Paris Session 2022

Applying VSC-MMC technology on UHVDC overhead lines

B4 – DC SYSTEMS & POWER ELECTRONICS
PS1-7 – Multi-Terminal & Hybrid (LCC+VSC) HVDC Systems: Question 1.11

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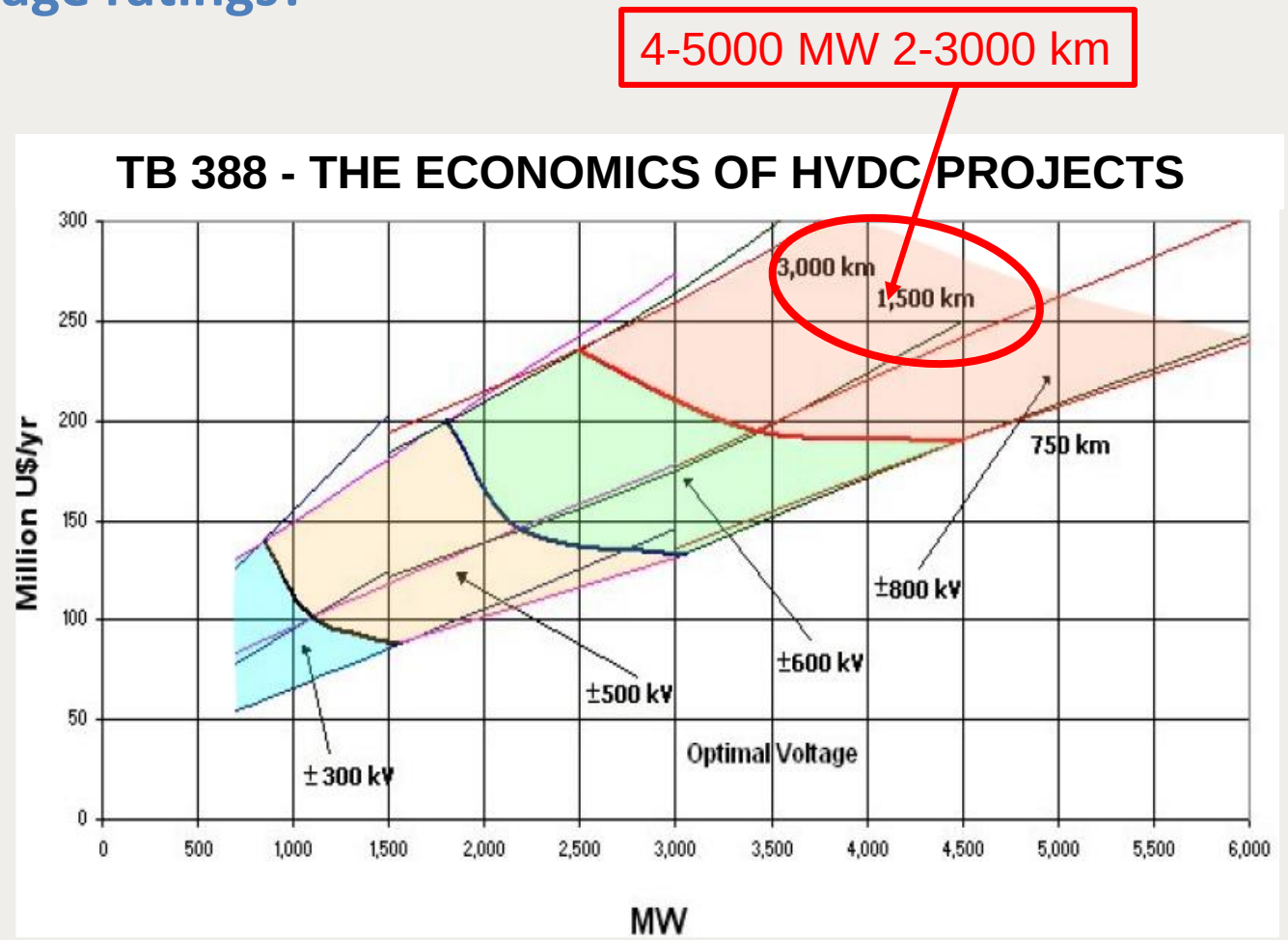
Q 1.11: Are there any special concerns with applying the VSC-MMC technology at greatly increased power and voltage ratings?

- Choice of voltage is a function of distance and power transmitted.
- Brazil has major loads concentrated in the SE region.
- New renewable energy sources are remote from load.
- The geographical dimensions dictate distances of 2-3000 km.
- Existing LCC links are 3-4000 MW each, with 5000 MW in planning.
- TB 388 would indicate ±800 kV for LCC and still true for VSC.



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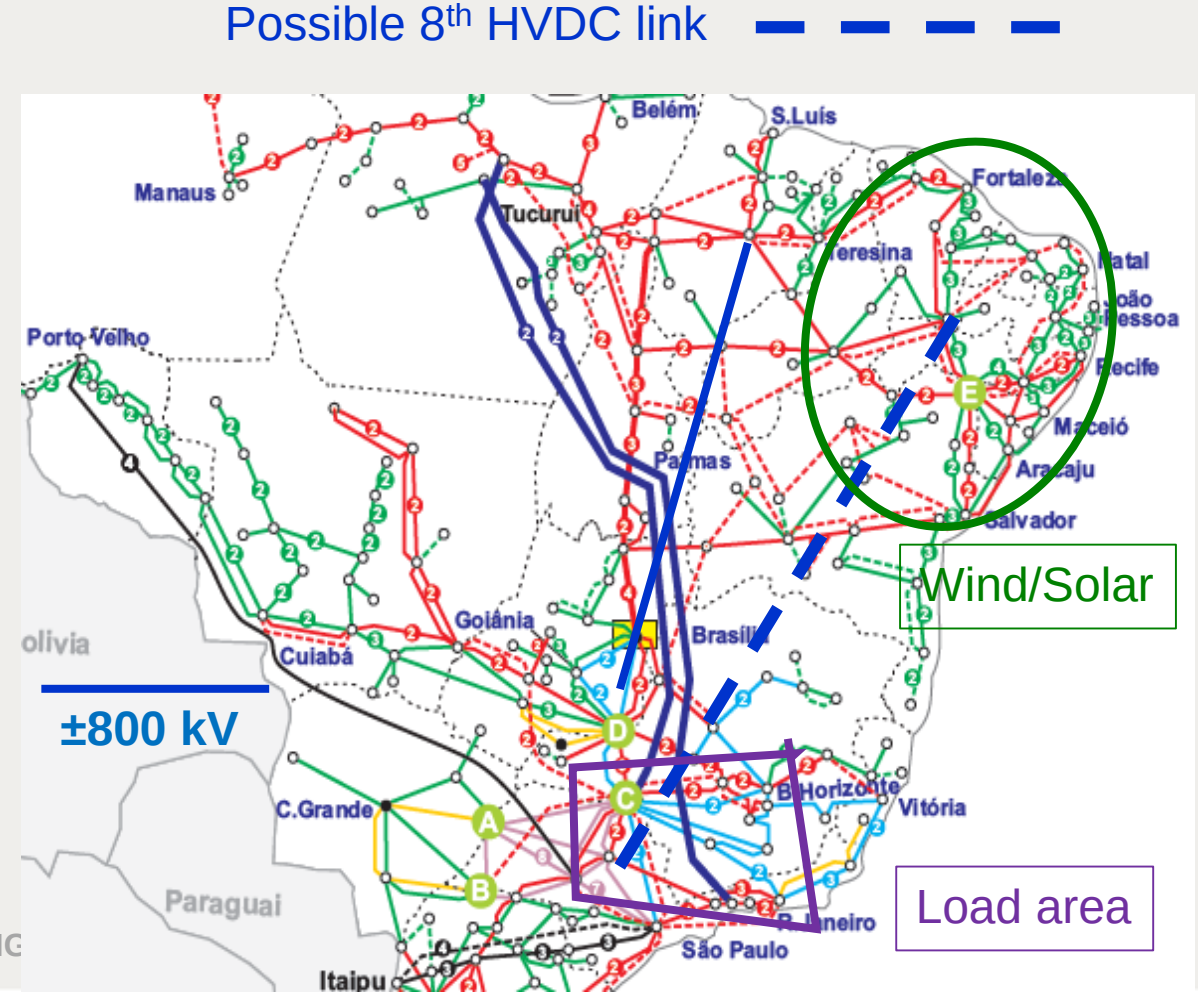
Question: Why use VSC-MMC technology at greatly increased cost?

- Six HVDC bipoles in SE load area, plus two more planned.
- Multi-infeed interaction already a serious concern.
- VSC-MMC technology can improve dynamic performance.
- Unfortunately, this improvement comes at an additional cost.
- When applied with overhead lines, the technology employed needs to ensure arc extinction on the OHL, as well as satisfactory power recovery.



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Question: Appropriate VSC-MMC technology for UHVDC overhead line?

- An R&D project is underway.
- With overhead lines, VSC technology needs to ensure arc extinction on the OHL, and satisfactory power recovery.
- R&D Base 4000 MW, ±800 kV.
- Line lengths 2000 to 3000 km simulated.
- Digital EMT models for system planning have been developed.

R&D project starts with modelling full-bridge MMC as most conservative approach.
Hybrid LLC/MMC to be tested as more economical.
Three terminal system included.

Q 1.11: Are there any special concerns?

Yes, and they are being addressed