# NERC Lessons Learned

## Abnormal Area Control Error due to a Model Translation Error

## **NERC Major Event Review:** 2023 Southwest Utah Disturbance & 2022 California Battery Energy Storage System Disturbances

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# Problem Statement

- After a scheduled quarterly model update, the entity experienced an abnormal area control error (ACE) deviation from expected ranges. It was identified that the automatic generation control (AGC) application sent invalid set point instructions to the generation fleet due to a model translation error

# Details

- The entity updates its models every quarter. Normally, the data is exported via a Common Information Model
- The exported models are then loaded into the data/table structures of the energy management system (EMS)
- The Model Handler was provided by Vendor A, the custom-built tool was an in-house, and the EMS platform was provided by Vendor B.

# Corrective Actions

- The entity reverted to its previous model to manage system conditions while continuing to investigate.
- The operators started updating their neighbors about the situation and took manual actions to resolve the issue by cutting pumping load and conducting blast calls to direct generation to move up within their available range.
- After identifying the modeling error, the entity developed instructions to address the zero MW set point issue and to apply a fix to AGC with the new model.

# Lessons Learned

- For a major model release, entities should perform front-end and back-end data validations and field-by-field comparisons of all databases that are not limited to fields or areas with previously identified issues.
- Entities should run regression testing with new models in a comprehensive test environment and ensure the applications can consume the new models and yield similar or improved results.

# NERC Lessons Learned Reference

- https://www.nerc.com/pa/rrm/ea/Lessons%20Learned%20Document%20Library/LL20230901_Abnormal_ACE_due_to_Model_Translation_Error.pdf

# NERC Major Event Reviews

2023 Southwest Utah Disturbance

# Summary

- Widespread loss of solar photovoltaic (PV) resources that occurred in Southwest Utah in the morning of April 10, 2023
- This event is the first major widespread solar loss to occur in the Western Interconnection outside of California. Nine solar PV facilities failed to ride through a normally cleared fault on a 345 kV transmission circuit. This resulted in an unexpected loss of 921 MW of generation, which is categorized as a Category 1i event in the NERC Event Analysis Process. 5

# Summary

- A single-line-to-ground fault occurred on a 345 kV transmission circuit in the Southern Nevada/Southwest Utah area. Protective relaying cleared the fault normally in 3.5 cycles.
- The abnormal response from multiple facilities was caused by the protection and controls within each facility responding to the BPS fault in an unreliable manner. The loss of generation caused system frequency to fall from around 60.01 Hz to 59.89 Hz

# WECC System Frequency

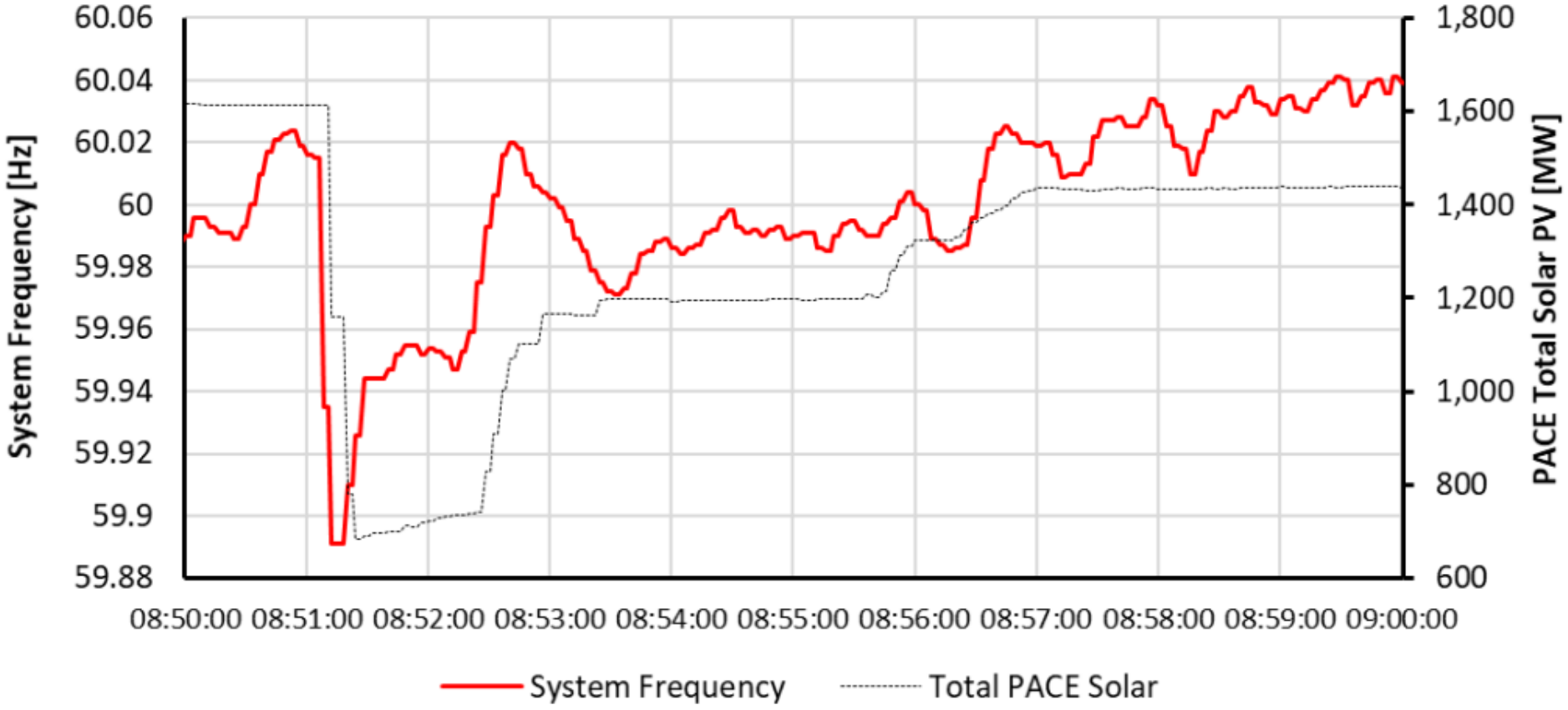


**Figure I.4: WECC System Frequency**

# Key Findings and Recommendations

- Reiterated Need for NERC Project 2023-02 to Ensure Proactive Risk Mitigation
- Reiterated Need for Performance-Based Comprehensive Ride-Through Standard

# Reference

- https://www.nerc.com/comm/RSTC_Reliability_Guidelines/NERC_2023_Southwest_UT_Disturbance_Report.pdf

# 2022 California Battery Energy Storage System Disturbances

September 2023

# Overview

- CAISO identified the events on March 9, 2022, and April 6, 2022, by observing the reduction of power outputs across multiple BESS and solar PV facilities.
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# Details

- Transmission Owners (TOs) and Generator Owners (GOs) should identify unreliable ride-through performance issues prior to commercial operation. TOs should establish clear ride-through performance requirements in their interconnection requirements and enforce them throughout the interconnection process
- All GOs should check with their inverter manufacturer to ensure that their inverters are not prone to tripping, during normally cleared unbalanced grid faults:
  - Unexpected, unbalanced ac current
  - Unexpected dc bus overvoltage tripping
  - Unstable dc bus voltage

# Report Link

- https://www.nerc.com/comm/RSTC/Documents/NERC_BESS_Disturbance_Report_2023.pdf

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