



Inverter-Based Resources Dynamic Model Improvements

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Proposed IBR Dynamic Model Verification and Validation

Unit Validation

- PSCAD/EMT model validation (simulation against lab test measurement)
- Type of tests: voltage/frequency/phase angle step change, voltage ride through, system strength, etc.
- To ensure the controllers and functions are modeled accurately
- Inverter/turbine specific, not site-specific

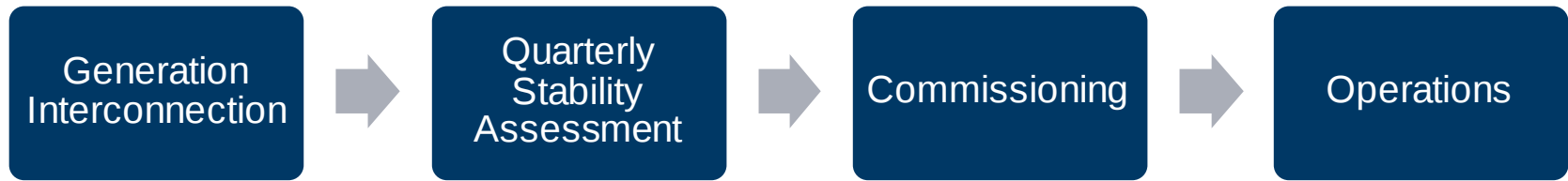
Plant Verification

- PSCAD/EMT model with site-specific settings (snapshot of key settings in the controllers)
- Key settings: inverter voltage control gain, plant voltage control gain, etc.
- To ensure the site-specific settings are implemented in the proper models
- PSCAD/EMT model can be used to benchmark with positive-sequence models like PSS/e and TSAT

Dynamic Model Quality Tests

- Positive Sequence Models (PSS/e, TSAT). Model quality tests shall be provided to demonstrate acceptable model performance. (PGRR075)
 - Flat Start Test
 - Small/Large Voltage Disturbance Test
 - Frequency Disturbance Test
 - System Strength Test
- PSCAD/EMT model. Model quality tests shall be provided to demonstrate acceptable model performance. (proposed)
 - Flat Start Test
 - Small/Large Voltage Disturbance Test
 - Frequency Disturbance Test
 - System Strength Test

Dynamic Model Submittal Requirements



Generation Interconnection

- Interconnecting Entities (IEs)
 - PSS/e dynamic model
 - PSS/e dynamic model quality tests
 - PSCAD model
 - PSCAD model quality tests (proposed)
 - PSCAD modal validation (proposed)
 - Technology (inverter/turbine type) specific, not site specific

Quarterly Stability Assessment

- Interconnecting Entities (IEs)
 - PSS/e dynamic model, if model is updated
 - PSS/e dynamic model quality tests, if model is updated

Commissioning

- Interconnecting Entities (IEs) (within 30 days of Initial Synchronization)
 - Identify the key settings prior to Initial Synchronization (proposed)
 - Verification of key settings implemented in the operating Facility (proposed)
 - PSS/e dynamic model with site specific key settings
 - TSAT dynamic model with site specific key settings
 - PSS/e dynamic model quality tests with site specific key settings
 - PSCAD model with site specific key settings
 - PSCAD model quality tests with site specific key settings (proposed)
 - Benchmark PSS/e and PSCAD using model quality tests (proposed)

Operation

- Interconnecting Entities (IEs)
 - Verification of key settings implemented in the operating Facility every two years (proposed)
 - If the dynamic model needs to be updated, the following needs to be provided:
 - PSS/e dynamic model
 - TSAT dynamic model
 - PSS/e dynamic model quality tests
 - PSCAD model
 - PSCAD model quality tests (proposed)
 - Benchmark PSS/e and PSCAD using model quality tests (proposed)

Next steps and tentative schedules

- Draft language and discuss with RIW and DWG
- Submit Protocol/Guides revision requests in Q2, 2020

Comments are welcome to:

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