Paris Session 2022

Single contingency, Loss of Active power/inertia & circuit size

C1: Power system development and economics

Energy Sector Integration & tackling the complexity of multi-faceted network projects.

Q2.2.1: Planning HVDC transmission systems embedded into an AC interconnected network lead to a variety of challenges. Which design and technology aspects must be considered for embedded point-to-point and multi-terminal HVDC transmission systems?

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Single contingency, Loss of Active power/inertia and circuit size

- Paper C1-11097: ‘Thus, the rating of the HVDC overlay grid needs to consider the concrete conditions of the already existing meshed HVAC grid.’
- In a meshed grid the contingency loss of a circuit should not cause a loss of active power or inertia as the other circuits reroute the power.
- The circuit size in an overlay Grid should not be determined by the size of the grid circuits it overlays in the same was as Motorways are not limited to the capacity of primary roads - as this would defeat their purpose.
- This principle is applicable for bigger meshed grids including a pan European grid
- Voltage limits etc. inform permissible ratings and loadings of circuits.

Northern Ireland grid as an example of a circuit size exceeding Largest Single Infeed

- (Blue) 275kV ring circuit winter rating of 881MVA as meshed ring main built c. 40years ago
- Largest Single Infeed (LSI) limit ranged from 220MW to >400MW over the life of the transmission asset
- If a circuit in the ring main (meshed) is lost power can be delivered by an alternative route.
- In contrast, spurs / point to point not meshed so must observe LSI limits as their loss is equivalent to a corresponding reduction in active power.

Thank you for your attention !