CIGRE Study Committee B3

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP [1]

WG* N° B3.42	**Name of Convenor :** Jianbin Fan (CN) **E-mail address**: Jianbin-fan@sgcc.com.cn
Technical Issues # [2]: 6, 8, 10	**Strategic Directions # [3]: 2**
The WG applies to distribution networks [4]: Yes	
Title of the Group: Reliability analysis and design guidelines for LV AC/DC Auxiliary Systems	

Scope, deliverables and proposed time schedule of the Group :

Background :

The auxiliary system is a critical element of a substation, converter station, cable tunnel or power plant. It provides the essential LV AC&DC power supplies, for a variety of equipment including, cooling systems, protection & control, monitoring and communications systems. The expansion of power systems around the world coupled with the increasing application of network automation, power electronics and smart grids is resulting in a greater need than ever for reliable and secure LV AC/DC auxiliary systems.

A fault or poorly designed and installed LV AC/DC auxiliary system may have serious implications on overall performance. For example, on March 26, 2009, a DC system grounding fault caused a generator circuit breaker trip in a large hydropower station in China.

There is very little information on the performance or design guidance on this subject which sits at the heart of some of the most critical power solutions across the world.

Scope :

It is proposed to establish a working group to investigate and produce design guidelines on the configuration, operation & maintenance of auxiliary systems for substations, converter stations, cable tunnels and power plant. The main tasks of this WG are as follows:

1. Carry out a survey and review of substation and power plant auxiliary supply systems around the world, to establish best practice and AC/DC design configurations commonly employed.
2. Analyse the reliability & criticality of different AC auxiliary supply solutions (aux transformer, diesel etc) and attempt to establish a suitable reliability performance factor associated with the main asset the auxiliary system is supporting.
3. Examine the impact of different connection modes (grounding modes) of DC systems with reference to previous CIGRE work in TB 124 and 535.
4. Assess the maintenance, testing and diagnosis of substation DC auxiliary systems including charging equipment, battery, miniature special circuit breaker and the system insulation conditions.
5. Examine the development trends of DC & AC integrated uninterruptible power supply equipment and new intelligent technology solutions, taking into consideration, technical and environmental sustainability where applicable.
6. Assess the critical path maintenance, asset health indices and the influence of monitoring on the reliability and security of different auxiliary system solutions.
7. Prepare recommendations regarding the specification, performance and parameters for AC

and DC systems, back-up supply and essential supplies. **Deliverables :** Technical brochure, summary in Electra, Tutorial **Time Schedule** : start : November 2014 **Final report** : 2017
Comments from Chairmen of SCs concerned :
Approval by Technical Committee Chairman : M. Wald **Date** : 10/12/2014

(1) or Joint Working Group (JWG) - (2) See attached table 1 – (3) See attached table 2
(4) Delete as appropriate

Table 1: Technical Issues of the TC project "Network of the Future" (cf. Electra 256 June 2011)

1	Active Distribution Networks resulting in bidirectional flows within distribution level and to the upstream network.
2	The application of advanced metering and resulting massive need for exchange of information.
3	The growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and standardisation.
4	The need for the development and massive installation of energy storage systems, and the impact this can have on the power system development and operation.
5	New concepts for system operation and control to take account of active customer interactions and different generation types.
6	New concepts for protection to respond to the developing grid and different characteristics of generation.
7	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
9	Increase of right of way capacity and use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network.
10	An increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

Table 2: Strategic directions of the TC (cf. Electra 249 April 2010)

1	The electrical power system of the future
2	Making the best use of the existing system
3	Focus on the environment and sustainability
4	Preparation of material readable for non technical audience