



Friends of the Supergrid - FOSG Comments on ENTSO-E Draft Network Code on High Voltage Direct Current Connections and DC-connected Power Park Modules

7 January 2014

Friends of the Supergrid (FOSG) appreciate the possibility to take an active part in the Network Code HVDC (NC-HVDC) user group. We have summarized some comments from FOSG following the meeting on December 4 regarding the present open consultation and draft dated November 7, 2013. We are available for further clarification or input on these items if required.

General Grid related questions and comments

- ▶ Some functions requested in the present draft NC HVDC can be provided inherently by a typical VSC HVDC system. Examples are the requirements to provide reactive power or short circuit currents. However, considering the requirements of a specific application, Line Commutated Converter (LCC) based HVDC systems may be economically attractive. However since this technology does not provide functions such as reactive power compensation it would not comply with the NC HVDC. With respect to the "principle of optimisation between the highest overall efficiency and lowest total cost for all involved parties" as described in Article 4.2, it is recommended for the NC HVDC to allow selecting the most economical solution for a given task.
- ▶ The close link of Power Park Modules (PPM) and HVDC in "DC connected PPM" should be reconsidered. Not all of the islanded systems (onshore or offshore) may be dedicated nodes for future system expansion, where NC requirements would be relevant. Therefore, it is recommended to define the interface requirements of all "significant grid users" (including PPM) at their connection point to a "*relevant transmission system*". A transmission system would be relevant, if its performance has a cross border impact. The requirements of chapter 3 may be applied to nodes of the *relevant transmission system*, not synchronously connected with any synchronous zone today (but may be in the future). The planning for the *relevant transmission system* should be carried out by the relevant TSO respecting the provisions of Article 4(3).
- ▶ The consequences of separating PPM from the transmission system, by applying the NC HVDC to the *relevant transmission system* would have the following benefits:
 1. The transmission system planning would be formally decoupled from the individual relevant grid users. The individual relevant grid users might be PPM, Oil and Gas, Energy Storages or others. They should have the choice to connect to an offshore node of a relevant transmission system (provided by a TSO) or to connect to a node of the onshore transmission system. NC HVDC requirements would apply to the Point of Common Coupling (PCC) to the relevant transmission system only, no matter where the PCC is located.

2. It would no longer be relevant, whether a PPM was connected to the relevant transmission system directly, via a HVDC link or via a HVDC link in parallel with an AC connection. The connecting power export system could be considered part of the PPM, with the conditions and operating requirements inside the PPM (and export system) being entirely left open for the owner of the system.
 3. The technology behind the Point of Common Coupling (PCC) between the relevant grid user and the relevant transmission system would leave the door open for the development of new and probably more economic technologies, such as flexible voltage and/or frequency based systems.
- The present draft NC HVDC addresses the requirements for HVDC systems concerning their connection with AC systems. It can be expected, that future developments towards multi-terminal systems and HVDC Grid Systems, e.g. the *Supergrid*, will require the behaviour of a HVDC substation to be defined concerning its connection with DC systems as well. It is recommended describing the scope of the present NC HVDC accordingly. Future adoptions of the NC HVDC may include descriptions related to the DC connection as well.

Comments with reference to articles

The members of Friends of the Supergrid have summarized comments on a more detailed level in the table below. Please consider these comments as remarks where clarifications may be needed.

Reference	Subject	Comment
General	Definition	It is recommended to provide a good definition or example on “the consent of the HVDC System Owner shall not be unreasonably withheld”
Article 39	Frequency stability requirements	It is not clear why the “Time periods for operation” presented in table 8 are not compatible with those of table 1 , Article 7.
Article 39	Reference to RfG	The present draft NC HVDC makes reference to the NC RfG. It is recommended replacing these references by specific requirements for HVDC systems.
Article 49	Simulation models	This article put most demand on the HVDC Owner to supply good simulation models. For a good system design the TSO would need to deliver good models as well