CIGRE Study Committee A1

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP (1)

WG* N° A1.38	**Name of Convenor : Zlatanovici Rodica (ROMANIA)** **E-mail address**: **rodicaz@icemenerg.ro**
Technical Issues # (2): 5, 8	**Strategic Directions # (3): 2**
The WG applies to distribution networks (4): No	
Title of the Group: Guide for Generator On-Line Over and Under Excitation Operation Issues	

Scope, deliverables and proposed time schedule of the Group :

Background :

System services are defined as services provided by the electric power producers (in most cases) at the request of the Transmission and System Operator (TSO). They are required to maintain the reliability of the power network and the quality of the delivered energy. Voltage control is such a system service with important consequences regarding the ability of the electric generators to provide it. Generators connected to a grid perform voltage control by producing or absorbing reactive power to and from that grid.
Generator operation in the inductive regime is determined by the limits of the field and stator currents, which in turn are determined by thermal limits. Operation in the capacitive regime is generally determined by the natural static stability curve in P-Q coordinates (commonly with at 10% margin) and by the minimum field current. In addition, operation in this regime is also limited by the supplementary power losses in the stator end zone, specifically in the frontal stator teeth (first sheets pack). This thermal limit can be determined through rather laborious calculations or by experimentation. Generator manufacturers do not usually provide these thermal limits.
The operation limits are illustrated very intuitively by the Walker diagram (active power P vs. reactive power Q). Specialized on line monitoring systems (including some based on PQ diagram) are used to control the generators' operation in regimes with production or absorption of reactive power.

Scope :

1. Development of a guide for on-line operation of electric generators in inductive and capacitive regimes.

2. WG will examine whether the generators' manufacturers provide the limits for generator operation in capacitive mode, whether the limitation criterion is indicated (thermal conditions in the end zone, or internal angle, or stability limit, or other criteria), and whether they provide the PQ diagrams. It also will examine whether the manufacturers guarantee the thermal limits in capacitive regime.

3. WG will examine whether the power companies use the generators for voltage control in the grid. If yes, what criteria are used for setting safe operating zone boundaries when generating or absorbing reactive power, and whether these criteria are specified in the grid code.

4. WG will examine the types of monitoring systems used in extreme capacitive and inductive regimes.

5. WG will review whether operation in such regimes caused any damage to the generators (accidents, defects, premature wear).

Deliverables : Report to be published in Electra or technical brochure with summary in Electra

Time Schedule: **Start:** August, 2012 **Final report:** October 2016

- Presentation of the WG and its targets: 27 August 2012, Paris
- Draft Questionnaire: December 2012
- Issue Draft Questionnaire for comments 15 January 2013
- Discussion and approval of the Questionnaire: at SC-A1 meeting, September 2013 in Bucharest
- Distribute the Questionnaire : 31 October 2013
- Responses due: 31 January 2014
- Approval of Draft report on Questionnaire & recommendations: August 2014, Paris
- Draft report / guide: December 2014
- Issue Draft report / guide for comments: 15 January 2015
- Approval of Draft report / guide: SC A1 Meeting, September 2015
- Final report / guide: January 2016
- Approval of final document: SC-A1 meeting in Paris, August 2016

Final document to be published: 30 October 2016

Comments from Chairmen of SCs concerned :

Approval by Technical Committee Chairman : Klaus Fröhlich
Date :12/08/2012

(1) 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