TAG Meeting
October 25, 2021

Webinar

TAG Meeting Agenda

1. Administrative Items – Rich Wodyka
2. 2021 Study Activities Update – Orvane Piper and Lee Adams
3. Regional Studies Update – Bob Pierce
4. 2021 TAG Work Plan – Rich Wodyka
5. TAG Open Forum – Rich Wodyka

2021 Study Activities Update

Orvane Piper - Duke Energy Carolinas
Lee Adams - Duke Energy Progress

Study Process Steps

Completed

1. Assumptions Selected
2. Study Criteria Established
3. Study Methodologies Selected
4. Models and Cases Developed
5. Technical Analysis Performed
6. Problems Identified and Solutions Developed
7. Collaborative Plan Projects Selected
8. Study Report Prepared

Problems Identified and Solutions Developed

- Identify limitations and develop potential alternative solutions for further testing and evaluation
- Estimate project costs and schedule

Annual Reliability Studies

- 2026 Summer
- 2026/2027 Winter
- 2031 Summer

New Projects in 2021 Plan

Reliability Project	TO	I/S Date
Coronaca 100 kV Line (Coronaca-Creto), Upgrade and add second circuit	DEC	December 1, 2025
Monroe 100 kV Line (Lancaster-Monroe), Upgrade	DEC	June 1, 2028
Westport 230 kV Line (McGuire-Marshall), Upgrade	DEC	TBD

New Projects in 2021 Plan (continued)		
Reliability Project	**TO**	**Planned I/S Date**
Whiteville 230 kV - Construct South Bus and Convert to Double Breaker	DEP	December 2025

Public Policy Request

- Accelerated retirement of coal generation
- Increased solar generation
- Increased wind in DVP
- Wind imports – offshore + onshore
- Combined Cycle at Roxboro
- Mayo Battery

TAG Input Request

- TAG is requested to provide any feedback and/or propose alternative solutions to the OSC on the 2021 Preliminary Study Results.
- Provide input by November 3rd to Rich Wodyka (rich.wodyka@gmail.com)

Collaborative Plan Projects Selected

- **Compare all alternatives and select preferred solutions**

Study Report Prepared

- **Prepare draft report and distribute to TAG for review and comment**

Questions ?

Regional Studies Reports

Bob Pierce

Duke Energy

SERC Long Term Working Group Update

SERC Long Term Working Group

- Completed work on 2021 series of LTWG cases
- Completing 2026 Summer Study
- Completed 2021 series MMWG cases

SERTP

SERTP

- 3rd Quarter Meeting (WebEx) was held in September
- 4th Quarter Meeting will be held on December 16th
- 2021 Economic Planning Studies don’t impact NCTPC footprint

http://www.southeasternrtp.com/

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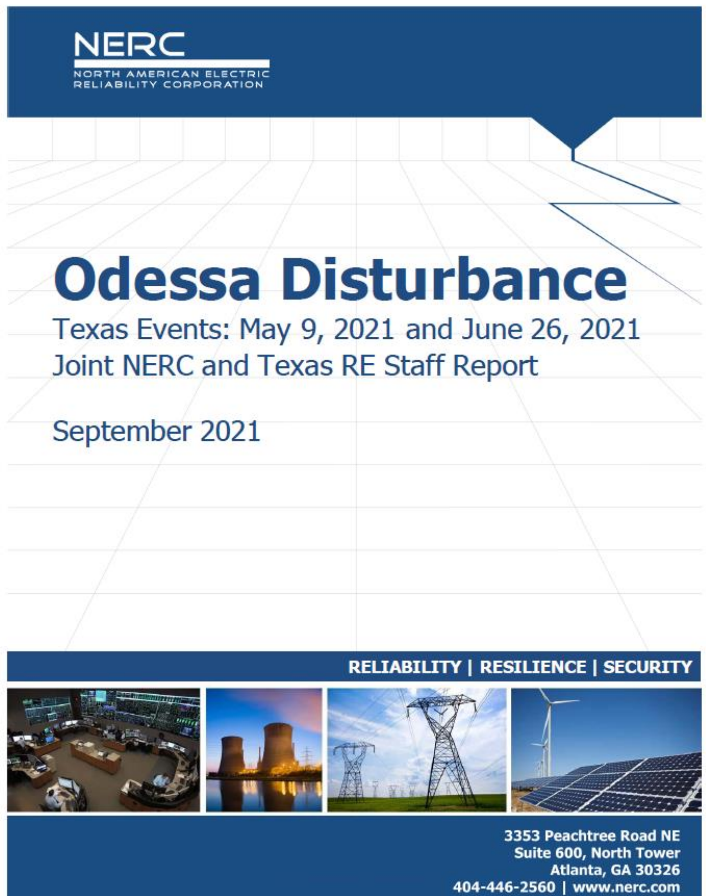
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NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION
Odessa Disturbance
Texas Events: May 9, 2021 and June 26, 2021
Joint NERC and Texas RE Staff Report
September 2021
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Industry Webinar

Odessa Disturbance Report

November 5, 2021 | 1:00 – 3:00 p.m. Eastern

Click here for: Odessa Disturbance Report
Teleconference: Meeting Registration

NERC is hosting an informational webinar to share the key findings and recommendations from the recently published Odessa Disturbance Report and raise industry awareness of the analysis of solar photovoltaic (PV) disturbances.

On May 9, 2021, the Texas Interconnection experienced a widespread reduction of over 1,100 MW of solar PV resources due to a normally fault on the bulk power system. While the ERO has analyzed multiple similar events in California, this is the first disturbance involving a widespread reduction of solar PV resources in the Texas Interconnection. The event involved facilities across a large geographic area of up to 200 miles from the location of the initiating fault. There were multiple causes of power reduction from the affected facilities; however, the causes appear to be systemic in nature and closely match the similar types of disturbances that have been analyzed in California. A second, smaller event involving solar PV resources subsequently occurred in Texas on June 26. NERC and Texas RE analyzed both events, in coordination with ERCOT, and documented the key findings and recommendations in the report. The report provides details regarding the initiating event, performance of the bulk power system-connected solar PV fleet during the event and additional details around the event. The report also describes modeling and studies improvements needed to address the root causes of these issues, which is applicable to all Interconnections. The report lays out strong recommendations for the electric industry regarding mitigating these abnormal performance issues.

Please register for the webinar using the registration link provided above. You will have the option to add the event to your calendar after registration.

For more information or assistance, please contact Levetra Pitts.

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RELIABILITY | RESILIENCE | SECURITY

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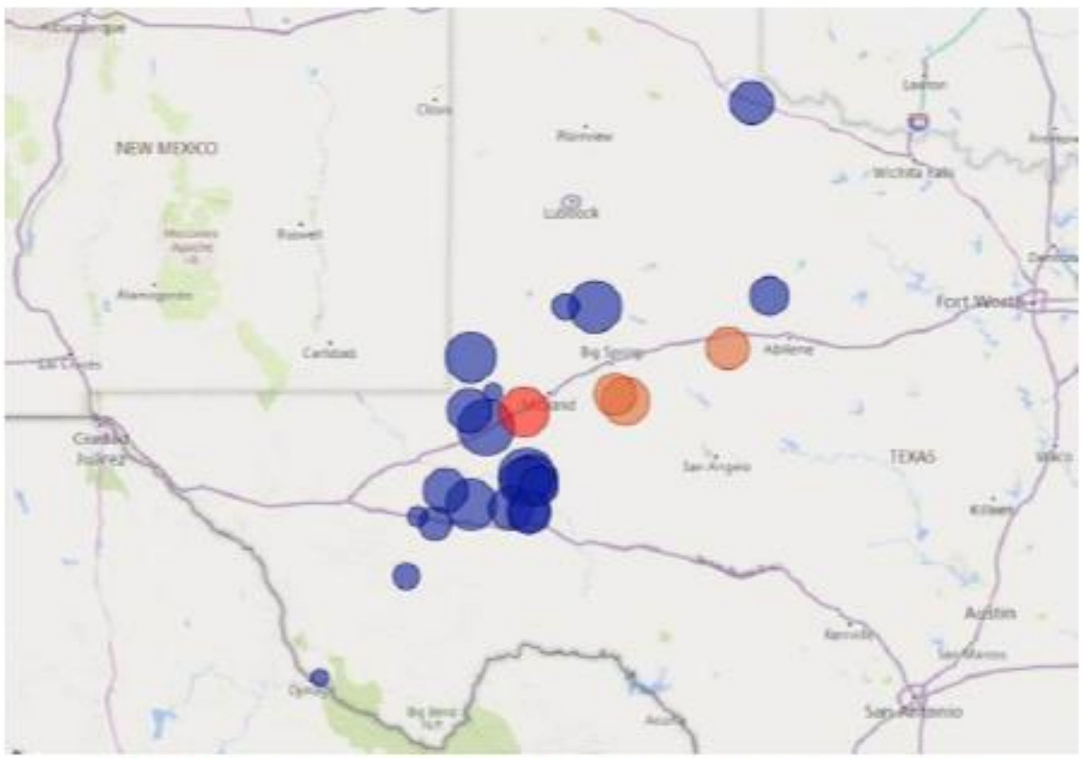

Figure I.4: Map of the Fault Location and Affected Facilities

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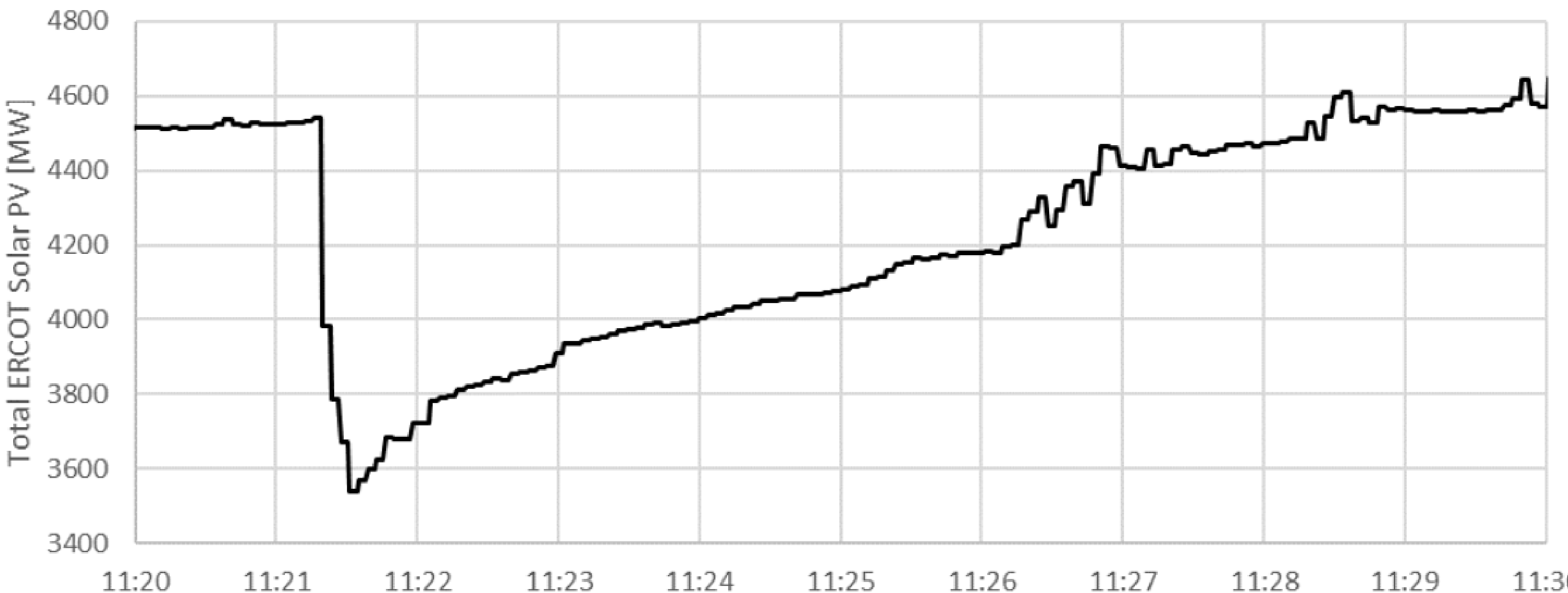

Figure I.5: ERCOT BPS-Connected Solar PV during Disturbance [Source: ERCOT]

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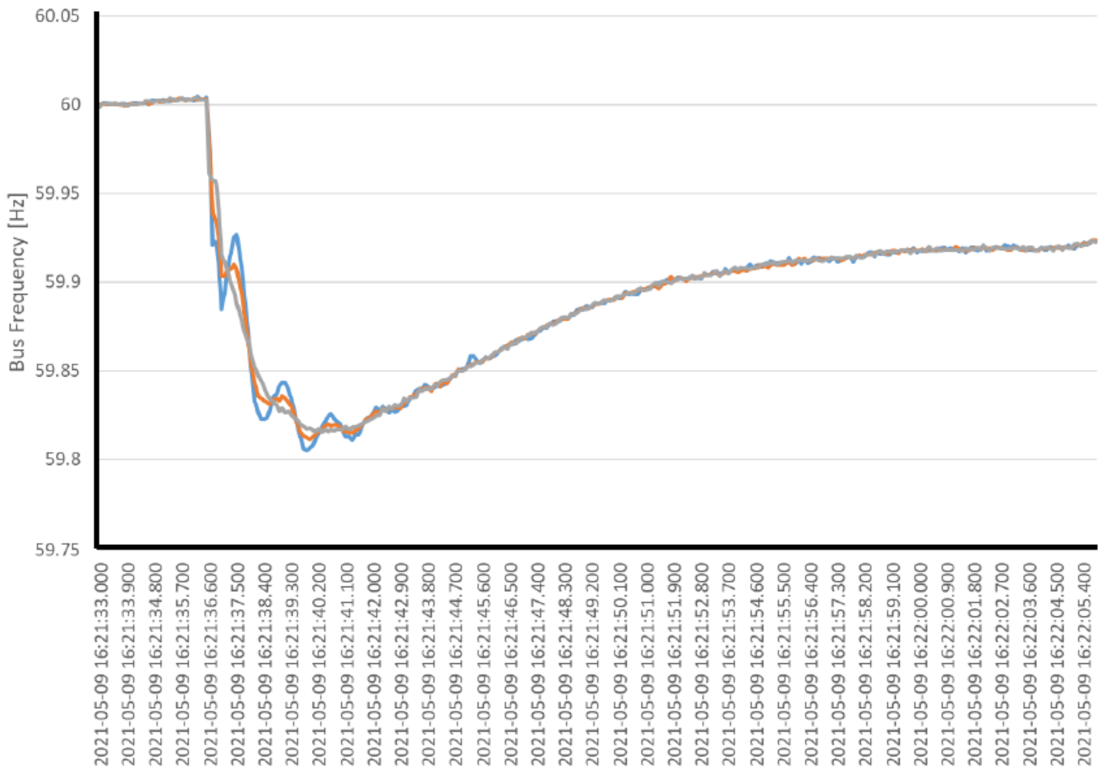

Figure I.6: System Frequency during Event [Source: UTK/ORNL]

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A significant number of solar PV resources responded to the BPS fault event in an abnormal manner. Many of the solar PV resources are large BES facilities with affected resources over a significantly large geographic area within the Texas footprint (over 200 miles away).

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Table 1.1: Causes of Reduction	
Cause of Reduction	**Reduction [MW]**
PLL Loss of Synchronism	389
Inverter AC Overvoltage	269
Momentary Cessation	153
Feeder AC Overvoltage	147
Unknown	51
Inverter Underfrequency	48
Not Analyzed	34
Feeder Underfrequency	21

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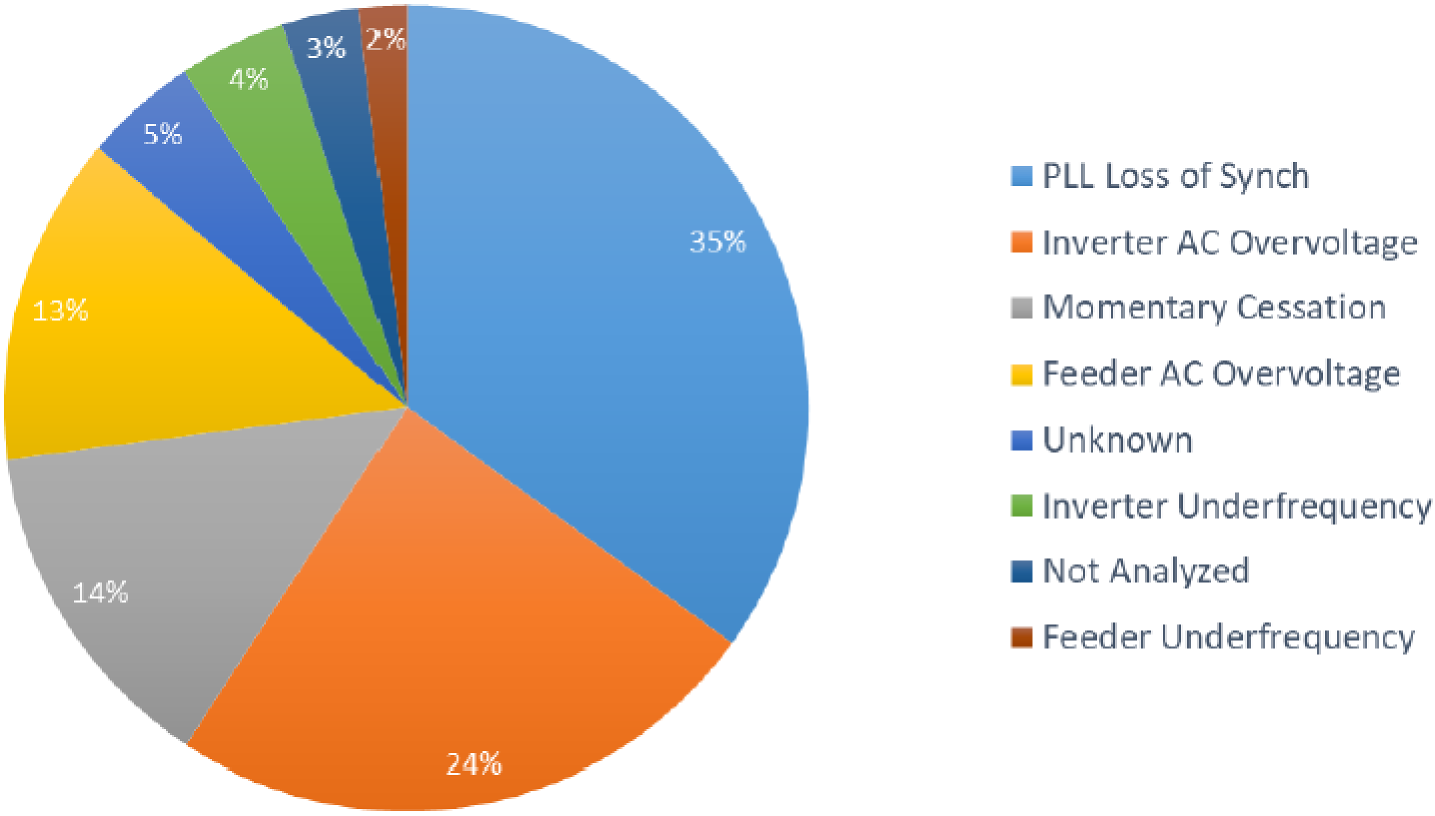
35%
24%
14%
13%
5%
4%
3%
2%
PLL Loss of Synch
Inverter AC Overvoltage
Momentary Cessation
Feeder AC Overvoltage
Unknown
Inverter Underfrequency
Not Analyzed
Feeder Underfrequency

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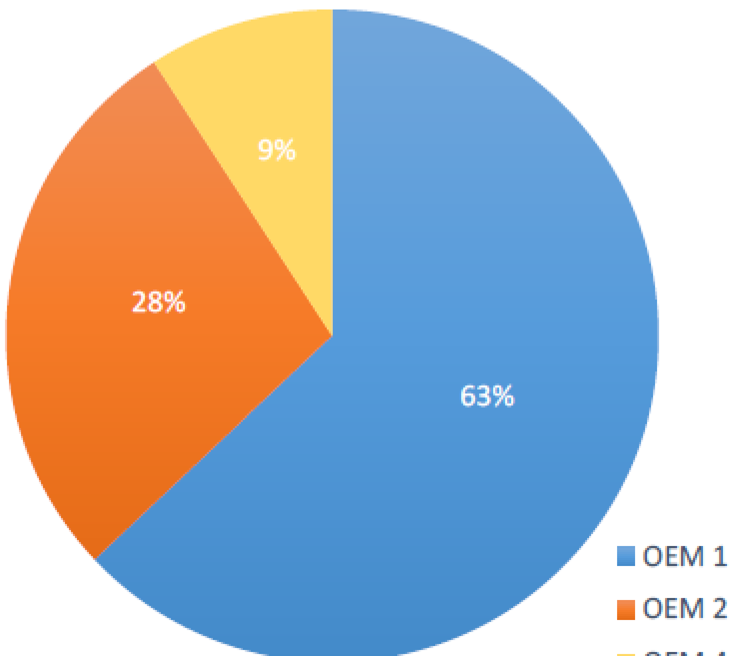

Figure 1.2: Inverter Manufacturers Involved in Disturbance

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PLL Loss of Synchronism (389 MW)

- was the largest contributor to the reduction of solar PV output in this event
- Two large BES facilities reduced output by 239 MW and 150 MW.
- Tripping is specifically attributable to one inverter manufacturer and has been identified in multiple prior events. It is a systemic concern for facilities with this inverter type.
- Existing facilities are likely set with inverters that will trip when their voltage phase angle experiences a shift during fault events (i.e., 10 degree vector shift); the inverters issue a fault code and shut down.

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Inverter-Level Instantaneous AC Overvoltage (269 MW): Trip mechanism is using instantaneous peak measurements at 1.3 pu rather than using RMS fundamental frequency measurements, as stated in the standard. So the inverters are much more prone to tripping on those instantaneous spikes that occur on the order of a few milliseconds during fault events.

PRC-024-3 is not an adequate protection to ensure BPS-connected inverter-based resources do not trip for normal BPS fault events. This form of tripping has been identified in nearly all large-scale solar PV tripping events analyzed by NERC. Plant POI voltage conditions are not a suitable criteria for establishing trip settings within the inverter.

It appears that some plants experience reactive power injections post-fault that exacerbate these types of tripping issues.

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Momentary Cessation with Plant-Level Ramp Rate Interactions (153 MW): One plant includes legacy inverters that use momentary cessation when the voltage falls below 0.9 pu. The inverters should recover back to predisturbance output relatively quickly when voltage recovers; however, the PPC (plant level controller) interacted with the active power recovery and slowed the recovery to the limits established for meeting BA ramping requirements in this case.

This is not the appropriate application of these limits and is negatively impacting system stability nor is it meeting the recommended performance recommendations in the NERC reliability guidelines.

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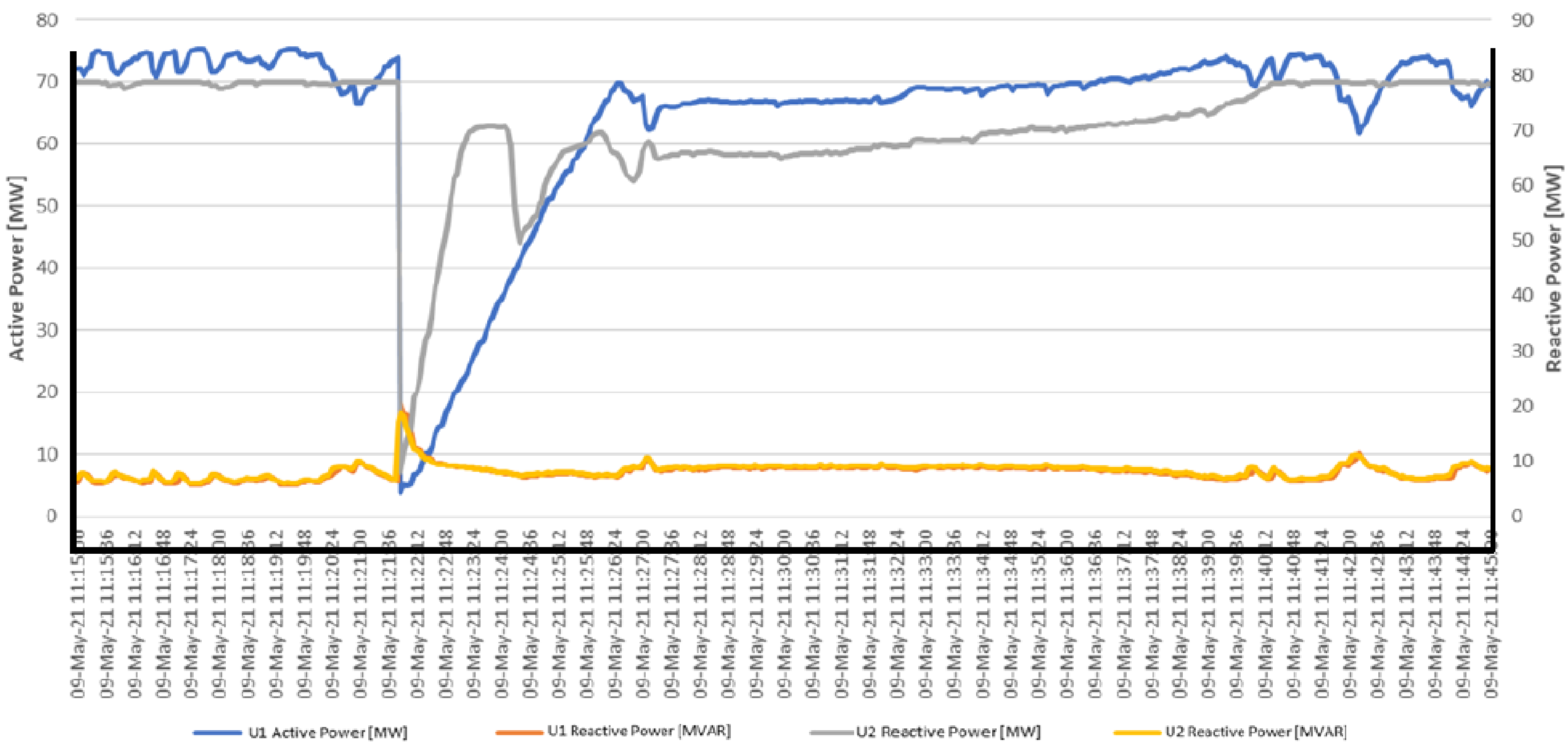

Figure 1.3: Momentary Cessation with Ramp Rate Interaction

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Feeder-Level Instantaneous AC Overvoltage (147 MW): One facility had feeder-level protection trip on instantaneous phase ac overvoltage 59 targets set at 1.2 pu.

These settings are directly on the PRC-024-3 curves. The review team questioned the need for this protection on the feeders and the plant owner/operator was unable to clarify what these feeder-level voltage relays are protecting.

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Unknown Cause (51 MW): One facility had insufficient data to perform any useful root cause analysis; the cause of reduction remains unknown.

Inverter-Level Underfrequency (48 MW): One facility had all inverters trip, and the majority of the inverters in the facility recorded tripping on measured “grid underfrequency" conditions; however, frequency did not fall outside of the PRC-024-3 boundaries, so these inverters likely erroneously tripped on a poorly measured or calculated frequency signal.

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Feeder Underfrequency (21 MW): One plant had one feeder-level relay operate on underfrequency, tripping 21 MW of inverters. The relay manufacturer indicated that the relay performs the frequency measurement over a 3 cycle window. Analyzing the waveforms during the disturbance from the relay, it was determined that the relay measured the frequency correctly over the 3 cycle window. However, the manufacturer recommends a minimum time delay for frequency tripping to be 5 cycles. The relay was set for zero delay. This reinforces previous disturbance reports recommendations to not use an instantaneous trip setting for frequency protection.

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Key Finding

In many cases, industry is not proactively identifying abnormal performance issues of inverter-based resources. Furthermore, the recommendations outlined in NERC reliability guidelines are not being adequately adopted to ensure reliable operation of the BPS with a changing resource mix to inverter-based technology. Plants stated that no mitigating actions are being done (or planned) to improve the performance of the resources involved in the event.

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Key Finding

Data provided by affected solar PV facilities for this event is significantly improved from past events analyzed by NERC and the Regional Entities. This is likely due to ERCOT establishing some monitoring and measurement requirements in its interconnection requirements and market rules. 1-second SCADA data resolution appears to be a common industry practice and helps aid in initial analysis. PMU data at the POI is also helpful for overall plant analysis; however, DFR data at the POI is essential for performing plant-level event analysis. Only one plant provided inverter-level oscillography data which significantly limited the ability of the review team to conduct adequate root cause analysis. TOs are not improving interconnection requirements based on the recommendations set forth in the NERC reliability guidelines.

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The recommendations set forth in the NERC reliability guidelines related to monitoring data for inverter-based resources are not being implemented by GOs of newly interconnecting inverter-based resources. Furthermore, TOs (in coordination with their RC and TOP) are not establishing interconnection requirements based on the recommendations laid out for improving those requirements for these resources. Specifically, the monitoring capability at solar PV facilities is not comprehensive enough to effectively perform root cause analysis and is leading to unreliable operation of these resources due to the inability to effectively develop mitigations for abnormal performance.

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Key Finding

Solar PV plants continue to trip on PLL loss of synchronism, and these issues are not being properly mitigated. TOs, in coordination with their RC, BA, TP, and PC, are not establishing interconnection requirements to prohibit plants from tripping on PLL loss of synchronism. This form of tripping is not addressed in PRC-024-3 but it is the most significant cause of solar PV reduction in this event. This has led to unreliable performance of a number of large BES solar PV resources that lack sufficient ride-through capability to support the BPS for normal BPS fault events. This reliability issue is persistent, growing in the number of resources prone to this issue, not being mitigated appropriately, and warrants mitigating actions to address. The NERC RSTC should direct the NERC IRPWG to produce a SAR to mitigate this issue effectively.

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Key Finding

Plant-level controller interactions with inverter response after fault events continue to be an issue for BPS solar PV facilities. These two layers of controls are not properly tuned with each other and are resulting in unreliable performance of these resources once connected to the BPS. Furthermore, these interactions are not properly being identified in the interconnection study process.

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Inverter Controls Leading to Facility Tripping

In multiple plants, the root cause of solar PV reduction of active power was attributed to inverter controls driving conditions that led to the plant tripping. Most commonly, the inverter controls during and after the fault lead to voltages within the plant that exceed protection settings on either the inverter or on feeder protection.

These types of interactions should be identified during the interconnection study process.

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However, this requires that detailed and accurate models are provided during the time of interconnection that represent the equipment and controls that will be installed in the field.

NERC, in coordination with industry stakeholders and the NERC IRPWG, has identified numerous times that detailed models of equipment are not being provided during the interconnection study process, and inverter-based resources are being interconnected in an unreliable manner due to poor modeling and inadequate studies being conducted during the interconnection process.

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EXAMPLE

Response to Fault

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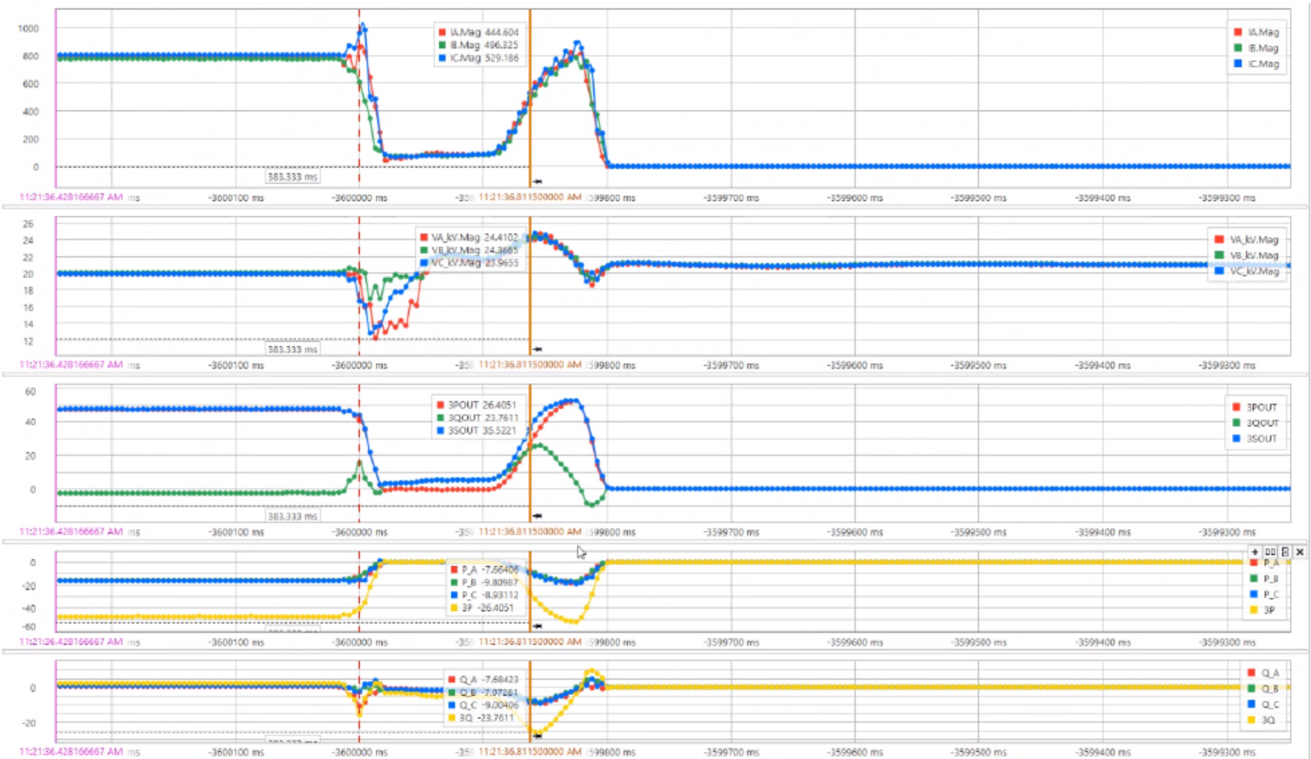

Figure 1.4: Current Injection at Time of Trip

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Upon further analysis and discussion with the inverter manufacturer, this issue is believed to be caused by poor coordination between the inverter controls and the plant-level controller. Immediately upon voltage recovery, the inverters begin responding to the plant-level controller set points. Their last received set point is an injection of reactive power, creating the overvoltage condition that ultimately tripped the plant. This behavior is solely based on the logic programmed into the controls for the inverter and plant-level controller.

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Key Finding

Multiple solar PV plants tripped on inverter terminal or feeder-level protection caused by inverter and plant-level controls driving voltage conditions above trip settings to some degree. The electrical response of the facility is based solely on the logic programmed into the inverter and plant-level controls. These issues should have been identified during interconnection studies, yet the plant was able to connect in an unreliable manner.

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As experienced in the past NERC analyses of disturbances involving solar PV resources, resources tripped on ac overvoltage conditions. One facility was able to capture inverter-level oscillography data (see **Figure 1.5**).

The inverters follow a K-factor injection of reactive current due to the low voltage measured during on-fault conditions.

Upon fault clearing, voltage returns to normal operating ranges and the inverters continue to inject a large amount of reactive current into the normal voltage and ultimately drive voltage to above 1.3 pu.

This leads to the inverter tripping to protect itself from the high voltage conditions. The 1.3 pu trip threshold is hard-coded by the inverter manufacturer and entirely separate from the overvoltage protection settings configurable by plant personnel.

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Note that PRC-024-2 was modified and updated to PRC-024-3, and one of the main clarifications added to this standard was that the "voltages in the boundaries assume RMS fundamental frequency phase-to-ground or phase-to-phase per unit voltage".

This hard-coded voltage trip threshold is based on instantaneous peak measurements, not RMS measurements of voltage. Therefore, these settings cannot be modified for any existing facilities and likely will continue to invoke tripping for normal grid fault events unless plants are tuned accordingly to appropriately ride through these types of events.

Inverters are being installed on the system with trip setting that use instantaneous rather than RMS fundamental frequency measurements and will likely continue to result in plants tripping on ac overvoltage conditions. The modifications made to PRC-024-3 will not address this growing and persistent issue with solar PV resources, particularly from this one manufacturer.

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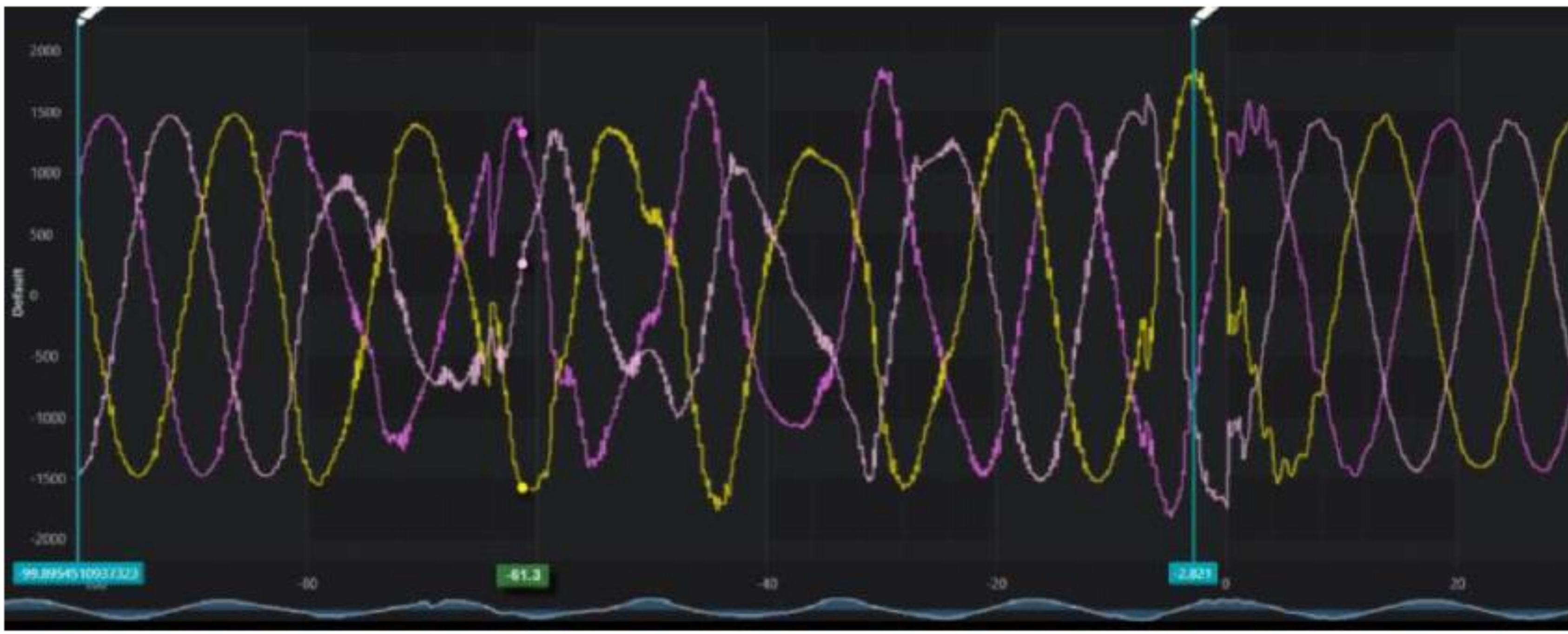

Figure 1.5: Inverter Oscillography of Transient AC Overvoltage Tripping

NERC

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However, inverters are being installed on the system with trip setting that use instantaneous rather than RMS fundamental frequency measurements and will likely continue to result in plants tripping on ac overvoltage conditions. The modifications made to PRC-024-3 will not address this growing and persistent issue with solar PV resources, particularly from this one manufacturer.

NERC

Key Finding

Multiple solar PV plants include protective functions either within the inverters or in feeder-level protection that are set directly to the curves specified in PRC-024-3. The purpose of the standard is to establish requirements for performance when using voltage and frequency protective relaying. However, PRC-024-3 was recently updated to explicitly clarify that these type of protection are not mandatory nor is protection necessary unless it is based on an equipment rating or limitation. PRC-024-3 does not require any specific type of protection be enabled nor does it specify that protection should be set directly on the curve. This is a systemic issue with solar PV resources across multiple interconnections, as highlighted in past disturbance reports.

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In discussions with multiple solar PV plant owner/operators, the review team expressed concerns that protection system settings were programmed directly on the PRC-024-3 boundaries. The overvoltage (OVR) and undervoltage (UVR) protection settings are programmed directly on the PRC-024-3 boundaries, illustrating that the protection settings within facilities may not be set to equipment capabilities.

Plant personnel were unsure of the justification for feeder-level protection and were unsure of whether inverter-level protection was set to the equipment capabilities or to the PRC-024-3 curves.

In addition, the inverter-level protection (at the inverter terminals) may be not coordinated with conditions at the POI (per requirements in PRC-024-3).

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Key Finding

After the fault event and recovery of system frequency, frequency reached the upper deadband of 60.017 Hz. At that time, the review team identified a number of solar PV resources rapidly changing active power output in response to this condition. However, the magnitude of active power reduction to these overfrequency conditions does not match the expected performance following the requirements set forth by ERCOT. Therefore, it appears that interactions and abnormalities may exist with the implementation of PFR controls in these facilities and that this may be a more systemic issue than only the plants analyzed.

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Frequency declined due to the loss of resources following the fault event.

About six minutes later, frequency returned to nominal and actually reached the upper end of the frequency deadband. The review team identified a number of resources that experience abnormal performance when frequency reached the upper deadband threshold.

For example, frequency reached 60.028 Hz momentarily, which is 0.011 Hz outside the upper deadband threshold. On a 5% droop characteristic based on nameplate rating, this equates to a reduction in plant output by only 0.37% (i.e., 0.37 MW for a 100 MW facility).

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Facilities began reducing power output significantly for these minor frequency deviations. Such large swings in active power output from inverter-based resources will actually degrade the ability of the BA (i.e., ERCOT) to control frequency in a smooth and stable manner.

This finding highlights the need for a comprehensive analysis of all plants to ensure performance that is appropriately tuned to the requirements and expectations of the BA.

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Key Finding

Inverters from one manufacturer are programmed to gate block (a form of momentary cessation) rather than open the inverter ac circuit breaker for fault events in order to prevent overuse of the breaker. However, this leads to the inverter output capacitors remaining connected to the BPS when the inverter current injection is ceased. This leads to a fixed reactive power injection during these times with no ability to control voltage post-contingency. This type of behavior was not known by ERCOT prior to the event analysis nor is this type of behavior supporting the BPS post-fault.

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With the output capacitors remaining connected to the system once the inverters ceased current injection, the plant was not providing any voltage support and was injecting an unexpected amount of reactive power into the BPS.

This was not previously known by ERCOT, is not a desired response from inverter-based resources,25 and should not be allowed without prior consent from the TO, TOP, and RC. Furthermore, this should be appropriately modeled and studied by the TP and PC as well.

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Key Finding

In the absence of return to service specifications for inverter-based resources, these facilities are using default automatic reconnection times most commonly on the order of five minutes. However, some facilities are able to return to service much faster by modifying these timers. The TO (and BA) did not have any return to service requirements and therefore plants are making assumptions on the preferred performance. These types of specifications should be clear for all BPS-connected resources to ensure the BA has sufficient capability and flexibility to balance the system during normal and emergency grid conditions.

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Most commonly, solar PV facilities that experience a “minor fault” event, such as these abnormal responses to BPS faults, will undergo a five minute disconnection with an automatic restart timer and ramp back to pre-disturbance levels.

The five minute restart has been observed across all solar PV disturbances analyzed by NERC. In this event, some facilities experienced a trip and were able to return to service following the trip in a relatively short time period (e.g., around 30 seconds to a couple minutes).

These timers can be modified and are being modified by some asset owners. However, ERCOT does not have any requirements or specifications for returning to service following a trip, and therefore, solar PV plant owners stated that the default timers are most commonly used in absence of any further guidance.

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The NERC reliability guidelines specifically cover this issue and state that “TOs, in coordination with their BA, should specify the expected performance of inverter-based resources following a tripping event. This may include automatic reconnection after a predefined period of time or may include manual reconnection by the BA. Ramp rates during return to service conditions should be specified as well.

Following “system black” conditions, inverter-based resources should not attempt to automatically reconnect to the grid (unless directed by the BA) so as to not interfere with blackstart procedures.” However, ERCOT has not implemented any return to service specification following these recommendations outlined in the reliability guideline.

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Recommendation

Most of the causes of solar PV reduction identified in this event and past events analyzed by NERC cannot be properly represented in positive sequence dynamic models. High quality, vendor-specific EMT models are required to identify these causes of tripping. EMT studies should be required as part of the interconnection study process to ensure that all resources can reliably operate once connected to the BPS prior to the resource being interconnected. Resources that experience abnormal performance once connected should be subject to performance validation against the submitted models. Any discrepancies should be reported to the TP, PC, BA, RC, and NERC. A performance validation feedback loop should be incorporated into a NERC Reliability Standard to ensure reliable operation of the BPS with growing levels of inverter-based resources moving forward.

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Recommendation

EMT models are expected to be the most accurate representation of a resource for use in detailed reliability studies. Assessments demonstrate that EMT models are lacking key protection and control functions within the models and that they are unable to demonstrate the response of the equipment in the field, and this poses significant reliability risks (particularly in areas of rapidly growing penetrations of inverter-based resources). Industry should develop EMT-focused modeling and study requirements and implement them in a timely manner, particularly in areas of high inverter-based resource penetration.

Recommendation

All TPs and PCs should be assessing the quality and fidelity of the positive sequence and EMT models provided during the interconnection study process. Model quality checks, test, and validations should be conducted per the recommendations set forth in the NERC reliability guidelines. Any model quality concerns should be addressed prior to the studies being conducted and resources should be held accountable for any modeling errors that do not suitable represent the installed equipment in the field.

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Table 2.1: Solar PV Tripping and Modeling Capabilities and Practices		
Cause of Tripping	**Can Be Accurately Modeled in Positive Sequence Simulations?**	**Can Be Accurately Modeled in EMT Simulations?**
Erroneous frequency calculation	No	Yes
Instantaneous* ac overvoltage	No	Yes
PLL loss of synchronism	No	Yes
Phase jump tripping	Yes	Yes
DC reverse current	No	Yes
DC low voltage	No	Yes
AC overcurrent	No	Yes
Instantaneous* ac overvoltage—feeder protection	No	Yes
Measured underfrequency—feeder protection	No	No**

* Sub-cycle ** Due to very limited protective relay models in EMT today

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Key Finding

The majority of BPS-connected solar PV plant owners and operators are unaware of the abnormal behavior of their inverter and plant-level controller responses to BPS fault events until the RC, BA, TOP, Regional Entity, or NERC identifies a more widespread issue. This is leading to more common widespread solar PV reductions to fault events than is necessary or warranted. PRC-004-6 does not require any analysis or reporting of large reductions in inverter-based resource facilities caused by either the protection or controls. The RSTC should direct its technical sub-groups to develop a SAR to address this gap to ensure that mitigating actions are developed to eliminate abnormal tripping and response of inverter-based resources to BPS fault events. Without any further action, these issues will continue to persist. Furthermore, the analyses should also be reported to the TP and PC, who should perform model quality checks to ensure their dynamic models accurately capture these unexpected performance issues.

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The purpose of NERC PRC-004-6 is to “identify and correct the causes of misoperations of protection systems for BES elements” and is the one NERC Reliability Standard that drives the analysis of protection system misoperations and corrections to any identified abnormalities.

The requirements focus specifically on misoperations where the protection system fails to operate. The requirements apply to TOs, GOs, and distribution providers; however, the requirements ultimately do not cover situations where protection operates unexpectedly due to external faults.

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For example, a number of facilities analyzed for this event report that their inverters all tripped within the facility, but this was "correct operation" based on the inverter controls. However, these abnormal responses from the protection and control systems of inverter-based resources result in systemic and widespread reduction in power output from these facilities with ultimately no follow-up analysis to mitigate its occurrence.

This leads to a widespread lack of understanding of inverter response to fault events, possible abnormal tripping issues, and very few plant owner/operators performing any post-event forensic analysis of their inverter and plant-level control behavior. Many facilities were unaware that their inverters had responded abnormally until ERCOT administered the RFI and the review team held one-on-one follow-ups with each facility.

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Industry needs to improve the mandatory analysis and reporting of these types of abnormal tripping issues. The protection and controls within BPS-connected inverter-based resources should be analyzed after fault events when protection results in the tripping of individual inverters or protection systems in the facility that trip more than 75 MVA of aggregate resources (NERC's jurisdiction).

This should also be analyzed for any control systems that cause that same reduction of power output for more than 1–2 minutes. Presently, there is no standard requirement for any of this analysis to be performed, and this is leading to performance gaps and unreliable operation of these facilities.

This analysis should be linked to model quality analyses conducted by the TP and PC who should have the ability to correct any modeling deficiencies identified by this type of performance assessment.

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Under high inverter-based resource penetrations, **there is a delicate tradeoff between an expeditious interconnection process (timelines, costs, scheduling, etc.) and due diligence to address reliability concerns**, such as ride-through performance, operation in low short-circuit strength networks, subsynchronous resonance and control interactions, and other issues that may arise. **Industry is challenged with recognizing that having both a quick interconnection process and addressing these reliability issues is a significant challenge not realistic and in many cases due to the types of analyses needed under these conditions.** NERC recognizes that improvements to the FERC generator interconnection process are likely needed to balance these issues and is committed to working with FERC to develop solutions that can help industry both achieve effective interconnection processes while still ensuring reliable operation of the BPS.

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PLANT K SUMMARY STATEMENT IS INDICATIVE OF OVERALL REPORT

The combination of these two findings raises concerns by NERC that the existing standards and interconnection requirements do not mitigate reliability risks appropriately. Plants are being commissioned with improperly tuned and coordinated controls and protection settings. Plants are abnormally responding to BPS disturbance events and ultimately tripping themselves off-line. These issues are not being properly detected by the models and studies conducted during the generator interconnection study process nor during annual planning assessments. Improvements to the generator interconnection procedure, agreements, and study processes are strongly recommended.

Questions ?

2021 TAG Work Plan

Rich Wodyka

Administrator

2021 NCTPC Overview Schedule

Reliability Planning Process

- Evaluate current reliability problems and transmission upgrade plans
- Perform analysis, identify problems, and develop solutions
- Review Reliability Study Results

Local Economic Planning Process

- Propose and select Local Economic Studies and Public Policy Study scenarios
- Perform analysis, identify problems, and develop solutions
- Review Local Economic Study and Public Policy Results

Coordinated Plan Development

- Combine Reliability and Local Economic Study and Public Policy Results
- OSC publishes DRAFT Plan
- TAG review and comment

TAG Meetings

1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter

January - February – March

➢ 2020 Study Update

- ✓ **Receive Final 2020 Collaborative Transmission Plan Report**
- ✓ **Receive Draft 2020 Off-shore Wind Study Report**
  - *TAG provide input to the OSC on Offshore Wind Study results*

➢ 2021 Study – Finalize Study Scope of Work

- ✓ **Receive request from OSC to provide input on proposed Local Economic Study scenarios and interfaces for study**
  - *TAG provide input to the OSC on proposed Local Economic Study scenarios and interfaces for study*
- ✓ **Receive request from OSC to provide input in identifying any public policies that are driving the need for local transmission**
  - *TAG provide input to the OSC in identifying any public policies that are driving the need for local transmission for study*
- ✓ **Receive final 2021 Reliability Study Scope for comment**
  - *TAG review and provide comments to the OSC on the final 2021 Study Scope*

January - February – March

First Quarter TAG Meeting – March 22nd

- **2020 Off-shore Wind Study Analysis**
  - ✓ **Receive report on and discuss the 2020 Off-shore Wind Study Results**
- **2021 Study Update**
  - ✓ **Receive a report on the Local Economic Study scope and any public policy scenarios that are driving the need for local transmission for study**
  - ✓ **Receive a progress report on the Reliability Planning study activities and the 2021 Study Scope**

April - May – June

Second Quarter TAG Meeting – June 7th

- **2021 Study Update**
  - ✓ **Receive a progress report on study activities**
  - ✓ **Receive update status of the upgrades in the 2020 Collaborative Plan**

July - August – September

Third Quarter TAG Meeting – October 25th

- **2021 Study Update**
  - ✓ **Receive a progress report on the study activities and preliminary results**
  - ✓ **TAG is requested to provide feedback to the OSC on the technical analysis performed, the problems identified as well as proposing alternative solutions to the problems identified**
  - **TAG input requested by November 3rd**

October - November - December

Fourth Quarter TAG Meeting – December 6th

- **2021 Selection of Solutions**
  - **TAG will receive feedback from the OSC on any alternative solutions that were proposed by TAG members**
- **2021 Study Update**
  - **Receive and discuss final draft of the 2021 Collaborative Transmission Plan Report**
  - **Discuss potential study scope scenarios for 2022 studies**

Questions ?

TAG
Open Forum Discussion

Comments or Questions ?