



CIGRE Study Committee B4

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG B4.67	Name of Convenor : Dr Nigel Shore, UK E-mail address: nigel.shore@se.abb.com
Technical Issues # : 3	Strategic Directions # : 1
The WG applies to distribution networks : No	
Title of the Group: Harmonic aspects of VSC HVDC, and appropriate harmonic limits	
<p>Background :</p> <p>The rapid proliferation, increasing size and technical advances of VSC HVDC in recent years has revolutionized the industry. In the sphere of harmonics and filtering, the impact has been highly significant, with the harmonic footprint of these converters being much less than equivalent LCC schemes, but also radically different in terms of frequency ranges of interest, and the significant deliberate generation of inter-harmonics.</p> <p>The existing national and international regulations and recommendations governing harmonics were originally formulated considering the types of converters and associated harmonics then prevalent. In many senses they are proving inadequate to deal with the new technology and its consequences. Individual regulatory bodies are hastening to catch up, but sometimes lack a firm basis of appropriate technical knowledge.</p> <p>Furthermore, the implications of VSC transmission for harmonic generation are not widely enough understood – in terms of range, magnitude and the necessity or otherwise of having dedicated filters. The modelling of a VSC converter as a harmonic voltage source is also not fully appreciated in its implications for regulatory methodologies. The implications of the generation of non-integer harmonics by the latest generations of converters also has profound implications.</p> <p>A further topic is the effect of VSC installations on pre-existing (background) harmonics. Some designs of VSC converter now produce a quasi-sinusoidal waveform so clean that in some cases harmonic filters may not be required to mitigate the harmonics generated by the converter. However, the converter will still have a harmonic impedance as seen from the network, and it is important to be able to assess this harmonic impedance and calculate its impact in terms of possible amplification (or damping) of the pre-existing network harmonics.</p> <p>It is therefore an appropriate task for CIGRÉ SC B4 to assess this area and provide expert technical advice which can be referred to where necessary.</p> <p>Scope :</p> <ol style="list-style-type: none"> 1. Assess the state-of-the art of VSC technology in relation to harmonics, and predicted future developments. 2. Assess the nature and magnitude of present-generation and predicted VSC converters as harmonic sources, and how they should be characterised and modelled – as voltage or current sources, or otherwise. 3. Assess the harmonic impedance of VSC converters and the consequent impact on pre-existing (background) harmonics emanating from the supply network. 4. Consider how VSC harmonics are assessed under current IEC and national 	

regulations, and identify areas where this is considered unsatisfactory.

5. Consider areas where fundamental research may be needed, or other bodies consulted, for example when considering interharmonics.
6. Produce a Technical Brochure which will be a reference source on the subject and will also contain recommendations for use by those charged with modifying existing standards to adapt to the advent of VSC HVDC.

Deliverables :

Technical Brochure with summary in Electra

Time Schedule : start October 2014

Final report : 2016

Comments from Chairmen of SCs concerned :

Approval by Technical Committee Chairman :

Date : 21/07/2014

A handwritten signature in black ink, appearing to read "M. Wald", is written over the approval line.