## Paris Session 2022





# Modelling tools and model validation practices to support high penetration of inverter-based resources SC B4

#### PS1/ Question 1.2:

- 1) What is the experience of IBR modeling with regards to detailed models in power systems with a massive presence of IBR?
- 2) What model validation process do TSOs and ISOs, etc. use to approve these models? Are these models being used to study the integration of new nearby IBRs?

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**Group Discussion Meeting** 

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### Modelling tools for systems with high-share of inverter-based resources

Phasor domain transients (PDT) (aka RMS)

Electromagnetic transients (EMT)

Suitable for single plant instability analysis

Access to widearea models

Simulation time

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Access to widearea models

Simulation time

Suitable for control interaction studies

Maturity of gridforming inverter models Access to control system parameters

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- Vendor-specific site-specific EMT models are used for generator connection and operational studies.
- Generic EMT models are becoming important for long-term system planning.

#### Current end-to-end connection process including model validation

Technical Model acceptance Commissioning and System disturbance Post-commissioning performance compliance tests testing model validation validation assessment Wide-area and Wide-area and Wide-area and **SMIB SMIB** SMIB SMIB SMIB **EMT** and PDT **EMT** and PDT EMT or PDT **EMT** and PDT **EMT** and PDT OEM/developer OEM/developer OEM/developer OEM/developer TSO/ISO TSO/ISO DD TSO/ISO DD TSO/ISO DD

- Wide-area
- EMT (grey-box)

TSO/ISO

Coordinated control system tuning

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- OEMs/developers cannot replicate instabilities and interactions due to lack of access to the wide-area EMT models.
- TSO/ISO do not have access to all control system parameters nor having expertise about the control systems.