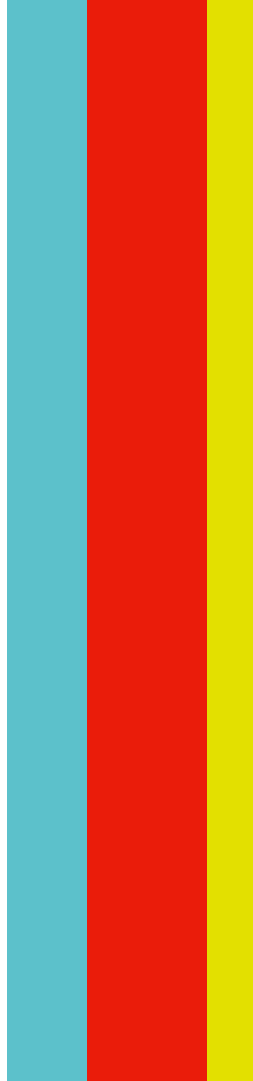


Dynamic Model Challenges: Resource Owner Perspective

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Model Submission Process & Challenges

- Submit PSS/e dynamic model of the turbine/generator or inverter to ERCOT with the Full Interconnection Study (FIS) request
 - Get the model from the manufacturer
 - Some manufacturers may have to convert it from another format to PSS/e, which may take up to several months
 - Submit the model to ERCOT and the TSP (= TO)
 - Attached within the RARF submitted for the FIS
 - Submitted **separately** to ERCOT and TSP
 - Cannot be emailed as attachments due to IT firewall and/or and file size
 - ERCOT and **some** TSP's provide upload links
 - Single submission of RARF with models to ERCOT and TSP?

Study Process & Challenges

- TSP or their consultant performs the stability study
- Dynamic study queues at some TSP's adding a long waiting period on top of the study time
 - May not get sufficient time to meet the QSA deadline especially if a restudy is needed
- Model questions from the TSP's or consultant's study engineers
 - Most have to be sent to the manufacturer for answers. In some cases may take a long time to getting the correct answer.
 - Timely communication involving proper expertise at the manufacturer is key to getting issues resolved

Model Updates

- All models and updates to models have to be submitted to ERCOT and TSP
- MOD-032: Retain evidence that we provided steady-state, dynamics and short circuit modeling to the TP and PC's.
- MOD-026-1: Submit Models and Data for Generator Excitation Control System or Plant Volt/Var Control Functions to TP upon request
- MOD-027-1: Submit Models and Data for Turbine/Governor and Load Control or Active Power/Frequency Control Functions to TP upon request

PSCAD Study Challenges

- SSR/SSCI study has to be completed and approved 90 days prior to synchronization
- SSR/SSCI study queues at some TSP's adding a long waiting period on top of the study time
 - May not get sufficient time to address SSR concerns
 - Need to involve more study consultants to eliminate long study queues

Operational Site Challenges

- Resource Owner is responsible for the site for the lifetime – eg 25 years
 - OEM support may not be available for the lifetime of the project
 - Many ROs do not have capability for modelling and rely on external consultants
 - Changes to models can cost a significant amount
 - Cost is not proportional to the size of the project
 - Different ISOs/TPs may have different requirements for software and models
 - 3 purposes of models (Steady State, Dynamic, Transient)
 - Standardization on a single model type for each purpose would be beneficial
 - OEMs and ROs would know requirements.
 - Focusing on standard model type would result in better familiarity

Operational Site Challenges – Changes to models

- Many required changes to models are due to factors outside of the RO control
 - Changes to NERC requirements (eg MOD 26 & 27)
 - Changes to software used by ISO/TP (eg PSS/E → PSCAD)
 - Change of version of software (eg PSS/E V32 → V33)
 - Change to acceptable models
 - Change to issue that is being modelled – additional info required
 - Changes to system – new facilities, new lines, etc
- The RO is responsible and bears the cost for all of these changes