CIGRE Liaison Report

Agenda — October 22nd, 2012

- Overview of CIGRE 44th Session
- U.S. Representation in CIGRÉ Study Committees
- Details on A2 Study Committee
- Details on B3 Study Committee
- Details on D1 Study Committee

Preferential Subjects Discussed in Paris 2012

PS1 > Modeling and practical experience of the interaction of new generation/transmission technologies and related power electronics with the transmission and distribution systems

PS2 > Advanced tools and techniques for power system performance analysis with particular reference to stochastic methods

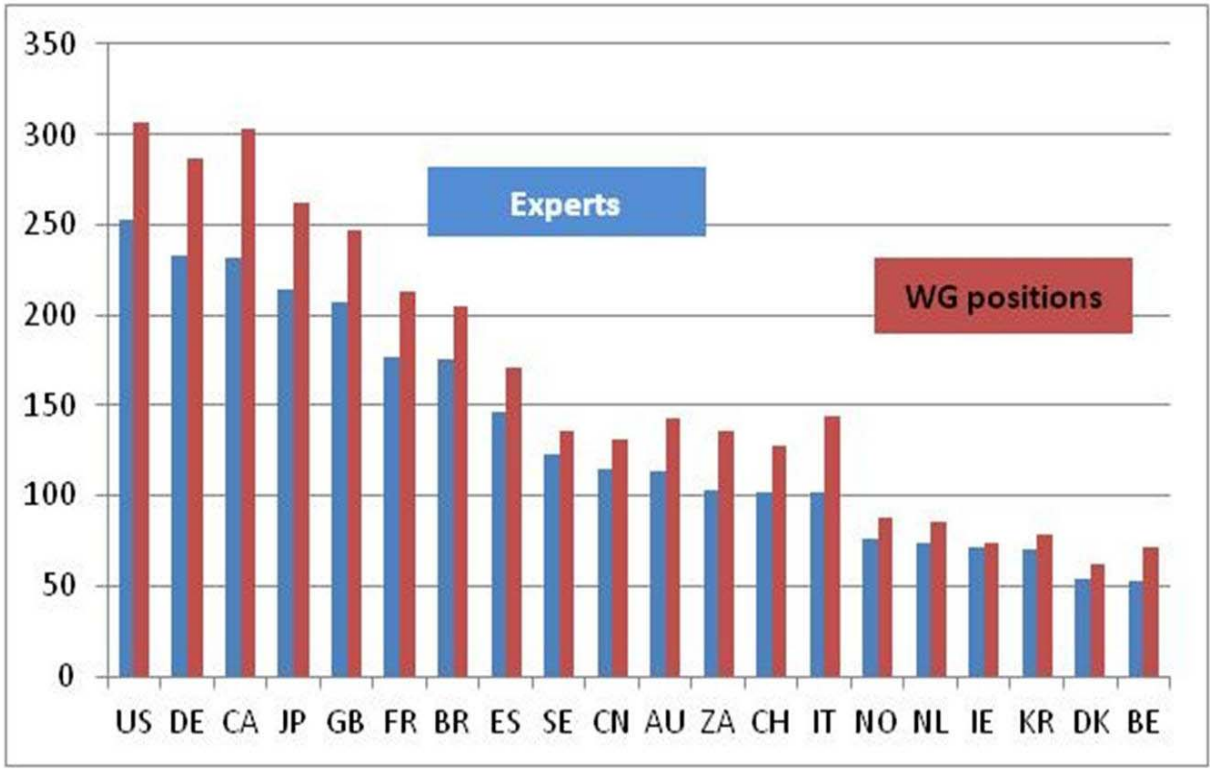
PS3 > Lightning protection and insulation coordination as it relates to new generation and transmission technology

USNC Membership

•	2008	2009	2010	2011	2012*
Individual	380	319	332	394	459
"Collective"	29	27	28	32	32
Collective	(18)	(14)	(14)	(18)	(18)
Sustaining	(5)	(7)	(6)	(6)	(6)
Patron	(6)	(6)	(7)	(8)	(8)
Educational	(1)	(1)	(1)	(0)	(0)

*** 2012 Data as of June, 2012**

Number of experts/positions in the various countries



Info. on USNC Registrants

- August 2012 Paris 44th Session & Technical Exhibition attended by ~ 3200 Delegates
- Sam Mehta received the Distinguished Member Award in July 2012, and completed 8 years as US National Delegate for A2 Study Committee
- USNC Paris Registrants – 143
    - 122 in 2010
    - 117 in 2008
    - 110 in 2006
    - 98 in 2004

U.S. Representatives to CIGRÉ Study Committees & Appointment Dates

- A1-Sam Salem (GE Energy) – 2006
- A2-Raj Ahuja (SPX Transformer Solutions Inc.) – 2012
- A3-Mietek Glinkowski (ABB Inc.) – 2008
- B1-David Lindsay (EPRI) – 2008
- B2-Dale A. Douglass (Power Delivery) – 2006
- B3-John Randolph (PG&E) – 2012

- B4-Hamid Elahi (GE Energy) – 2010
- B5-Mark Adamiak (GE Energy) – 2008
- C1-Richard Wakefield (DNV KEMA) – 2007
- C2-Anjan Bose (Washington State Univ.) – 2006
- C3-John Oglevie (Power Engineers) – 2006
- C4-Ian S. Grant (TVA) – 2006
- C5-Andrew L. Ott (PJM Interconnection) – 2006
- C6-Roger Dugan (EPRI) – 2008
- D1-Andrew Phillips (EPRI) – 2012
- D2-Thomas E. Kropp (Nexant) – 2006

A2 – Raj Ahuja (SPX Transformer Solutions)

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

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, ...)

Chairman: Claude Rajotte (CA) **Secretary: Patrick Picher (CA)**

Present SC A2 Activities

- 24 regular members
- 19 observer members
- 9 WG's and 3 JWG's
- 272 experts from 39 countries
- 5 AG's
- Meeting at Paris was attended by 60 delegates (50 members and 10 guests)

Present SC A2 Working Groups

WG A2-33 -Fire Safety (A. Petersen/AU)

- Avoidance of tank rupture
- Precaution to fire victim
- Precautions to fire origin

Technical Brochure target date Dec12

WG A2-36 Guide for Transformer Procurement (T. Breckenbridge / UK)

- Capability assessment of transformer manufacturers
- Evaluation of technical competence and experience
- Review and update of the existing CIGRE A2 documents on procurement
- Expected completion in 2012

WG A2-37 Transformer Reliability Survey (S. Tenbohlen/DE)

- Review all existing national surveys and study different practices ; identify best practices
- Compile and present the information available in these national survey reports
- Make recommendations to improve the situation
- Final brochure Expected to be ready in 2013

WG A2-38 Transformer Thermal Modeling (J. Lapworth/UK)

- Describe the state of the art techniques in transformer thermal modelling to evaluate winding hottest spot as well as hot spots on other metallic parts
- Examples of application of hottest spot direct measurement and best practices
- Recommendation for improvement of standards
- Interim report for Electra – Dec 2012

JWG A2/C4.39 - Electrical Transient Interaction between transformers and the Power System (A.Rocha/BR)

- Assess and discuss the different types of electrical transient interaction
- Discuss the general increase in transformer dielectric failures in the system
- 1st Draft @ 70% complete

WG A2.40 - Copper sulphide long-term mitigation and risk assessment (J. Lukic/RS)

- Method, tools and diagnostic
- Metal passivator stability and efficiency
- Efficiency of existing on-site oil treatment
- Interim report by Dec. 2012
- Final Report expected in 2014

JWG A2/D1.41 - Oil conductivity under DC condition (A. Küchler/DE)

- Started under recommendation of WG A2/B4.28
- Review techniques and standards for measurement of conductivity of liquids
- Suggestions for new standards

WG A2.42 - Guide on transformer Transportation (A. Mjelve/NO)

- Typical conditions/forces during transport

- Specifications and design review
- Requirements on transportation issues
- Final report Expected by Dec 2013

WG A2.43 Transformer bushings reliability (A. Mikulecky/HR)

- Bushing failure definition
- Failure mechanisms for OIP, RBP, RIP
- Bushings failure rate
- Predicted life time, maintenance, diagnostic
  - First survey will be sent by Dec 2012

WG A2.44 – Transformer Intelligent Condition Monitoring (C. Dupont/BR)

- Conversion of data to relevant information
- Demonstration of benefits
- Hardware/software/data integration
- Draft expected by Mid 2013

WG A2.45: Transformer Failure Investigation and post-mortem Analysis (C. Kuen/AT)

- Important information to collect
- Availability and significance of design data
- Documentation during the dismounting
- Paper sampling: how, where, precautions

JWG A2/D1.46: Field experience with transformer solid insulating ageing markers (R. Mertens/BE)

- Field cases: correlation between chemical markers and DP

- Design information relevant to ageing markers models
- Consideration of operation and maintenance records
- Influence of oil sampling conditions (ex: temperature)

Recent CIGRE BROCHURES

Scope	*Ref*	*Year*
Moisture Equilibrium in Transformer Insulation	349	2008
Copper Sulphide in Transformer Insulation	378	2009
Thermal Performance	393	2009
HVDC Tr. – Test, ageing, reliability in service	406	2010
HVDC Tr. – Guidelines for design review	407	2010
Experience in service with new insulating liquids	436	2010
Guide on Transformer Maintenance	445	2011

Expected in DEC 2012

- **Guide for Preparation of Specifications for Power Transformers**
- **Guide for Conducting Design Reviews for Power Transformers**
- **Guide for Conducting Factory Capability Assessment for Power Transformers**

Future activities

Possible future WG - under discussions

- Shunt Reactor
- Transformer health index
- Spare transformer policy
- Efficient and eco-design transformers
- Experience with utilisation of transformers in FACTs

2012 Grid of the Future Symposium. October 28-30, 2012. Kansas City, MO

http://cigre-usnc.tamu.edu/ngn/grid/

2013 SC A2 Colloquium

Sept. 9th – 13th in Zurich, Switzerland

Joint Colloquium with C4

- Interaction between transformer and the Power System
- Experience with the use of Phase-Shifting transformers
- Network planning in the context of an ageing transformer fleet

B3 – John Randolph (PG&E)

Study Committee B3 Joint plans for 2012:

- Expert Round Table #2: “On-Line Condition Monitoring”, again held jointly with IEEE/PES Substations Committee, on May 21 in Raleigh, USA
- Plans now for Panel Session at IEEE/PES General Meeting in Vancouver, Canada in July 2013: “On-Line Condition Monitoring”, to include other Technical Committees within Power & Energy Society

B3 Activities for 2012

AA1 Concepts and Developments:

- **SC B3.12**: Obtaining value from substation condition monitoring
- **SC B3.13**: Reducing replacement time of high voltage equipment
- **SC B3/C1/C2.14**. Circuit configuration optimization
- **SC B3.26**: Guidelines for the design & construction of AC offshore wind farms

AA2 Gas Insulated Substations:

- **SC B3.25**: SF_6 analysis for AIS,GIS and MTS condition assessment
- **SC JWG B3/B1.27**: Economical aspects of GIL and underground cables
- **SC B3.29**: Field test technology on UHV substation construction and operation
- **SC B3.30**: Guide to optimize the use of SF6 during routine testing of electrical equipment

AA3 Air Insulated Substations:

- **SC B3.21**: Turn key substations
- **SC B3.23**: Guidelines for uprating and upgrading of substations
- **SC B3.31**: Design for severe climate conditions
- **SC B3.32**: Saving through optimized maintenance

AA4 Substation Management:

- **SC B3.06**: Substation management
- **SC B3.10**: Primary/Secondary system interface, modeling for total asset performance
- **SC B3.34** Expected impact of future grid concept

D1 – Andrew Phillips (EPRI)
MATERIALS AND EMERGING TEST TECHNIQUES

Advisory Groups:

- AG D1.01 Liquids and liquid impregnated systems L.Lundgaard
- AG D1.02 High Voltage and High Current testing and diagnostic – M.Muhr
- AG D1.03 Insulating Gases – U.Schichler
- AG D1.04 Solid Materials – S.Gubanski

WG's : Total of 26. 22 D1 Working Groups, plus 4 Joint Working Groups with other SCs

D1 - Working Groups

- WG D1.19 Solid insulation endurance stressed by repetitive transient voltages caused by power electronics J. Holboell
- WG D1.23 Diagnostics and accelerated life endurance testing of polymeric materials for HVDC application G.C. Montanari
- WG D1.25 Application guide for PD detection in GIS using UHF or acoustic methods U. Schichler
- WG D1.27 Material Properties for new and nonceramic insulation J. Seifert
- WG D1.28 Optimized Gas insulated systems by advanced dielectric coatings and functionally graded materials H. Hama
- WG D1.29 Partial discharges in transformers J. Fuhr
- WG D1.30 Oxidation stability of transformer insulating oils I. Hoehlein
- WG D1.31 Dielectric performance of insulating liquids for Transformers L. Lundgaard
- WG D1.34 Condition assessment for oil-impregnated insulation used in ac cables S. herukupalli
- WG D1.35 Performance of high-voltage and high-current measurement systems for high voltage testing Y. Li
- WG D1.36 Special requirements for dielectric testing of UHV equipment U. Riechert
- WG D1.37 Maintenance and evaluation of measuring procedures for conventional and unconventional partial discharge E. Gulski
- WG D1.38 Emerging test techniques common to High Temperature Superconducting power applications M. Noe
- WG D1.39 Methods for diagnostic/failure data collection and analysis P. Morshuis
- WG D1.40 Functional Nanomaterials for Electric Power Industry M. Fréchette
- WG D1.42 Radiation Ageing of Polymeric Insulating Material T. Okamoto
- WG D1.43 Rotating machine insulation voltage endurance under fast repetitive voltage transients A. Cavallini
- WG D1.44 Testing of naturally polluted insulators I. Gutman WG D1.45 Testing of insulator performance under heavy Rain A. Pigini
- WG D1.48 Properties of insulating materials under VLF voltages E. Ildstad
- WG D1.50 Atmospheric and altitude correction factors of air gaps and clean insulators J. Rickmann
- JWG A2/D1.41 HVDC transformer polarity reversal – Oil conductivity A. Küchler
- JWG A2/D1.46 Field experience with transformer solid insulating ageing markers R. Mertens
- JWG D1/A2.47 New frontiers of DGA interpretation for power transformers and their accessories M. Duval
- JWG D1/B1.49 Harmonized test for the measurement of residual inflammable gases in insulating materials by gas chromatography J.P. Mattmann