Paris Session 2022

Planning embedded HVDC transmission systems - Brazilian experience

Power System Development and Economics – C1

PS 2 - Question 2.2.1

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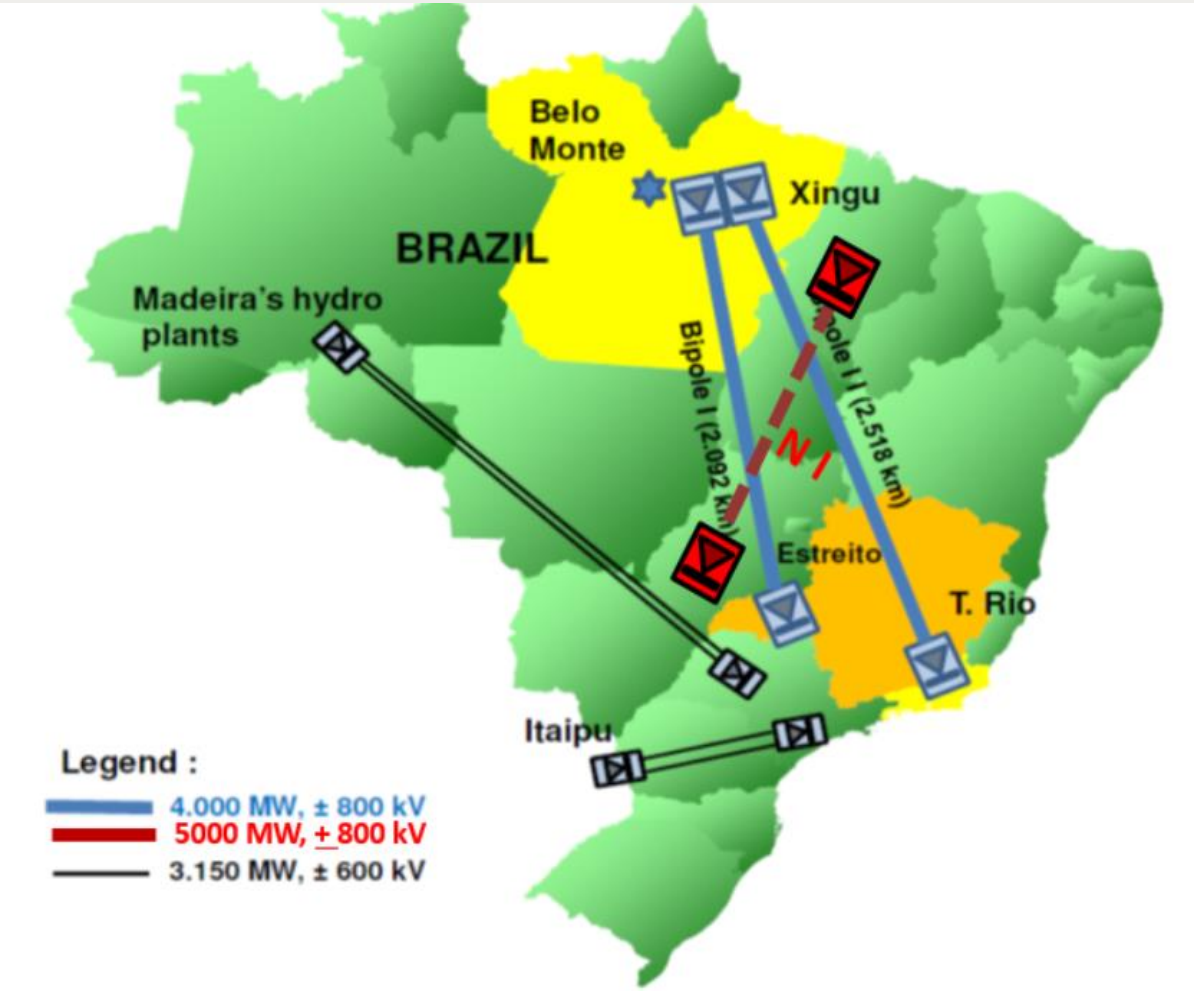
Brazilian HVDC links

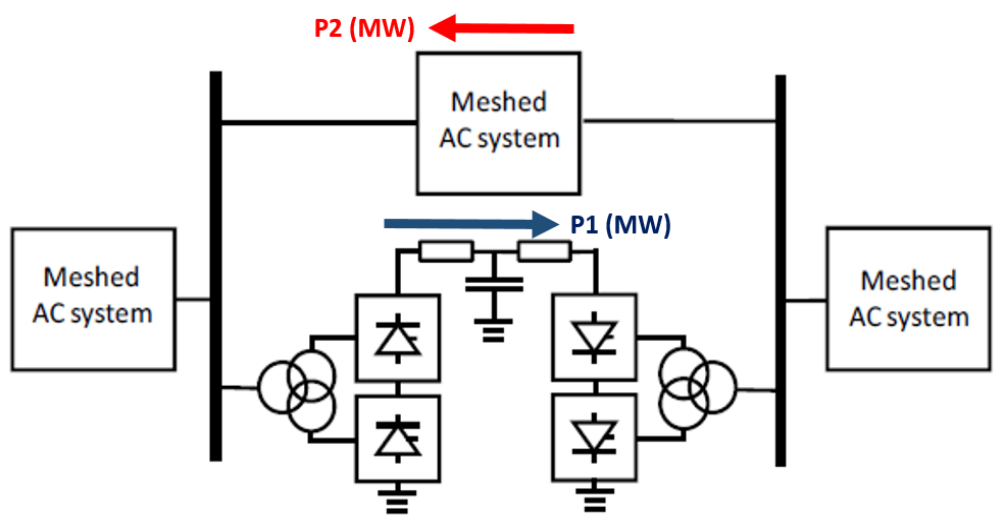


- Six HVDC LCC long distance transmission bipoles links in operation
- All associated with large hydropower generation (Itaipu, Madeira and Belo Monte)
- Two 800 kV bipoles embedded in a meshed AC network (Belo Monte I,II)
- A new embedded 800 kV bipole link in final planning stage (Nordeste I):
  - *to carry the surplus variable renewable generation (VRG) - wind and solar - and reiforce AC North-South corridor*

Design/technology aspects for embedded links – Brazilian experience

In addition to the requirements of regular (not embedded) HVDC links with LCC technology

- ✓ HVDC power flow control to minimize the potencial loop flows and increses in losses



- ✓ Power Oscillation Damping (POD), for power oscillations in the AC system at least at one end of the HVDC link. Links connect long distant points (1500 km to 2500 km)

Design/technology aspects for embedded links – Brazilian experience

In addition to the requirements of regular (not embedded) HVDC links with LCC technology

- ✓ Temporary increase of reactive absorption capacity, provided by converters or compensation associated to the HVDC project :

  In scenarios of substantial load and/or generation reduction (AC grid capacity temporary idle), likely to happen in areas with load and VRG

- ✓ Power reversal capability, in addition to the direct transmission, considering the different possibilities of generation and load in the North and Southeast regions.