

# IBR Modeling: Important Aspect for Meeting IEEE 2800 Modeling and Ride Through Requirements

John Zong Contact: [jzong@epeconsulting.com](mailto:jzong@epeconsulting.com), 604-376-6680

## IBR Modeling Requirements

- Positive sequence models (PSS/E, PSLF, TSAT): WECC generic /User Defined Model (UDM)
- EMT models (PSCAD)
- Planning models: tuned to meet regional performance requirements
- As-built model validation and verification: unit type test validation, controller setting parameter verification, plant model validation via testing (e.g. NERC MOD-026, 27 testing)

## Challenges

- Field setting implementation, e.g. planning model parameters not commissioned in the field
- Model benchmarking: WECC generic vs. UDM, PSS/E vs. PSCAD, PSS/E vs. TSAT
- Contradictions between testing data vs. setting data
- OEM modeling support and version controls, e.g. OEM improves models after first submission in the planning phase
- Lack of Power Plant Controller (PPC) models, e.g. PPC is not properly modeled in Solar/BESS where PPC and inverters uses different OEMs
- Lack of EMT models for legacy sites, e.g. EMT models not available when sites were built 10 years ago
- Model parameterization with hundreds of field setting parameters

## Owner/Developer Best Practices:

### Planning Stage

- Develop PSSE detailed and aggregated models (power flow, short circuit and dynamic)
- Develop PSCAD aggregated model
- Obtain field tunable parameters and ride through capabilities from the OEMs
- Perform model tunings to meet regional performance and ride through requirements
- Submit tuned PSSE and PSCAD models to TP/PC for planning studies

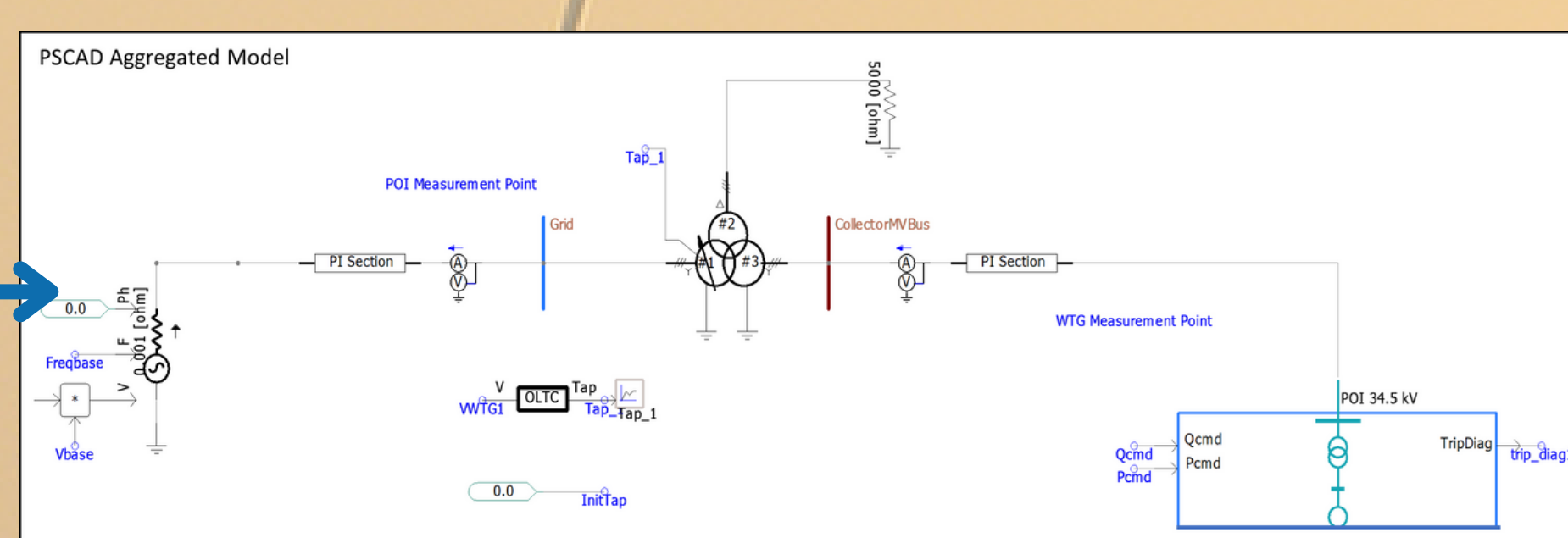
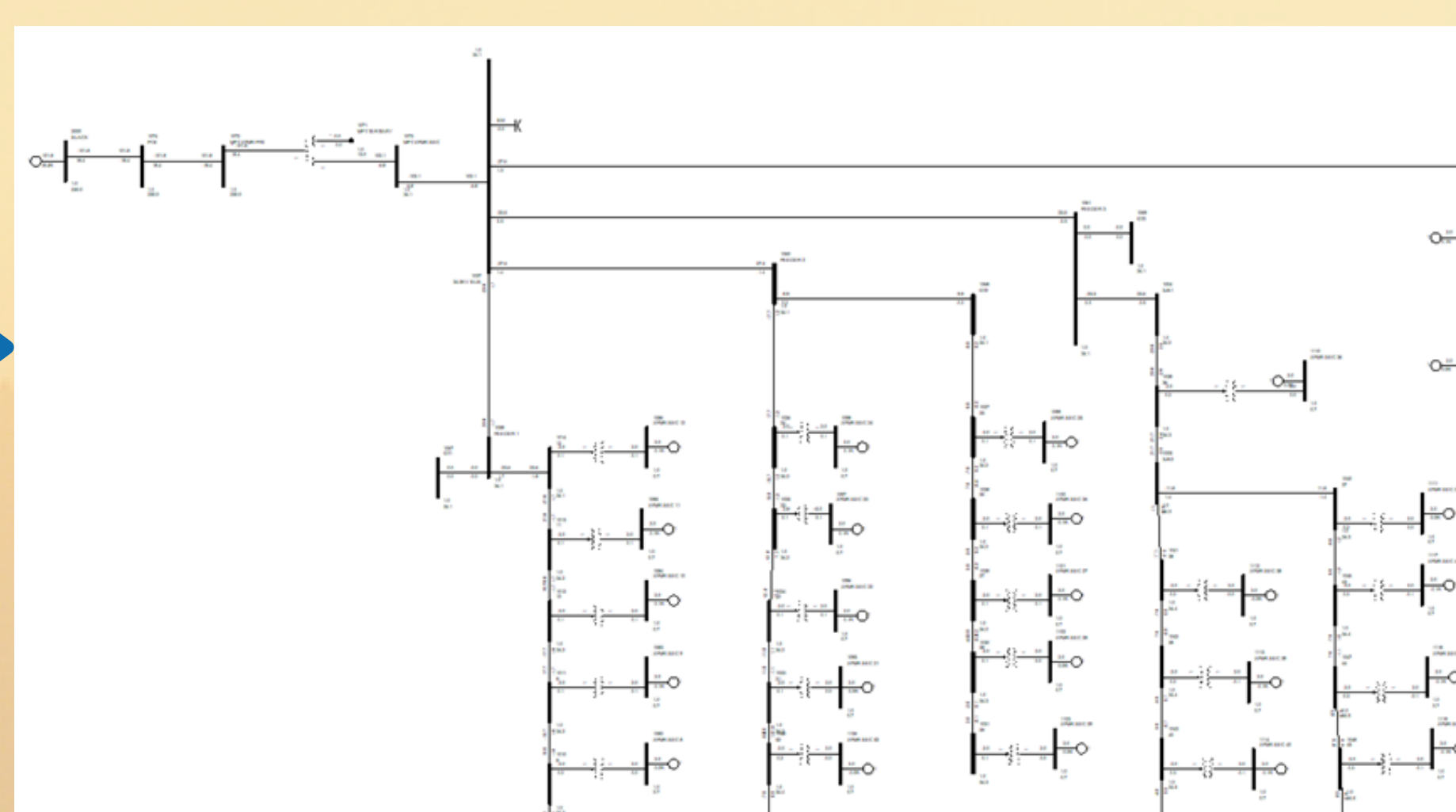
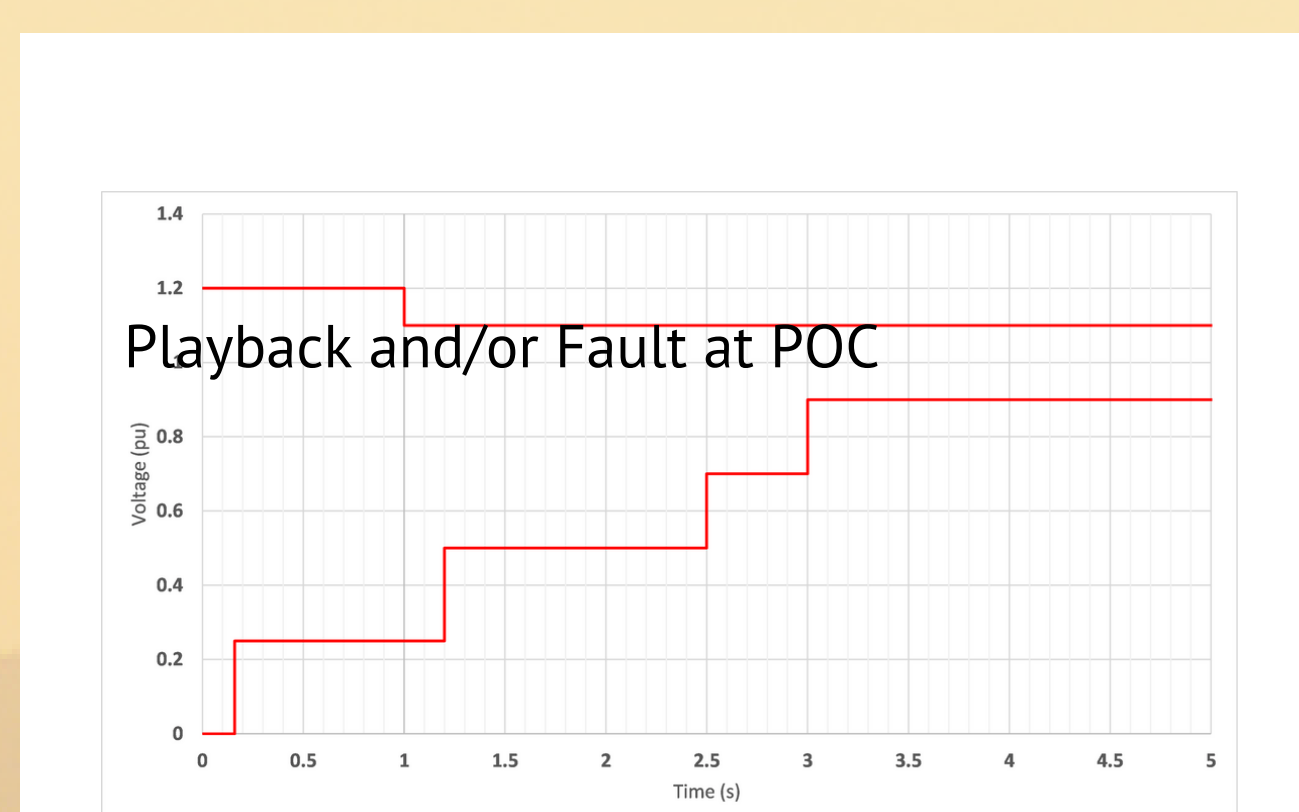
### Commissioning Stage

- Ensure the tuned model parameters are implemented in the inverter and PPC tunable settings during commissioning.
- Field setting tuning when necessary

### Post-Commissioning Stage

- Develop as-built PSSE detailed and aggregated models (power flow, short circuit and dynamic) based on the as-built drawings, nameplates, PPC and turbine/inverter control and protection settings.
- Validate the as-built model response against staged test/real system event responses
- Benchmark as-built PSSE model against PSCAD model
- Ensure as-built model responses still meet regional performance and ride through requirements
- Perform periodic or ad-hoc model validation per regional standard requirement

## IEEE 2800 Ride-Through Evaluation Using PSSE and PSCAD Models



### Result Evaluation

- Result Evaluation
- Ride-through capability
- Ride-through performance
- Current injection during ride-through mode
- Consecutive voltage deviation ride-through\*
- Restore output after ride-through \*
- Transient overvoltage ride-through

### Modeling Methodology

- Conventional Generators: develop model to match the field settings.
- IBRs: Set field setting parameters to match tuned models.

