – Bangkok, February 2011, 45 participants

##### **□ SCB2: Annual Meeting**

- Reykjavik, Iceland 2011, around 100 persons.
  - Upgrade of OHL (by R. Meijers)
  - Innovation solution for towers (by J.Da Silva)
  - Ice melting methods for OHL (M Farzaneth)
  - Age Fittings (W. Troppaeur)
  - Current trends in design OHL (R.Stephen)
  - Reliability issues (Z.Kieloch)
  - Impact of climate change on OHL (S.Fikke)

#### **Poster Sessions**

K Paplilou mentioned that all SC's will have a poster session for the next Paris meeting in 2012. He also thinks that it is a very good opportunity to give information about SCB2 activities with a pamphlet.

#### **Preferential subjects for 2012.**

Three preferential subjects were approved instead of two that had been submitted and three special reporters were appointed.

- PS1 improved utilisation of OHL
- PS2 Condition and assessment of OHL
- PS3 Maintenance and refurbishment of OHL.



### **WG meeting in Paris**

Chairman requested W.Troppauer to transfer the future TAG06 meeting planned in August 2012 in Lyon to Paris with the other WG's and with all the SCB2 family.

He also insisted that all autumn WG's meetings in the odd years should be in conjunction with the SCB2 annual meeting and not at a separate place.

### **Preferential subjects for 2014**

A discussion concerning the 2014 PS has been initiated:

- Efficiency of OHL (losses, grounding, protection)
- Joint session with B1, cables and B2
- Distribution issues
- Tower design (hybrid tower, top geometry)

### **Next Meetings**

**The main meeting next year has been confirmed in Paris (26<sup>th</sup> – 31<sup>st</sup> August)**

Sunday, August 26<sup>th</sup>, WG Meetings (Welcome Ceremony)

Monday, August 27<sup>th</sup>, WG Meetings and Poster Session

Tuesday, August 28<sup>th</sup>, Technical meeting

Wednesday, August 29<sup>th</sup>, Contribution to Main Session

Thursday, August 30<sup>th</sup>, Main Session

Friday, August 31<sup>st</sup>, Administrative meeting (AM)

2013 - New Zealand conference will incorporate site visit to recently completed OHTL project

2015 - India

Simon H. Neve    October 2011    [simon.neve@bbusl.com](mailto:simon.neve@bbusl.com)

Chairman	Secretary
Konstantin O. Papailiou	Normand BELL

ADVISORY GROUPS		
Ref	Title	Convener
SAG B2	STRATEGIC ADVISORY GROUP	DALLE bernard
CAG B2	CUSTOMER ADVISORY GROUP	O'LUAIN Cathal
P&TAG B2	PUBLICATIONS & TUTORIALS ADVISORY GROUP	BELL Normand
AG B2.07	ASSET MANAGEMENT, RELIABILITY, AVAILABILITY	ROGIER Jan
AG B2.04	ELECTRICAL PERFORMANCE	DOUGLASS Dale
AG B2.05	TOWERS, FOUNDATIONS, INSULATORS	DA SILVA Joao

	Advisory Group	
AG B2.06	MECHANICAL BEHAVIOUR OF CONDUCTORS AND FITTINGS	HEARNSHAW David

Working Groups - Task Forces		
Ref	Title	Convener
ADM_Meeting	SCB2_ADMINISTRATIVE_MEETING	KONSTANTIN PAPAILIOU
WG B2.21	Arc protection and diagnosis for composite string insulators	SCHMUCK Frank
WGB2.22	Mechanical security of overhead lines with effective failure containment measures : design loading cases and strategies for effective anti-cascading supports	McCLURE Ghyslaine
WGB2.23	Geotechnical and structural design of the foundations of HV & UHV Lines, application to the updating to the refurbishment and upgrading guide	CUER Neil
WGB2.24	QUALIFICATION OF HV AND UHV OVERHEAD LINE SUPPORTS UNDER STATIC AND DYNAMIC LOADS	KEMPNER Leon
WGB2.25	Preparatory studies on specifications for revision of IEC testing of Self Damping and conductor fatigue characteristics (new IEC Spec.), for high temperature Fittings (IEC 61284), for tests on spacers (IEC 61854) and on dampers (IEC 61897)	COSMAI Umberto
JWG B2./B3.27	Live line maintenance : a management perspective	LINDSEY Keith
WGB2.28	Meteorological data for assessing climatic loads. Update of IEC TR 61774	FIKKE Svein
WGB2.29	ANTI- AND DE-ICING SYSTEMS FOR OVERHEAD LINES	FARZANEH Masoud
WGB2.31	Modelling of Aeolian Vibration of single conductors	DIANA Giorgio
WGB2.32	Assessing the performance of aged fittings: - Testing, acceptance criteria & recommendations for HV & UHV Lines.	SUNKLE Dave
WGB2.33	Guidelines for cable cart/trolley (cycling) safety on old conductors (earthwires) equipped with aircraft warning markers (and other fittings).	CATCHPOLE Peter
WGB2.34	The Impact of Line Configurations on electric and magnetic fields, radio interference and audible noise for 800 and 1100 kV OHL	GALLEGO Angel
WGB2.36	Guide for Application of Direct real time monitoring systems on Overhead Transmission lines.	STEPHEN Rob
WGB2.38	Evaluation of High Surge Impedance Load solutions for increased natural capacity of OHL	REGIS Oswaldo
WGB2.39	Validation of Design guidelines implemented for High Intensity Wind	HAWKES Henri

WGB2.40	Calculations of the electrical distances between live parts and obstacles for OHL : Preparatory studies for revision of IEC standard (IEC61865 –IEC60826 –EN50341)	LAKE Robert
WGB2.41	Guide to the conversion of existing AC lines to DC operation	LUNQUIST Jan
WGB2.42	Guide to Operation of Conventional Conductor Systems above 100°C	CUSTER Len
WGB2.43	Guide for Thermal Rating Calculations for Overhead Lines with high temperatures and real-time weather & load data	IGLESIAS Javier
WGB2.44	Coatings for protecting overhead power network equipment in winter conditions	FARZENETH Masoud
WGB2.45	Bushfire characteristics and potential impacts on Overhead Line Performance	VOSLOO Hein
WGB2.46	Wind Induced Motion on Bundle Conductors	DIANA Giogio
WGB2.47	Remedial Actions for Aged Fittings & Repair of Conductors	HALSAN Kjell
WGB2.48	Experience with the Mechanical Performance of New Conductor Types	WAREING Brian
WGB2.49	Safe Design Tension for Conductor Fitted with Elastomer Cushioned suspension Units	SUNKLE David
WGB2.50	Safe Handling of Fitting and Conductors	DULHUNTY Peter
WGB2.51	Methods for the Optimised Design of OHL	STEPHEN Robert
WGB2.52	Use of Robotics in Assessment and Maintenance of OHL	LEBLOND Andre
WGB2.53	Management Guidelines for Outsourcing OHL Technical Expertise	LINDSEY Keith
WGB2.54	Management of Risk Associated with Severe Climatic Events and Climate Changes on OHL	HAWES Henry