2nd NC HVDC User Group meeting

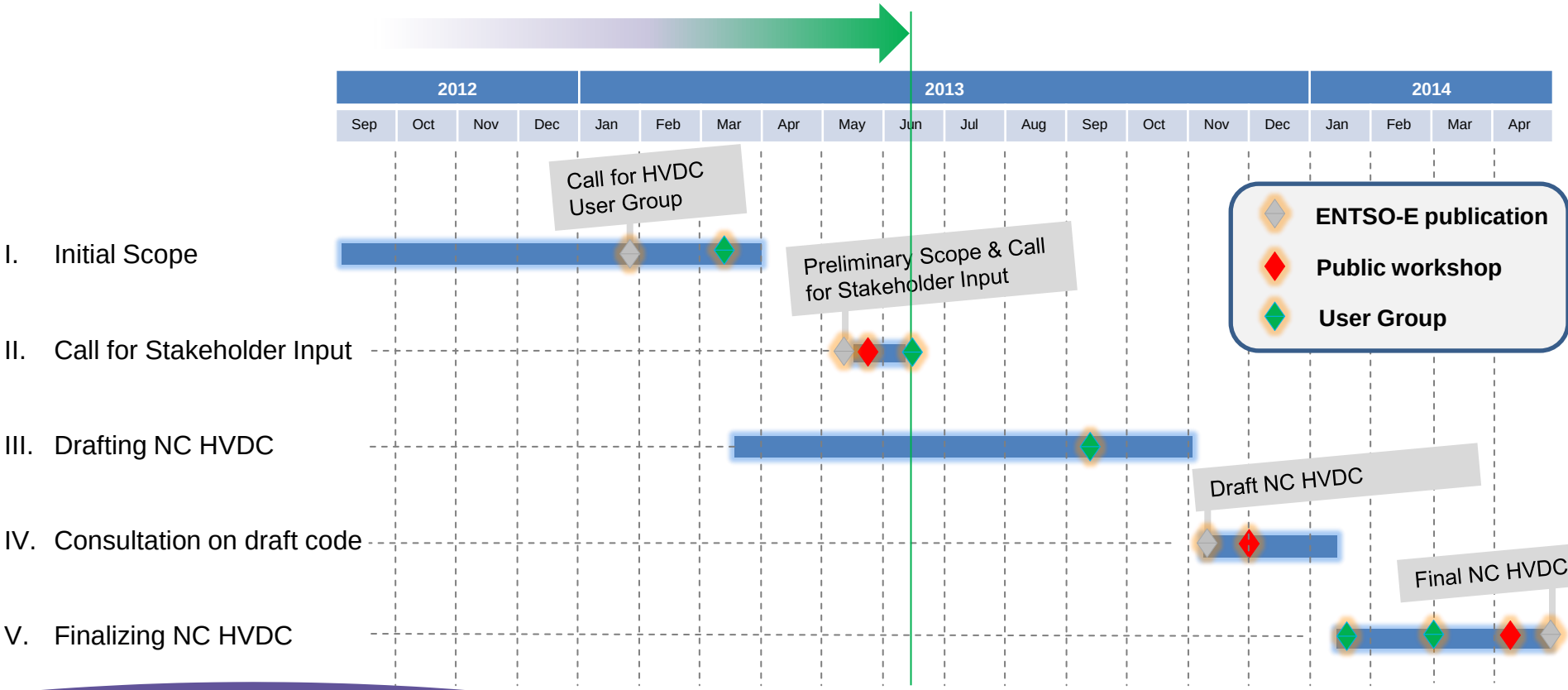
11 June 2013
Brussels

entsoe

Reliable Sustainable Connected

The "NC HVDC - Call for Stakeholder Input"…

…and next steps.

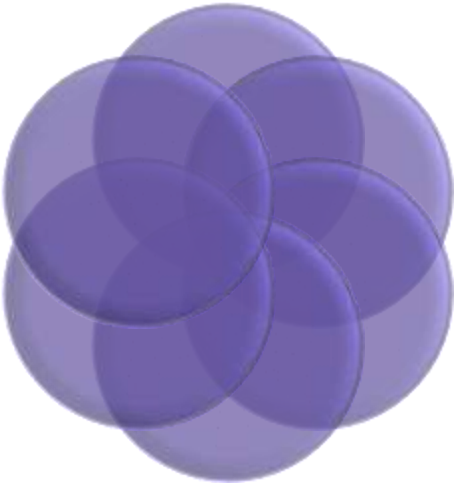


NC HVDC User Group

European & national associations

Consumers

Project developers & consultancy



DC link owners & operators

Wind sector

Manufacturers

NC HVDC – Call for Stakeholder Input

Feedback received

- 15 responses: *ABB, CENELEC TC8X WG06, EDF, EDF Energy, EWEA, Friends of the Supergrid, GdF SUEZ, Iberdrola, KULeuven, PIVEX, swisselectric, TU Ilmenau, Universidad Politécnica de Madrid , VGB, ViK*
- Valuable balance of both key messages and detailed suggestions
- Little quantitative feedback on cost implications

Today

- All feedback available on the ENTSO-E webpage
- Open discussion among all impacted stakeholders→ clarify all views → focus on key directions → basis for final scope and argumentation of the NC HVDC

Next

- Draft code for discussion in 3rd User Group meeting (September)
- Assessment of all feedback is essential part of the NC supporting material

Agenda proposal

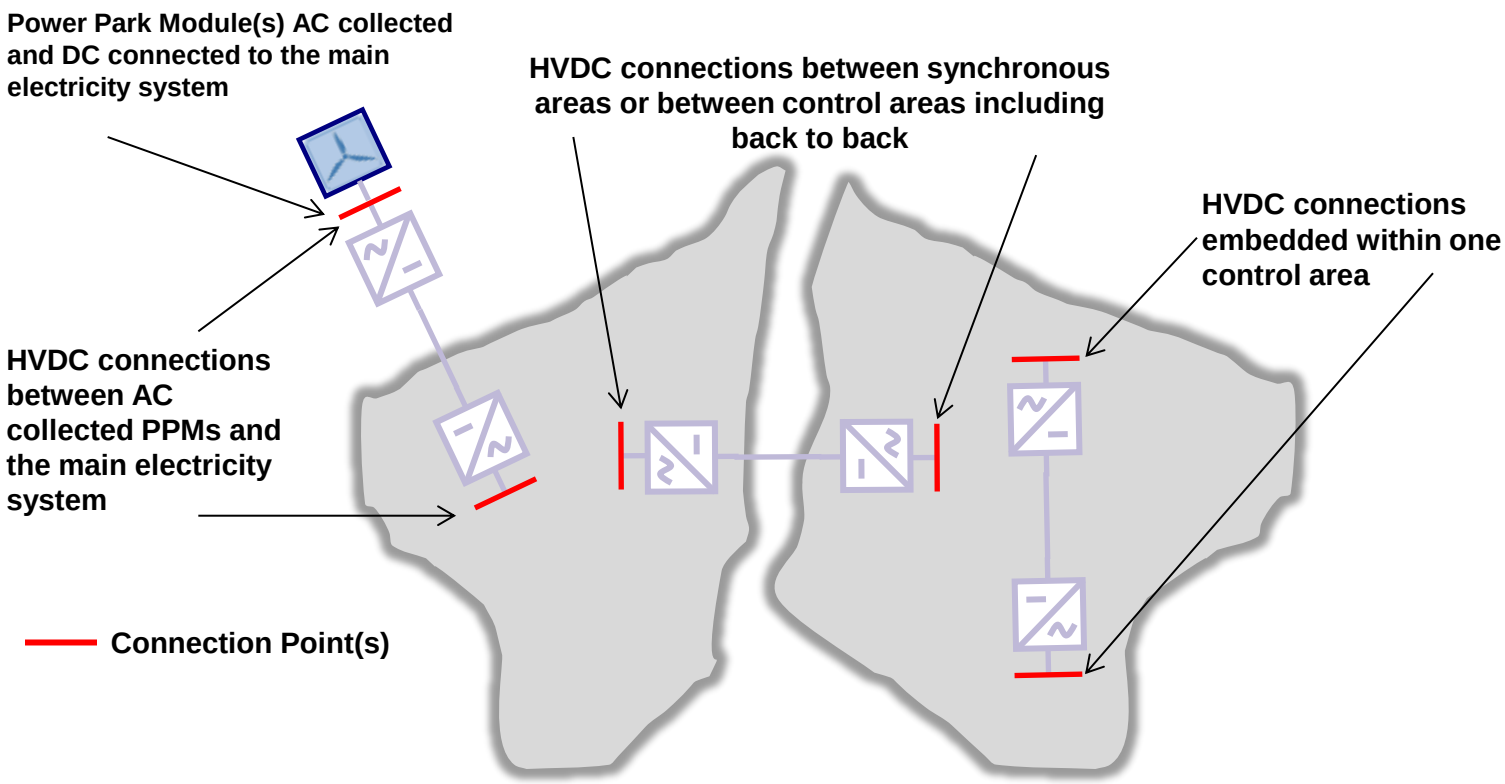
- Welcome & round-up Call for Stakeholder Input
- General views prepared: swisselectric, Vestas, EWEA
- General questions on the NC HVDC

(break)

- Requirements of the NC HVDC
- DC Connected Power Park Modules
- Alignment and interactions with other NCs
- Next steps

General questions on the NC HVDC

Relation to requirements of NC RfG / DCC	Fully aligned, adapted, or new approach?
Classification of significant grid users & application at connection points	Is this the best possible basic structure?
Sustainability of requirements	What should be in scope now and what not (yet)? What are the consequences?
Technology neutral	Probably the ideal approach, but which requirements deserve the most careful attention?
Multi-vendor flexibility	What level of openness is required? How to deal with data/models exchange?
Network Codes and ongoing standardization	Status?


Power Park Module(s) AC collected and DC connected to the main electricity system
HVDC connections between synchronous areas or between control areas including back to back
HVDC connections embedded within one control area
HVDC connections between AC collected PPMs and the main electricity system
Connection Point(s)

Active Power Control and Frequency Support

Frequency ranges	• Wider ranges / time periods for network than for connecting demand/generation, e.g. 45-55Hz? • Cost implication on components?
Rate of change of frequency withstand capability	• Go beyond what smaller systems experience today (1Hz/s)? • Cost implication on components?
Active power controllability; control range and ramp rates	• Technical limits?
Frequency sensitivity and frequency control requirements	• Mandatory? • Prepare for future LFCR measures? • Equivalent to NC RfG?
Synthetic inertia capability	• From zone A to B? • Stored capacitive energy in DC link?
Maximum loss of active power	• Limit the loss of power of an HVDC system to avoid costs in operational reserves? • Linked to LFCR dimensioning incident?

Reactive Power Control and Voltage Support

- ✓ Voltage ranges
- ✓ Short circuit contribution during faults
- ✓ Reactive power capability / Reactive power exchange
- ✓ Reactive power control mode
- ✓ Priority to active or reactive power contribution
- ✓ Power quality
- ✓ …?

  - ➢ Explicit ranges, at least those for demand/generation in DCC/RfG?
  - ➢ Consequences on equipment for wider ranges?
  - ➢ Can LCC ‘compete’ with VSC?

- ***Fault-Ride-Through***
  - Technical challenges?
  - Experience on restoration/recovery time of HVDC links?
  - Linked to nearby wind turbines or other converters?
  - DC faults: Fault clearance times? Recovery time? Limits on auto-reclosure? Dependent on HVDC technology?

- ***Control***
  - Avoid averse impact on other grid users (torsional stress, power oscillation damping) – cost impact of different control functionalities?
  - Interaction between power electronic controllers – experience? mitigation measures?
  - Conflicts with different manufacturers?
  - Robust control of multi-terminal schemes

- ***Protection Devices and Settings***

- ***Power System Restoration***

Requirements for DC Connected Power Park Modules

Approach for requirements

- on HVDC system at both connection points
- on PPM at AC ‘remote’ connection point
- focus on AC system needs
- fit for purpose towards 2030 challenges

Align with NC RfG requirements?

- Flexibility to set best cost/benefit balance according to local system characteristics is key principle of NC RfG
- Balance between
  - *Main system need with single link and single PPM: optimize requirements*
  - *Possible future (AC) expansions: need to align with RfG as much as possible*
- Which requirements need to be adapted/balanced? Why?

How to ensure frequency support at the onshore connection point?

Other requirements

- Any other general requirements? E.g.
  - Harmonics compensation
  - Negative phase sequence ‘sink’
  - Fault current adaption based on system operating conditions
- NC HVDC is the ninth code being developed - Which link with any other NC did we not cover yet?
- Compliance provisions – align with RfG/DCC?
- Derogation procedure – align with RfG/DCC?
- Application to existing users – align with RfG/DCC?

Next

- Based on the scope & today's discussion:
  - What are your **3 key suggestions** for the further development of this code?

- 3rd NC HVDC User Group meeting on **12 September 2013** (full day)
  - Focus on draft network code
  - Building on preliminary scope and general feedback received
  - Step towards a formal consultation, starting early November
  - Your expectations?