Dynamic Load Model Stability Study Results Summary

Transmission Expansion Advisory Committee

November 14, 2019

Background

- TPL-001-4 R2.4.1:

  System peak Load levels shall include a Load model which *represents* the expected dynamic behavior of Loads that could impact the study area, considering the *behavior of induction motor Loads*. An aggregate System Load model which represents the overall dynamic behavior of the Load is acceptable.

- Need for better load models
  - Static load models may not be able to capture critical dynamic behaviors of loads to system performance
  - For example, fault induced delayed voltage recovery (FIDVR)

Study Overview

- **Study year and load models**
  - 2022 (Phase 3), 2021 (Phase 2) and 2020 (Phase 1) summer peak load condition
  - Complex load models (CLOD model)
- **Stability criteria**
  - Angle stability, damping and transient voltage recovery
- **Study scenarios**
  - Generator stability study for existing generators in PJM footprint
  - System transient voltage study for selected N-1, N-1-1 contingencies
  - RAS/SPS evaluation, etc.

Results Summary and Observations

- **No potential stability criteria violation due to complex load models has been found.**
  - Overall complex load models increase generator angle swing compared to static load models.
  - Complex load models result in larger voltage dips and slower voltage recoveries than static load models.
- **In some cases complex load models affect non-BES bus voltage recovery performance considerably**.

Next Steps

- Continuous evaluation of dynamic load models from Transmission Owners for new planning year cases and various scenarios
- Sensitivity study using composite load models

Revision History

- V1 – 11/08/2019 – Original slides posted