

Expert Group: Identification of Connection Requirements for Offshore Grids

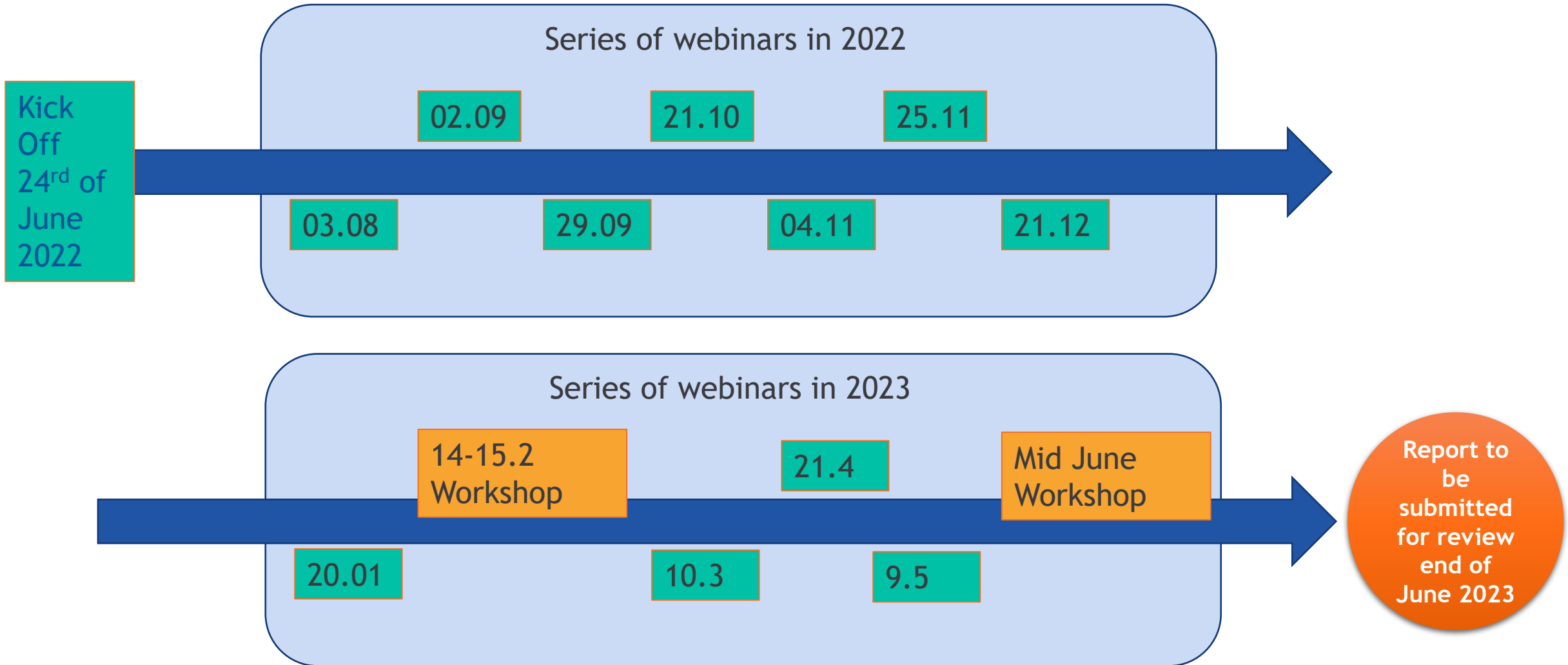
- A status report of ongoing EG CROS progress in Phase II

15.03.2023

EG CROS chaired by ENTSO-E, under the Grid Connection European Stakeholders Committee

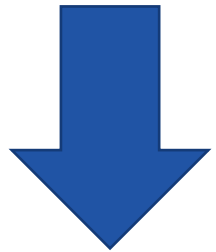
Presented by: Mario Ndreko (TenneT TSO GmbH), Adrian Gonzalez (ENTSO-E Secretariat)

Timeline of the EG CROS Phase II



New members nominated from T&D Europe and Hydrogen Europe

- T&D Europe has nominated HVDC experts from Siemens Energy, Hitachi Energy and GE
- Hydrogen Europe has nominated experts from electrolysis industry

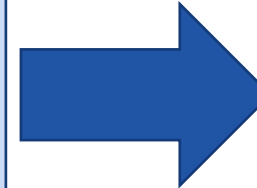


HVDC and Hydrogen electrolysis manufacturers are actively supporting the EG CROS work

Summary of all amendment proposals that EG CROS will provide legal text

Amendments

Amendment: Article 3 (scope)
Amendment: Article 12 (RoCoF withstand capability)
Amendment: Article 14 (Grid forming capability)
Amendment Article 19: (short circuit contribution during faults)
Amendment: Title III
Amendment: Article 38 (scope)
Amendment: Article 39 (Frequency stability requirements)
Amendment: Article 40 (Reactive power and voltage requirements)
Amendment: Article 41 (Control requirements)
Amendment: Article 42 (Network characteristics)
Amendment: Article 43 (Protection requirements)
Amendment: Article 44 (power quality)
Amendment: Article 45 (General system management requirements applicable to HVDC interface p...)
Amendment: NEW Article X (Grid forming capability)
Amendment: Article 37 (black start)
Amendment: Article 44 (power quality)
Amendment: Article 47 (Frequency stability requirements for remote-end HVDC converter station)
Amendment: Article 48 (voltage ranges, remote end HVDC station)
Amendment: Article 50 (power Quality)



- For all the amendment proposed a legal text proposal will be provided to ACER with the final report.
- EG CROS has already a first version of this legal text currently in discussion.
- EG CROS members welcome the active participation of ACER in the group

New definitions for NC HVDC (1/2)

- **‘HVDC interface point connected power park module’** means a power park module that is connected via one or more HVDC interface points to one or more HVDC systems;
- **‘HVDC interface point connected demand facility’** means a demand facility that is connected via one or more HVDC interface points to one or more HVDC systems;
- **‘HVDC interface point connected power-to-gas demand facility’** means a demand facility which consumes electrical energy to produce hydrogen or other gasses and is connected via one or more HVDC interface points to one or more HVDC systems;
- **‘HVDC interface point connected electricity storage module’** is an electricity storage module that is connected via one or more HVDC interface points to one or more HVDC systems;
- **‘Remote-end HVDC converter station’** is an HVDC converter station which is not connected to any synchronous area and it is capable to energise an isolated offshore network by forming the AC voltage and the frequency.

Amendment proposal for NC HVDC: Article 3

1. The requirements of this Regulation shall apply at the AC side of: ~~to~~:

(a) HVDC systems connecting synchronous areas or control areas, including back-to-back schemes;

(b) HVDC systems connecting power park modules, demand facilities, power to gas demand facility and electricity storage modules to a transmission network or a distribution network, pursuant to paragraph 2;

(c) embedded HVDC systems within one control area and connected to the transmission network; and

(d) embedded HVDC systems within one control area and connected to the distribution network when a cross-border impact is demonstrated by the relevant transmission system operator (TSO).

e) HVDC systems connecting two HVDC interface points which does not belong to any synchronous area.

The relevant TSO shall consider the long-term development of the network in this assessment.

Amendment proposal for NC HVDC: Article 12 (RoCoF withstand capability)

With regard to the rate-of-change-of-frequency withstand capability:

(i) an HVDC system shall be capable of staying connected to the network and operate at rates-of-change-of-frequency up to the following values:

- $\pm 4,0$ Hz/s over a period of 0,25 s
- $\pm 2,5$ Hz/s over a period of 0,5 s
- $\pm 1,5$ Hz/s over a period of 1 s
- $\pm 1,25$ Hz/s over a period of 2 s

Today in the regulation: An HVDC system shall be capable of staying connected to the network and operable if the network frequency changes at a rate **between $- 2,5$ and $+ 2,5$ Hz/s (measured at any point in time as an average of the rate of change of frequency for the previous 1 s).**

Amendment proposal for NC HVDC: Article 14 (Grid Forming)

- The expert group has discussed the proposal of ENTSO-E submitted to RfG for PPMs and from that has developed a legal text proposal that will update the article 14
- The grid forming capability is mandatory and within the power, current, voltage and energy rating of the HVDC system.
- The capability is specified at the connection point and it refers only to the AC voltage source behaviour behind and impedance (without inertia constant).

Amendment proposal for NC HVDC: Title II

- The title III of NC HVDC may be amended as:

”Requirements for HVDC interface point connected power park modules, HVDC interface point connected power-to-gas demand facility, HVDC interface point connected electricity storage module and remote-end HVDC converter stations stations”.

Work plan for 2023 and towards NC HVDC amendments

