

Paris Session 2022



Aspects to be considered for deployment of multi-terminal multi-purpose HVDC systems

SC C1 Power System Development and Economics

PS2 Energy sector integration and tackling the complexity of multi-faceted network projects

Question 2.2.1: Planning HVDC transmission systems embedded into an AC interconnected network leads to a variety of challenges. Which design and technology aspects must be considered for embedded point-to-point and multi-terminal HVDC transmission systems?

Lorenzo Zeni, Ørsted, Denmark



© CIGRE 2022

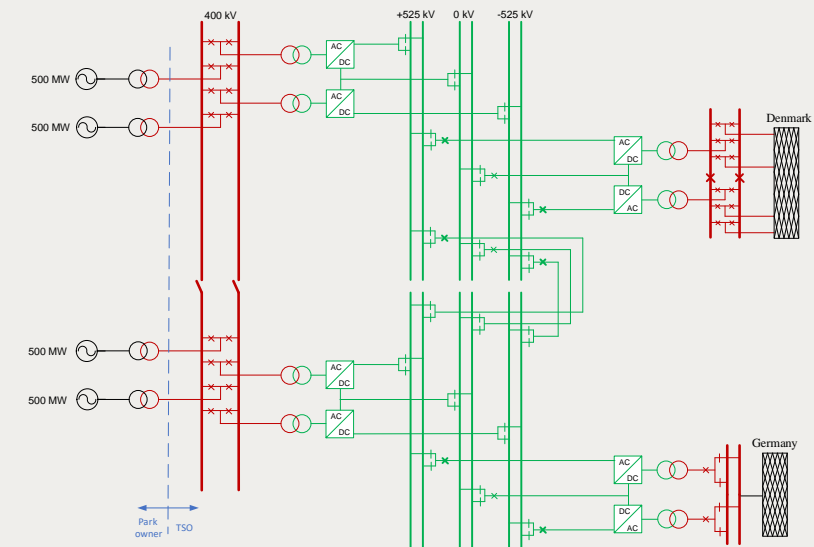
Group Discussion Meeting

1

© CIGRE 2021

Aspect 1 – De-risking deployment of less mature technical solutions

- Technical solutions needed for optimal multi-terminal multi-purpose (power transmission + offshore generation) may not be fully mature yet:
 - Interoperability of HVDC converters on AC and DC side
 - DC breakers (or equivalent fault clearing equipment)
- High level of risk if selecting one solution and implementing it directly on a multi-GW project
- A flexible and modularized deployment may entail larger overall initial investment but would reduce risk significantly:
 - Staged deployment of “modular” blocks allows slicing up investment
 - Use of both AC and DC hub concepts allows incremental deployment of less mature solutions (e.g. DC breakers)
- On the other hand staged deployment means that the addition of each new module over time has to be verified by tests and analysis for the possible combinations of existing modules, which has to be managed both practically and commercially/contractually between TSOs, owners and OEMs involved.

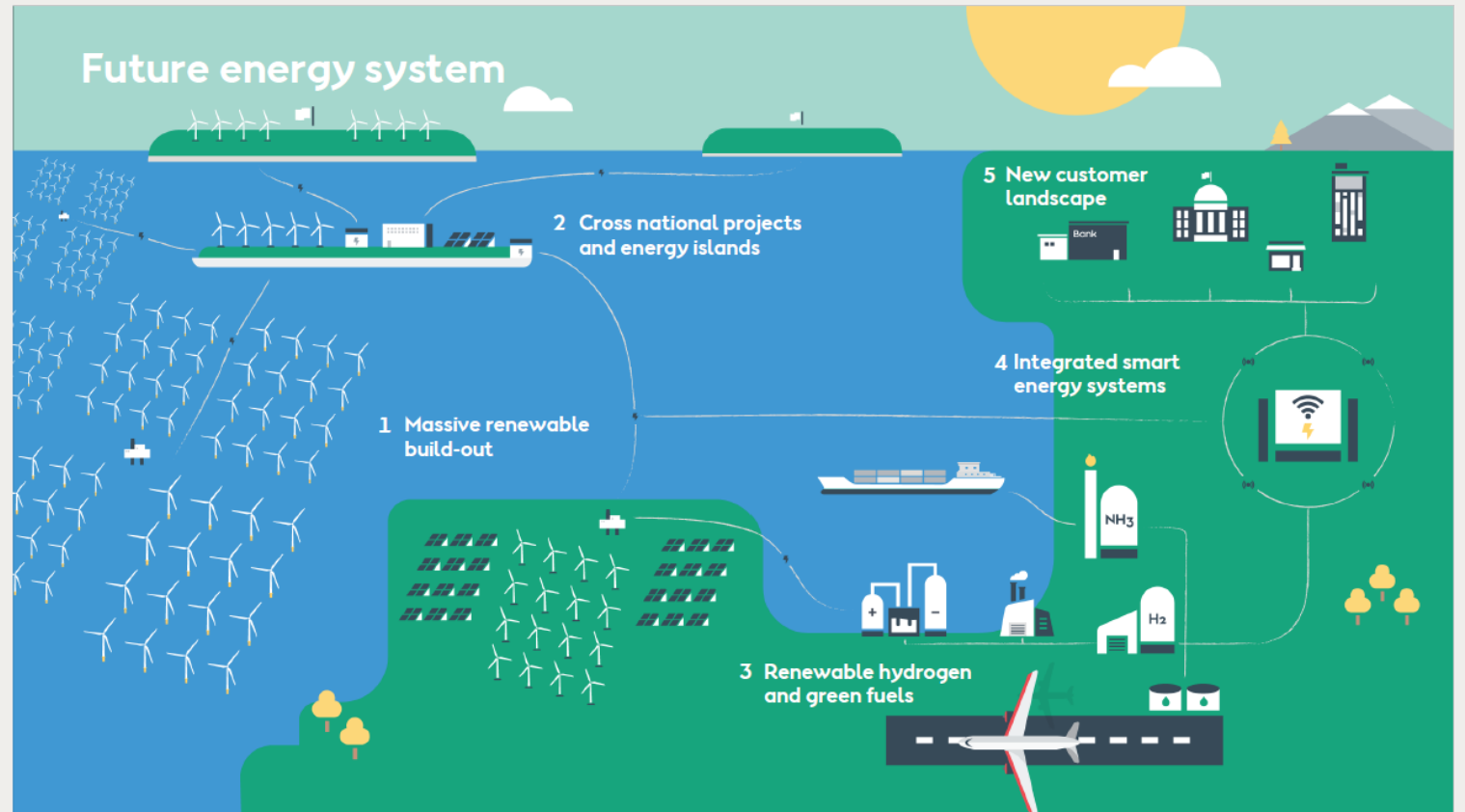


Group Discussion Meeting

Pictures from paper ID 10557

Aspect 2 – Loss of infeed limit

- When deploying large HVDC systems, loss of infeed limits represent a real limitation to full system optimization, as the advantages of large scale hit a wall at the loss of infeed limit
- Bipolar schemes and common metallic returns may help reduce the costs of coping with this constraint
- Adjusting the loss of infeed limits in power systems requires a system-wide assessment and may not always be possible/economic
- A possible alternative solution is coupling quickly adjustable loads (e.g. hydrogen production plants) with the HVDC links



Group Discussion Meeting