**IBRTF Report To ROS**

**September 2022**

**Chair: Mohammad Albaijat, Vice-Chair: Julia Matevosyan**

**IBRTF last met on September 13, 2022 (Webex)**

**Discussion Items:**

**Closed IBRTF Sessions Discussion**

* Presented by Freddy Garcia (ERCOT)
  + Reviewed closed session scope
  + Encouraged participants to sign the NDA
  + IBRTF was not opposed to having closed sessions and promote open and detailed discussion with OEMs, developers and generator owners, involved in disturbance events. As well as to discuss OEMs’ equipment capabilities and alignment with IEEE2800.
  + IBRTF supported broader participation in closed sessions (including TDSPs, OEMs and relevant industry experts).

**Status Update on Odessa Disturbance 2**

* Presented by Patrick Gravois (ERCOT)
* New large disturbance on June 4th, 2022, in Odessa area:
  + Event initiated by lightning arrestor fault on 345 kV level in Odessa area on June 4th at 12:59:25 PM
  + Estimated loss of 2,560 MW of thermal (851 MW) and Solar (1,709 MW from 14 facilities) generation
  + 3 inverter manufactures identified (same as in previous Odessa event), these OEMs represent over 60% of total solar capacity installed in ERCOT. OME1: 6 sites (65%), OME2: 5 sites (29%), OME3: 3 sites (6%)
  + 1,227 MW of RRS deployed, 1,116 MW of Load Resources deployed
  + 9 of the 14 lost generation resources in prior Odessa event May 2021
  + Categorized as NERC Cat 3 event (gen loss > 2000 MW), NERC event analysis triggered. ERCOT submitted NERC Cat 3a Brief Report to TRE.
  + Root causes of PV reduction in term of MW loss were contributed to AC overcurrent, Volt Phase Jump, AC Overvoltage, Vdc Bus Unbalance, Slow Ramp After LVRT, Momentary Cessation, Grid Over frequency, Unknown/Misc
  + OME1 MW loss root causes were due to AC overcurrent, Volt Phase Jump and AC Overvoltage
  + OME1 – AC Overcurrent:
    - No protection thresholds increase due to potential damage to inverter
    - OME1 developing algorithm to prevent current spike, undertesting
    - RE to develop mitigation plan and timeline to submit to ERCOT
  + OME1- Overvoltage:
    - OME1 increasing fast overvoltage protection thresholds
    - OME1 recommend decreasing k factor of DVC from 2 to 1
    - RE to develop mitigation plan and timeline to submit to ERCOT
  + OME1 – Volt Phase Jump
    - OEM1 recommends to either extending threshold or disabling protection altogether
    - RE to develop mitigation plan and timeline to submit to ERCOT
  + OME2 MW loss root cause due to Vdc Bus unbalance, Slow Ramp after LVRT, Momentary Cessation and other reasons
  + OME2 – Vdc Unbalance
    - OEM2 had seen issue in previous events and were already testing software update to mitigate
    - Software update improves DC bus regulation response time during voltage disturbances
    - OEM completed update to one plant on Aug. 29; second plant to be scheduled soon
    - Update to be applied to all OEM2 inverters in ERCOT (with one exception)
  + OEM2 – Momentary Cessation
* Unclear whether inverters went into momentary cessation or reduced active power and were unable to recover quickly due to loss of auxiliary power
* Older inverters with limiting logging capabilities – difficult to identify corrective actions to improve response
* Unclear whether voltage drop or phase jump caused initial active power loss
* RE to work to OEM to develop mitigation plan and timeline – installed new PPC since 2021 Odessa event
* Potentially may not be able to meet current VRT requirements with current inverters
  + OEM2 – Slow Recovery from LVRT
* Follow up call scheduled Sept. 14
* May have already implemented corrective actions to limit MW reduction during LVRT and increase thresholds for low/high voltage inverter trip settings
* Need to determine why recovery after LVRT is slow and cause of oscillations
* Potentially some PPC interactions that need to be addressed
  + OME3 and Miscellaneous
    - Root Cause: AC overcurrent, Grid Over frequency, Unknown/Misc.
    - Calls scheduled with OEM3 and two plants (combined 97 MW loss) on Sept. 21
    - OEM3 out of business – working with reps that took over service contracts
    - Plant with grid over frequency inverter trips had ongoing investigations at time of RFI response
    - Plant with 47 MW loss unable to determine root cause – need to improve logging capabilities

**NPRR/NOGPR Update**

* Presented by Stephen Solis (ERCOT)
  + ERCOT identified thirteen (13) high level gaps in ERCOT relate to IEEE2800 mandatory requirements
  + NPRR1138 (MVAr at 0 MW capability) is in the stakeholder process, while performance and testing NOGRR drafted and is being reviewed internally at ERCOT, expected to come out 2-3 weeks
  + Aligns with or exceeds applicable parts of IEEE2800 requirements where appropriate
  + ERCOT Shift efforts to further expediate the Voltage and frequency ride through requirements NOGRR
  + IBR Ride-Through requirements will be NOGRR revising sections 2.6 and 2.9 which address both VRT and FRT
  + Passed first technical review. Second review as we speak with an estimated 3-4 weeks of submission
  + FFR/Inertial response requirements not started
  + Will begin after other two efforts are in flight as ERCOT already has a level of FFR and inertial response requirement in effect.

**NPRR 1138 Update**

* Presented by Stephen Solis (ERCOT)
  + NPRR 1138 will provide accuracy and consistency in the following:
    - Representing accurate reactive capability of units that stay synchronized to the ERCOT system when they are not generating real power ( 0 MW output).
    - Improves accuracy of studies ability to identify post contingency voltage issues
    - Improves Operator situational awareness by having consistent application of status and reactive capability curves
    - **Minimizes reactive power and voltage oscillations on the system caused by current equipment limitations**
  + Some reactive oscillations have been able to be fully addressed through tuning and equipment adjustments.
  + ERCOT, with NPRR 1138, is in the short term focused on reducing the number of reactive oscillations that occur on the system due to equipment limitations.
  + ERCOT in the long term believes these limitations should not exist and that the IBR should have stable voltage control at all MW outputs.
  + Units needs to work with OEM to achieve an LSL of 0 or as close to 0 as possible if they have such a limitation.

**Industry Update**

* Presented by Julia Matevosyan (ESIG, IBRTF vice-chair)
* NERC IRPS kicked off two subgroups
  + Commissioning guide for IBRs which is relevant to ERCOT IBRTF commission check list efforts
  + Defining grid forming capability in interconnection requirements for BPS-connected BESS
* ESIG/G-PST Webinar “Operating the system towards zero carbon”
* NG of UK sharing experiences operating the system with high shares of IBRs
* Non-mandatory interconnecting requirements for grid forming inverters
* Overview of best practice guide – final report due Oct 2022
* Stability pathfinder – procurement of additional inertia, short circuit level, dynamic reactive power …etc.
* Strength to connect – Project looking to develop new metrics for system strength.
* Inertia monitoring – drivers, costs of maintaining inertia, two monitoring methods