



WORKSHOP: Horizon 2050 power system and the role of HVDC technologies in a highly decentralised RES generation

Venue: Directorate General for Energy – 24, Rue De Mot, 1040 Brussels

Date: Tuesday, February 4th, 2020 08.30 ÷ 17.30

The energy transition affects the design and operation of the overall electricity network, from generation to transportation, distribution and consumption. With the increasing penetration of renewables, the configuration of the electricity network is changing, shifting from the traditional centralised to a decentralised system, as well as transporting electricity over longer distances from production to consumption. The grid is becoming more and more complex. This is a challenge but can also be taken as an opportunity to evaluate the use of new technologies and systems supporting the energy transition.

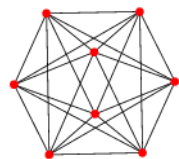
Direct Current (DC)-based systems integrated in the Alternating Current (AC) grid may provide a flexible, secure and reliable way forward, but need to be further investigated. In the EU, point to point High Voltage Direct Current (HVDC) connections have been integrated into an overall AC system across the seas and in a number of limited examples also on land in the past decades. This has been helped by the development of new technologies such as the Voltage Source Converter High Voltage Direct Current (VSC-HVDC) that allows very important functionalities for managing the grid (active and reactive power control, black start capability, etc.). The (offshore) grid that is needed to integrate increasing shares of wind energy from further offshore into the European energy system will lead to a more complex interconnected or meshed DC systems, but this requires further development of high-voltage converter technologies, in particular Multi-Terminal VSC-HVDC (MT VSC-HVDC).

The aim of the workshop is to discuss solutions addressing this epochal change in the electrical network:

- Take stock of the actual development and the potentialities of applying further DC technologies in the actual electricity grid;
- Find the means to make the DC as easy as AC;
- Get insights for potential application of little or unexplored technologies in HVDC;
- Analyse and identify the barriers (technical, regulatory, standardisation) for further development;
- Collect input/recommendations for further actions.

This workshop builds on the DC – AC/DC hybrid grid workshop¹ of 17.05.2018, where it was concluded that addressing separately and systematically the different voltage levels in more detail was necessary, starting with this workshop on High Voltage.

¹ See for further information: https://ec.europa.eu/energy/sites/ener/files/documents/180830_ac-dc-hybrid_grids_rt_outcome_for_publication.pdf



Horizon 2050 power system: role of HVDC technologies in a highly decentralised RES generation
DG ENERGY, Tuesday, February 4th, 2020

No.	Time	Description	Speaker
1	08.30 ÷ 09.00	Registration	
Part I - Overview of AC & DC technologies and the EU grid: state of play			
2	09.00 ÷ 09.30	Welcome and introduction	Klaus-Dieter Borchardt, Directorate-General for Energy, Deputy Director General
3	09.30 ÷ 10.00	HVDC converter interoperability <ul style="list-style-type: none"> Interoperability work stream - Update on standardisation for HVDC converters Open-source software for HVDC control and protection – enabling interoperability and reducing technical risks 	<ul style="list-style-type: none"> Wilhelm Winter, ENTSO-E convenor RDIC Working Group “Secure operations of tomorrow” Staffan Norrga, SCiBreak
4	10.00 ÷ 11.00	HVDC developments and use cases – perspective of RDI projects <ul style="list-style-type: none"> PE-interface to AC grid : grid forming control for a more resilient transmission grid, and a flexible DC connection of grid customer Promotion project: meshed offshore grid Options for system design – technology, control & protection The EU ERC funded project “Modelling DC” 	<ul style="list-style-type: none"> Xavier Florent, RTE Plet Cornelis, DNVGL Athanasios Krontiris, ABB Dragan Jovicic, University of Aberdeen <p><i>Moderation: Andreas Zucker, DG ENER</i></p>
5	11.00 ÷ 11.15	Coffee break	



6	11.15 ÷ 12.45	HVDC developments – perspective / implementation projects EEPR CEF PCI <ul style="list-style-type: none">• Celtic project• COBRACable project• Kriegers Flak• The Doggerbank system• Medgrid• Sahara Wind	<ul style="list-style-type: none">• Alain Davriu, RTE• Alex Alefragis, Tennet• Ole Stig Nissen, Energinet• Kamran Sharifabadi, Equinor• Philippe ADAM, CIGRE Secretary General• Khalid Benhamou, Managing Director <p><i>Moderation: Elaine O’Connell, DG ENER</i></p>
7	12.45 ÷ 13.45	Lunch	
Panel session I - European perspective: making DC as easy as AC			
8	13.45 ÷ 14.45	<ul style="list-style-type: none">• Future developments in the transmission grids – Technical challenges and needs and the role of converters and HVDC systems• Integration of HVDC systems in AC and DC grids• Interoperability for enhanced DC grid solutions• Interaction studies and compliance testing for assuring grid stability and security of supply• Optimised interfaces and processes: a must for system scale and complexity	<ul style="list-style-type: none">• Cora Petino, Tennet• Dirk Van Hertem, KU Leuven• Stig Olav Settemsdal, Siemens AS• Jochen Kreusel, T&D Europe Vice-President <p><i>Moderation: Laurent Schmitt, Secretary-General ENTSO-e</i></p>
Part II - New DC systems and technologies			
9	14.45 ÷ 16.00	<ul style="list-style-type: none">• HVDC / MVDC: roles and links• Superconductors for Bulk Power Transfer• Eco-efficient switch gears• Power Electronics in HVDC• The key role of HVDC in future AC/DC systems	<ul style="list-style-type: none">• Rik De Doncker, RWTH Aachen• Eoin Hodge, Supernode• Navid Mahdizadeh, ABB• Nadine Chapalain, Mitsubishi Electric R&D Centre Europe• Bruno Luscan, SuperGrid Institute



			<i>Moderation: Mario Dionisio DG ENER</i>
5	16.00 ÷ 16.15	Coffee break	
Panel session II - AC/DC Hybrid grid: developments, barriers and way forward			
10	16.15 ÷ 17.15	<ul style="list-style-type: none"> • European and Global perspective for AC-DC developments • The potential of modularity of DC systems: addressing constraints in the onshore grids with HVDC • Barriers (technical, regulatory, standardisation) • Role/maturity/applicability/scalability of new DC Technologies/devices in the grid • Horizon Europe and CEF 	<p>Panellists:</p> <ul style="list-style-type: none"> • Frank Schettler, convenor of the CENELEC/TC 8X/WG 06 “System Aspects for HVDC Grids” • Aidan Cronin, Siemens Gamesa • Ceciel Nieuwenhout, Groningen Centre of Energy Law • Bo Nilsson, NKT High Voltage Cables <p><i>Moderation: EC</i></p>
11	17.15 ÷ 17:30	Conclusions and next steps	Mark Van Stiphout, Deputy Head of Unit C2 - Directorate General for Energy