

## Weak Grid Connection Challenges of Virtual Synchronous Machine Battery System

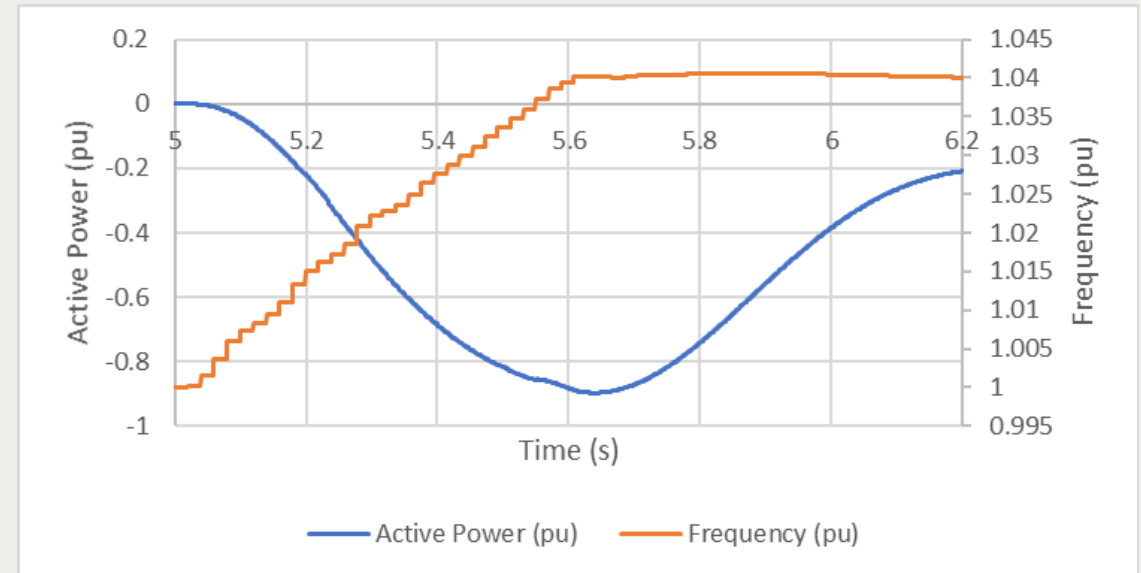
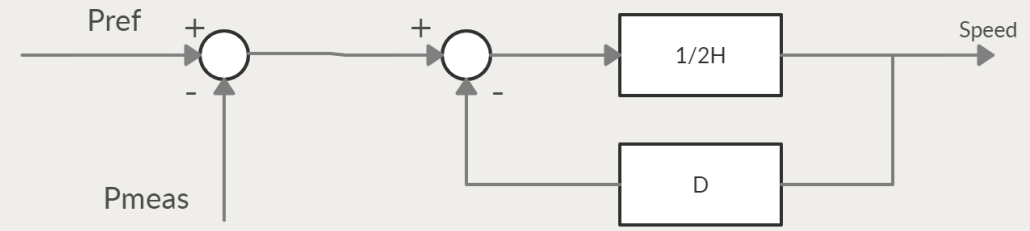
### C4 – Power System Technical Performance Preferential Subject 3 – Question 16

*What local- and whole-system considerations shall be applied to optimise the design and mitigate any potential side-effects when using synchronous condensers, grid-forming inverters, or a combination to address emerging system stability issues?*

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# Control coordination challenges

- Connection summary:
  - Remote location
  - 2 existing nearby inverter based resources (IBRs)
  - Short circuit ratio (SCR) ~2.0
  - Battery equipped with virtual synchronous machine (VSM)
- Challenges:
  - PPC and inverter coordination
  - Inverter control time delays
  - Virtual inertia vs sustained frequency control



Group Discussion Meeting

## Integration challenges: Voltage collapse

- Virtual inertia/frequency response
- Low SCR conditions
- Active power flow change drives change in voltage
- Voltage rise/collapse ensues
- Voltage FRT re-striking occurs

