WECC

Best Practices for Energy Emergency Alerts

WECC Energy Emergency Alert Advisory Group

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Introduction

The WECC August 2020 Heatwave Event Analysis Report recommended that subject matter experts (SME) in the industry should create a document of best practices to use while in an Emergency Energy Alert (EEA) state. The WECC Event Analysis and Situation Awareness department formed the EEA Advisory Group (AG) to help create the document.

After soliciting volunteers, the AG was formed with members from several Reliability Coordinators (RC), Reserve Sharing Groups (RSG), and Balancing Authorities (BA) within the Western Interconnection. The members of the AG were able to share ideas to create this document, which identified common best practices that can be considered in real-time operations and used to assist operating personnel in future events.

Understanding EEAs

An EEA is an emergency procedure defined in the NERC Reliability Standards EOP-011 in which a BA has an energy emergency within its area and may need assistance from others. For instance, when a BA is unable to meet its demand obligations or is unable to maintain enough reserves, it can request the RC to declare an EEA to communicate the need to receive emergency assistance. A BA can be placed into one of three EEA levels based on the severity of the event, where level 1 is the least severe, and level 3 is the most severe. An EEA, however, is something that should not be used as a daily operating practice.

EEA Best Practices

Within EOP-011, Attachment 1 is included to establish a process and description of the three levels of an EEA. Some information is straightforward, and other parts are left open for RCs and BAs to decide how they should be applied. The following information is provided to help the RCs and BAs identify actions they can take to help prevent an EEA, or actions to consider while in an EEA state.

Common Communication

It is important to communicate information effectively and consistently to help others know what is happening and, if possible, assist when needed by a deficient BA. The EEA AG believes the items in the following sections should be considered.

EEA Communication Procedure

The RCs and BAs should have a well-documented communication procedure for operating during different levels of an EEA that include steps to follow and a contact list for communication. The communication should be done through a predetermined method that is visible to other BAs and RCs, as well as WECC Situation Awareness (SA), so the emergency can be understood and

mitigated appropriately (ex., each RC's reliability messaging system). Standard templates or checklists are recommended.

What information should be in the communication?

When an EEA is declared, the following information should be considered in the communication from the RC or affected BA:

- **RC** issuing the EEA.
- **BA** affected, EEA level being issued, and BA contact information.
- **EEA** effective time—The start time and end time of the EEA, including the initial EEA level when the BA was placed in an EEA. Also, the event could include more than one level if the EEA were to escalate from one level to another.

A template for a brief, emergency communication might look like this:

> Effective [XXXX] hrs. PPT, The RC West Reliability Coordinator has declared an EEA-3 for [entity]. Please contact the deficient entity at (XXX) XXX-XXXX if you can provide emergency assistance.

Additional brief information can be provided by the RC or affected BA to give context to the cause of the emergency (ex., impact of wildfire, loss of generation).

Updates and Continued Messaging

If the BA is issued an EEA that is expected to last for a long duration, consider providing updates to the interconnection, including:

- **Notify** as far in advance as possible to all affected entities.
- **Status and forecast** (getting better, worse, Contingency Reserves and ability to maintain, generation, transmission).
- **RSG members**—Can the RSG provide additional reserves?
- **Load**—Is Qualifying Demand Response Load, or Firm Load designated as Contingency Reserve dispatchable and offline to full value in 10 minutes?
- **Processes** in place to dispatch load management per company policy.

Who Should Communicate?

The System Operators of affected entities will be busy during system emergencies and may need help communicating. This should be addressed in Operating Plans. Because real-time system operations staff must focus on maintaining reliability, another layer of support (ex., emergency coordination teams) may need to handle the emergency communications.

Who is Notified?

As affected entities have time, phone calls may take place between the entity and its RC, appropriate communication should also be provided to the interconnection to raise the level of situation awareness.

Timing

If BAs or RCs identify potential upcoming issues, communication should occur as far in advance as possible to allow others to prepare to assist.

The RC is not required to have an EOP-011 Emergency Procedure, but it is recommended that the RC have specific EOP-011 plans or procedures and include a process to issue a warning or watch in the day(s)-ahead horizon to provide notice of potential EEA declarations. This would allow an assisting BA to make long-start generation available and arrange for scheduling. Of note, RC West is now issuing an RC West EEA Watch ahead of EEA Level-1 when it sees issues in its advance outlook.

Tone

Messages should avoid prescriptive solutions to allow other BAs to come to the affected BA with solutions they can provide. If a solution is provided, it is recommended to include it as a suggestion but continue asking for help.

Terms

Identify and use similar industry terms in the templates or messages to help ensure the emergency is understood. At a minimum, language used in NERC Standard EOP-011 should be used. The terms *emergency*, *EEA* (EEA is defined in EOP-011), and *transmission emergency* can mean different things depending on how each company uses them internally. Even the terms *load shed*, and *firm load shed* can have different applications and be understood differently.

Considerations during an EEA

Every EEA is unique. The RC and BA should consider the following factors to help make decisions during the EEA lifecycle.

Health of the Interconnection

The overall health of the interconnection should be evaluated for stability, which includes making sure:

- **RTCA** results do not identify any post-contingency overloads or cascading outages related to the emergency with no real-time System Operating Limit (SOL)/ Interconnection Reliability Operating Limit (IROL) exceedances;

- **Frequency** of the Interconnection is within normal steady-state bounds and is stable;
- **Forecast** information for the next hour(s) does not indicate additional concerns (ex., additional BAs being placed in an EEA).

BA's Ability to Operate

The BA is still able to perform its responsibilities of maintaining required reserves, and either balancing its Area Control Error (ACE) or not negatively affecting the interconnection if unable to balance ACE.

Studies to Assess Effects of EEA

Tools should be used, and studies performed as needed (ex., every hour), to help with the analysis. For instance, a dynamic stability analysis can be performed by the RC to help determine the impacts on the interconnection of a BA that will remain in an EEA for several hours. The study should at least confirm whether the BA is in a potential load shed condition and examine frequency response across the interconnection to determine whether generation loss would lead to underfrequency load shedding.

As the study takes time to perform, the BA needs to coordinate with the RC. The RC may need to limit the number of requests to run studies to avoid straining resources.

Develop an EEA Prevention Plan

Develop plans to help manage loading before an EEA event occurs. Best practices for this type of plan could include the following.

Communication

Develop and identify when to use a pre-EEA level or EEA watch process to raise awareness and allow entities additional time to secure energy resources. Customer notifications can help with energy conservation measures by directly reducing their use or moving loads such as battery charging to non-peak load times.

Meetings can be held between merchant and BA operations to discuss peak times, corporate communications, and outreach. Government agencies should be contacted if there is a need for actions such as easing environmental constraints to increase generation availability.

BAs should declare restricted maintenance or no-touch conditions as early as possible and consider carrying reserves beyond those required when EEA conditions are forecast. The generator operators can provide information on their ability to increase capacity and whether generation can return to service earlier than planned.

Forecasting

Entities should perform a short-term risk or adequacy assessment in advance (ex. 2–7 days) and again the day before. Best practice considerations include:

- **Margins** for sustaining contingency reserves and unit commitments;
- **Load**—current and forecast;
- **Temperature**—potential range for the day;
- **Generation** schedule and source and renewable forecast to help identify any issues (transmission constraints)
- **Reserve** requirements vs. a range of forecast actual commitments; and
- **Transmission-**based limitations and plans for forced outages.

These assessments should include a means to quickly identify limitations individually or by area. Colors are often used to help with this type of identification: NERC uses green, yellow, and red in its regional assessment daily reports to identify threat conditions.

Best Practices for EEA Levels

The following sections list the EEA circumstances per EOP-011, a scenario providing an example of system conditions resulting in the need for the EEA, and some best practices that can be employed during the EEA.

EEA-1—All available generation resources in use

Circumstances per EOP-011Attachment 1:

- The Balancing Authority is experiencing conditions where all available generation resources are committed to meet firm Load, firm transactions, and reserve commitments, and is concerned about sustaining its required Contingency Reserves.
- Non-firm wholesale energy sales (other than those that are recallable to meet reserve requirements) have been curtailed.

Scenario

- On a peak day, a BA has a Contingency Reserve Obligation of 402 MW from a forecast 8,000 MW of load and 5,400 MW of generation in HE19. In HE13, a 500 MW generator is forced offline and not able to return until the next day at the earliest. The BA recovers from the contingency and, as the day progresses, deploys all available generation and curtails all non-firm exports. Those actions are sufficient for the BA to meet the 402 MW Contingency Reserve requirement through HE19. (Note that the RC does not have visibility of BA curtailments, so the BA needs to inform the RC of all actions before making a request.)

Going into the hour, the BA requests the RC to declare an EEA-1 for visibility even though no additional actions are needed.

The RC and BA have communicated that the BA has deployed all available resources, can meet required reserves and load demand, and has been placed into an EEA-1. The RC and BA review and agree on the next steps in the emergency procedure should conditions worsen.

Best Practices during an EEA-1

- **Review** and apply the section above for Common Communications.
- **Ensure** that recallable non-firm wholesale energy sales can be easily identified for curtailment.
- **Agree** on the next steps should the conditions worsen.

EEA-2—Load management procedures in effect

Circumstances per EOP-011 Attachment 1:

- The Balancing Authority is no longer able to provide its expected energy requirements and is an energy-deficient BA.
- An energy deficient Balancing Authority has implemented its Operating Plan(s) to mitigate Emergencies.
- An energy deficient Balancing Authority is still able to maintain minimum Contingency Reserve requirements.

For a list of responsibilities, refer to EOP-011Attachment 1.

Scenario

- On a peak day, a BA has a Contingency Reserve Obligation of 402 MW from a forecast 8,000 MW of load and 5,400 MW of generation in HE19. In HE13, a 500 MW generator is forced offline and not able to return until the next day at the earliest. The BA recovers from the contingency and, as the day progresses, deploys all available generation, curtails all non-firm exports, but those actions leave it with a forecast 350 MW of Contingency Reserves through HE19. The BA requests its RC declare an EEA-2 and then requests the public conserve energy and activate its Demand-Side Management (DSM) programs, which gets the BA a 60 MW load reduction that allows those resources to be used to maintain its Contingency Reserve Obligation.

In addition to the circumstance and requirements identified in the EOP-011Attachment 1, the BA is performing its responsibilities per its Operating Plan but is still able to maintain its required level for contingency reserves and no other issues are identified.

Best Practices during an EEA-2

- **Communicate** through the event with the recommendations in the Common Communications section. Notify any RC, BA, or TOP affected by delivery of emergency energy between RC areas, coordinate communications with your RC.
- **Reliability Coordinators,** to prevent any unintended results to the interconnection when evaluating and mitigating transmission limitations, consider performing studies before adjustment of facility ratings using ambient temperature, recalling equipment outages, and adjusting phase shifters .
- **Balancing Authorities**, in advance, identify a list of contract generators capable of providing Contingency Reserves, initiate contracts as needed. Seek emissions waivers under the Federal Power Act. Continue to be aware of your BAL-001 performance.
- **Transmission Operators** consider developing a range of temperature-based ratings rather than just seasonal ratings.
- **Load Reduction** can be achieved by working with entities and customers to postpone battery charging, working with high-load customers to voluntarily reduce load and, if needed, tripping contracted load above the contract limits and seeking voluntary load shedding.

EEA-3—Firm Load interruption is imminent or in Progress

Circumstances per EOP-011 Attachment 1:

- The energy-deficient Balancing Authority is unable to meet minimum Contingency Reserve requirements.

For a list of responsibilities, refer to EOP-011 Attachment 1.

Scenario

- On a peak day, a BA has a Contingency Reserve Obligation of 402 MW from a forecast 8,000 MW of load and 5,400 MW of generation in HE19. In HE13, a 500 MW generator is forced offline and not able to return until the next day at the earliest. The BA recovers from the contingency and, as the day progresses, deploys all available generation, curtails all non-firm exports, requests the public to conserve energy, and activates its DSM programs, but those actions are only enough to leave it with 200 MW of Contingency Reserves through HE19. The BA's RC declares an EEA-3, and, because its MSSC is 450 MW, the BA prepares to shed 250 MW of firm load to be used toward contingency reserves if another Balancing Contingency Event (BCE) were to occur. Because it can maintain its ACE within acceptable limits, is not negatively affecting the interconnection, and experiences no further generation trips, the BA does not shed load.

In addition to the circumstance and requirements identified in the EOP-011 Attachment 1, the BA is performing its responsibilities per its Operating Plan but is unable to maintain its required level for contingency reserves and is using firm load that can be shed within 10 minutes as reserves or shedding firm load per its Operating Plan.

Best Practices during an EEA-3

- **Communicate** through the event using the recommendations in the Common Communications section. BAs providing assistance should notify their RC of involved entities, reserves dispatched, method of dispatch, and study-based contingency plans that identify any issues.
- **Contingency Reserves** can be provided by arming firm load that can be tripped in 10 minutes or less. Ideally, this load should be geographically diverse, not include critical facilities, and not exceed the BA Contingency Reserve Obligation. Dynamic and Voltage stability analyses of MSCC loss should show no potential stability issues and no interaction with other existing grid conditions (ex. wildfires). If there is insufficient load to arm, the BA should consider the need to shed load.
- **Schedule cuts** to firm schedules should be pro rata with firm load shed. This can reduce the amount of load shed but should be communicated and coordinated in advance. Identifying ways to reliably relax import limitations can offset the need for schedule cuts or load shedding.
- **Load shed** procedures should distinguish between circuits with UFLS and those without. UFLS circuits, starting with the final stage (lowest frequency), should be manually shed only as a last resort.

Downgrading or Returning to pre-Emergency conditions:

Circumstances per EOP-011 Attachment 1:

- Whenever energy is made available to an energy deficient Balancing Authority such that the Systems can be returned to its pre-Emergency SOLs or IROLs condition, the energy deficient Balancing Authority shall request the Reliability Coordinator to downgrade or terminate the alert level.

At this point, if SOLs or IROLs were increased during the event, they can be returned to normal operational limits. Termination of all EEAs (Return to EEA-0) can occur when the energy-deficient Balancing Authority can meet its Load and Operating Reserve requirements. All firm load shed during the event should be returned or be in the process of being returned. RCs may consider a downgrade to the EEA when the BA is able to maintain its minimum Contingency Reserves even if the TOP is still in the process of restoring firm load.

Post EEA

Lessons learned from system events can help educate the industry. When events occur, TOPs, BAs, and RCs are encouraged to identify best practices and opportunities for improvements and send them to the WECC SA team so they can be confidentially communicated to the WECC Performance Work Group.

If a manual load shed was performed, analyze the time it took to perform the action, the amount of actual load shed, and the target load shed amount to help improve any calculations done for future needs.

Additional Best Practices

The following is a list of general best practices that should be considered.

- **Reliability Coordinators** can help with coordination of information and awareness during emergencies. Slowing things down during communications will help make sure participants understand what is happening and will have a calming influence during communications.
- **Reserve Sharing Groups** can help provide visibility to identify impacts on the interconnection. The RC should be knowledgeable on any RSG procedures involving EEAs and Contingency Reserve Obligation (CRO) deficiencies. It is not necessary for the RC to issue an EEA to a BA that is deficient in its obligation if they are a member of an RSG and the RSG is not deficient in its obligation. It is not necessary for the RC to issue Operating Instructions to a BA while they are calling on Contingency Reserves from their RSG unless they are outside the rules of that RSG or the requirements in BAL-002-WECC-3.
- **Plans** should include experienced staffing during critical times and an established System Operator playbook designed for the RC/BA that includes System Operator feedback from prior emergencies.
- **Training** System Operators on EEA events should include EEA levels, load shed, and should involve GOPs, RSGs, RCs, TOPs, using simulators when possible. The training should stress communication, terminology, and any procedures or regional playbooks to provide the most effective results.
- **Islanding** during an event may require suspension of market activities and may also require use of RSG backup procedures if source and delivery points are affected.

Additional References

The following links are references to help provide additional information or practices.

- NERC Lessons Learned—Preventing Energy Emergency Alerts
    - Podcast
- NERC Lessons Learned—Capacity Awareness During an Energy Emergency Event

- CAISO System Operations Emergency Plan
- SPP Emergency Operating Plan
- RC West System Emergencies Procedure
- NWPP Reserve Sharing Program Documentation
- Guidelines for Sending Messages Across RC Seams
- EOP-011 Emergency Operations Standard
- https://www.nerc.com/comm/RSTC_Reliability_Guidelines/Reliability_Guideline_Template_Operating_Reserve_Management_Version_3.pdf