



Capacity Load Shed

February 27, 2020

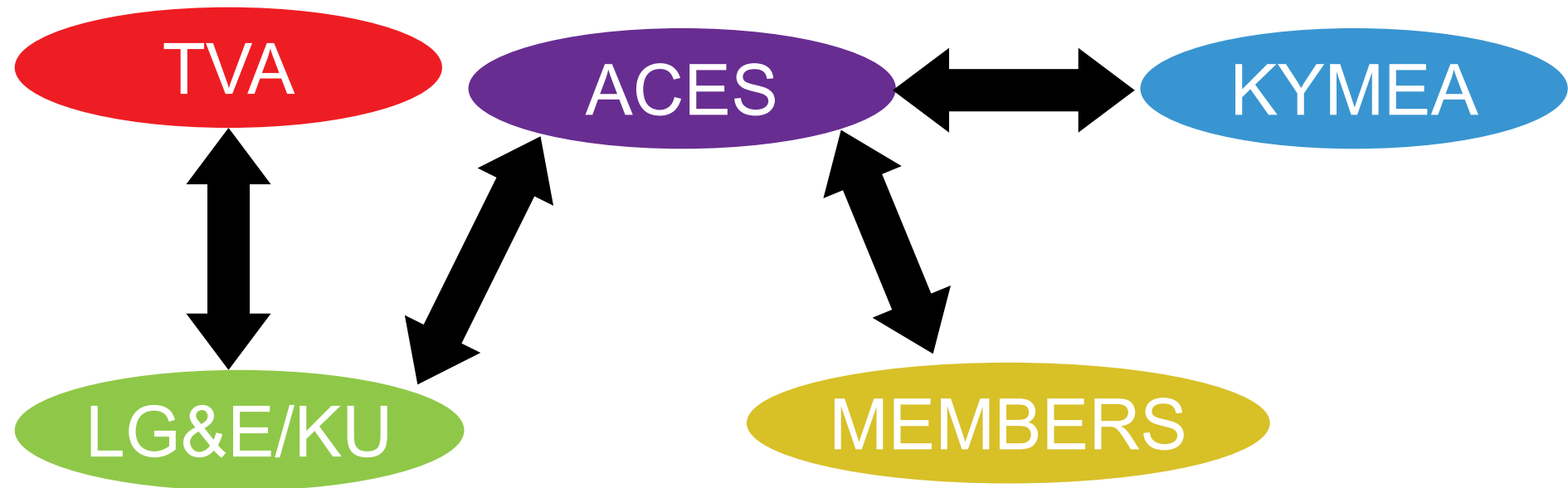
Tabletop Discussions

- LG&E/KU, KYMEA, KMPA, OMU and ACES
 - Met at LG&E/KU's Simpsonville Facility on January 29, 2020
- Participated in what if scenarios, system wide
 - Walked through a series of events that resulted in Energy Emergency Alerts to be declared by LSEs within the LG&E/KU Balancing Authority (BA)
 - Discussed how/what actions would be taken and how those would be communicated
- Identified strengths/weaknesses
- Developed actions items to address shortfalls and report back to LG&E/KU with plans by May 4, 2020

Tabletop Discussions

- In the event of an EEA, KYMEA has 90 minutes to correct the shortfall (5% of previous year's peak determines imbalance threshold)
- TVA will be asking LG&E/KU who in turn will be asking KYMEA what are you going to do?
- Any decision to curtail load will be a direct order from/to NERC certified personnel

Proposed communication
path for discussion



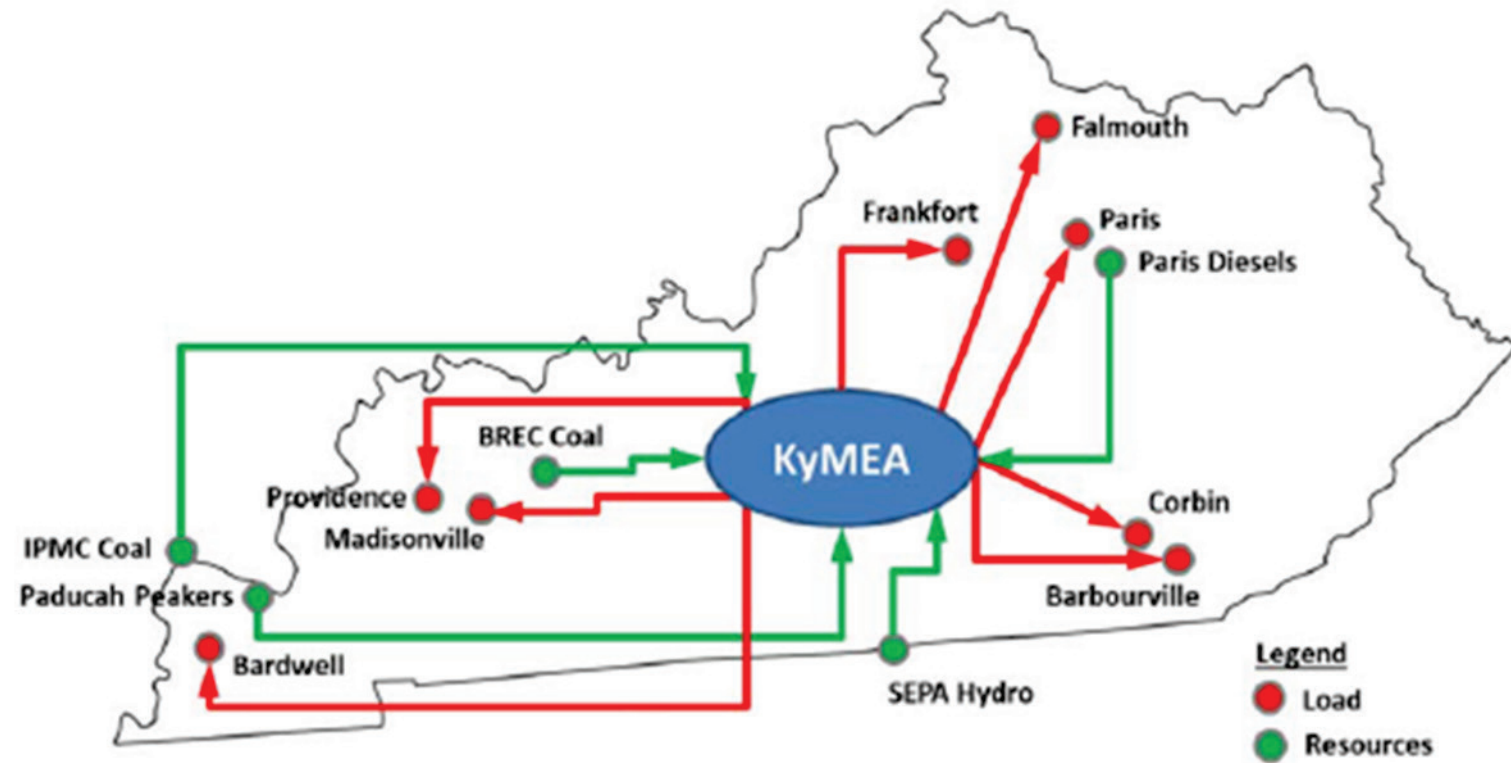
KYMEA To-dos

- Determine the point of contact with LG&E/KU (time is of the essence)
 - ACES (around the clock communications with LG&E/KU)
 - Members (expertise/knowledge of their own systems)
 - KYMEA (coordination, kept in the loop)
- Identify Circuits (must be unique from those identified for under frequency)
 - Locations?
 - Controls?
 - Size?
 - Critical?
 - Response time?
 - Interruptible loads?
 - Generation?

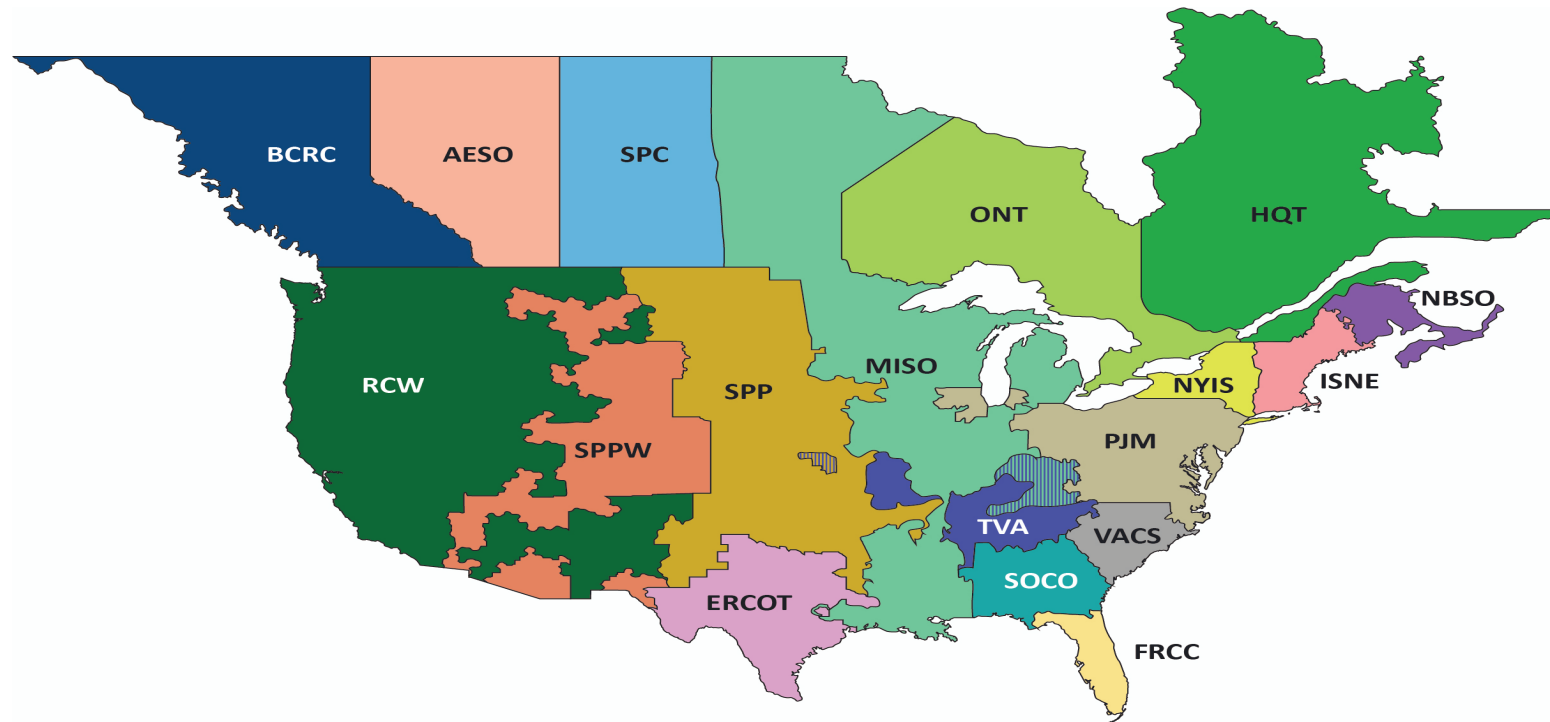
KYMEA To-dos

- Develop a Plan/Procedure
 - Communications between all parties
 - Contact list
 - Public appeal process
 - Staff at the ready
 - What other resources are available (submitted a request for CBM from LGEE)
 - MISO - requires transmission and ramp availability
 - PJM - requires transmission and ramp availability
 - TVA - unable to transact directly with TVA, would require delivery to the interface and LGEE network transmission
 - Paris
 - EEI
 - PPS – remaining capacity above/beyond KYMEA entitlement

KYMEA Today



NERC Reliability Coordinators



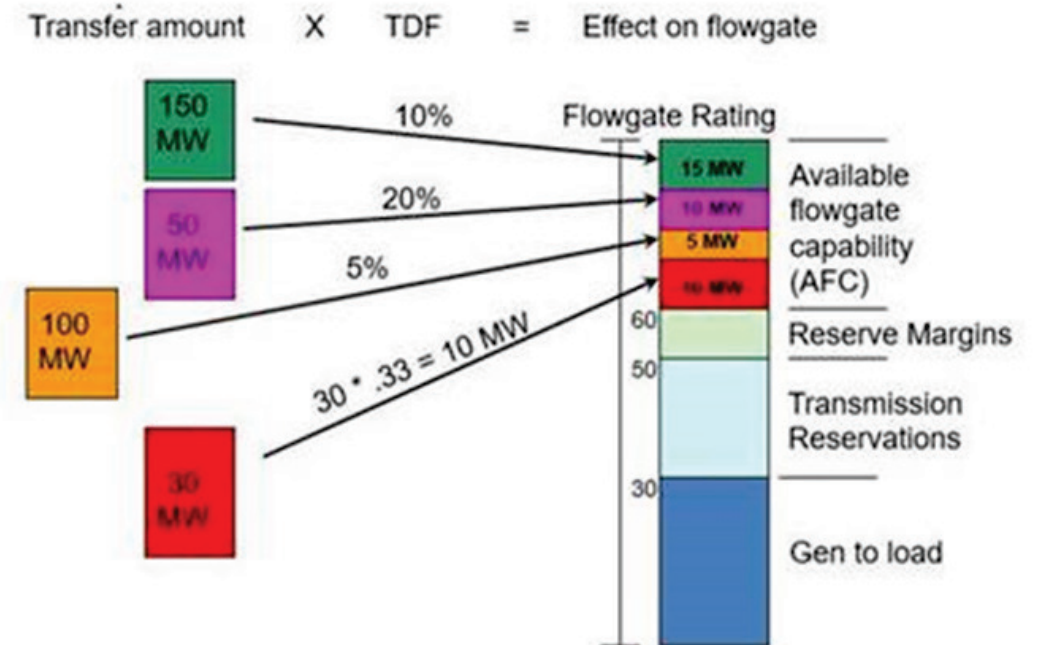
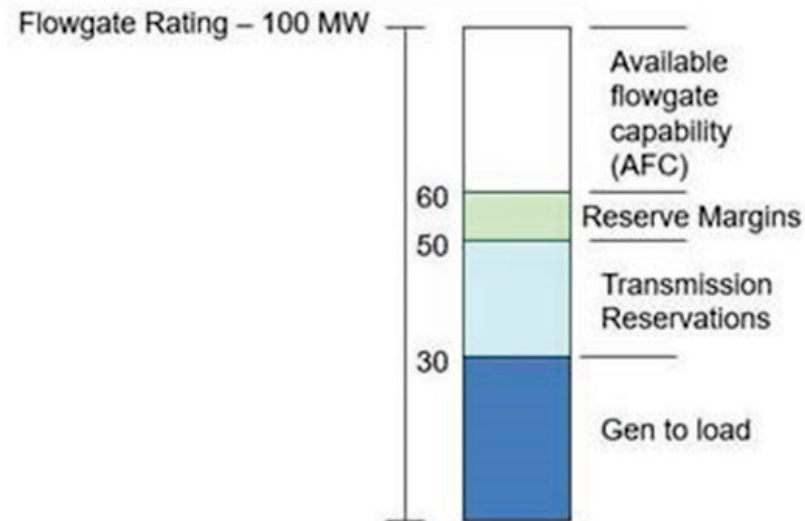
- | | |
|---|--|
| Alberta Electric System Operator | SPP West |
| British Columbia Hydro | PJM Interconnection |
| Electric Reliability Council of Texas | Reliability Coordinator West |
| Florida Reliability Coordinating Council | Saskatchewan Power Corporation |
| Hydro-Quebec TransEnergie | Southern Company Services, Inc. |
| ISO New England, Inc. | Southwest Power Pool |
| Midcontinent ISO | BAs receive RC Services from SPP or TVA |
| New Brunswick Power Corporation | Tennessee Valley Authority |
| New York Independent System Operator | BAs receive RC services from TVA or MISO |
| Ontario Independent Electricity System Operator | VACAR South |

NERC TLR Matrix

	TLR Matrix	TLR Level 0	TLR Level 1	TLR Level 2	TLR Level 3a	TLR Level 3b	TLR Level 4	TLR Level 5a	TLR Level 5b	TLR Level 6
TLR Description	Purpose and intent of TLR Level	TLR termination and Interchange Transaction restoration and notification	Notification of potential SOL or IROL violation	Hold transfers at present levels to prevent SOL or IROL violations	Reallocation of transmission service by curtailing non-firm transactions and allowing firm to flow	Curtail non-firm transactions to mitigate SOL or IROL violation	Gives operators time to reconfigure the transmission system to mitigate an SOL or IROL violation	Reallocation of transmission service by curtailing firm transactions and allowing higher priority firm to flow	Curtail firm transactions to mitigate SOL or IROL violation	Implement emergency procedures
	Conditions that may warrant calling this level of TLR	The Reliability Coordinator initiating the TLR Procedure shall notify all Reliability Coordinators within the Interconnection via the RCIS when the SOL or IROL violations are mitigated and the system is in a reliable state, allowing Interchange Transactions to be reestablished at its discretion. Those with the highest transmission priorities shall be reestablished first if possible.	The transmission system is secure. The RC foresees a transmission or generation contingency or other operating problem within its Reliability Area that could cause one or more transmission facilities to approach or exceed their SOL or IROL.	The transmission system is secure. One or more transmission facilities are expected to approach, or are approaching, or are at their SOL or IROL. The TLR level 2 is a transient state, which requires a quick decision to proceed to higher TLR levels to be implemented according to their transmission priority levels.	The transmission system is secure. One or more transmission facilities are expected to approach, or are approaching, or are at their SOL or IROL.	One or more transmission facilities are operating above their SOL or IROL, or such operation is imminent and it is expected that facilities will exceed their reliability limit unless corrective action is taken, or one or more Transmission Facilities will exceed their SOL or IROL upon the removal from service of a generating unit or another transmission facility.	One or more Transmission Facilities are above their SOL or IROL, or such operation is imminent and it is expected that facilities will exceed their reliability limit unless corrective action is taken.	The transmission system is secure. One or more transmission facilities are at their SOL or IROL. All Interchange Transactions using Non-firm Point-to-Point Transmission Service that are at or above the Curtailment Threshold have been curtailed. The Transmission Provider has been requested to begin an Interchange Transaction using previously arranged Firm Transmission Service that would result in a SOL or IROL violation. No further transmission reconfiguration is possible or effective.	One or more Transmission Facilities are operating above their SOL or IROL, or such operation is imminent, or one or more Transmission Facilities will exceed their SOL or IROL upon the removal from service of a generating unit or another transmission facility. All Interchange Transactions using Non-firm Point-to-Point Transmission Service that are at or above the Curtailment Threshold have been curtailed. No further transmission reconfiguration is possible or effective.	One or more Transmission Facilities are above their SOL or IROL. One or more Transmission Facilities will exceed their SOL or IROL upon the removal from service of a generating unit or another transmission facility.
Non-firm	Effect on current hour, non-firm tags	Reloads previously curtailed tags	Reloads previously curtailed tags	Prevents all tags with TDF > 5% from starting or increasing	N/A	Curtails tags with TDF > 5% until relief request is met. No reallocation	Curtails all tags with TDF > 5%	N/A	Curtails tags with TDF > 5%	Curtails tags with TDF > 5%
	Effect on current hour, non-firm market flow	Reloads previously curtailed market flow	Reloads previously curtailed market flow	Prevents all market flow with TDF > 0% from starting or increasing	N/A	Curtails market flow with TDF > 0% until relief request is met. No reallocation	Curtails all market flow with TDF > 0%	N/A	Curtails all market flow with TDF > 0%	Curtails all market flow with TDF > 0%
	Effect on next hour, non-firm tags	Reloads previously curtailed tags	Reloads previously curtailed tags	Prevents all tags with TDF > 5% from starting or increasing	Curtails/reallocates tags with TDF > 5% until relief request is met	Curtails/reallocates tags with TDF > 5% until relief request is met	Curtails all tags with TDF > 5%	Curtails tags with TDF > 5%	Curtails tags with TDF > 5%	Curtails tags with TDF > 5%
	Effect on next hour, non-firm market flow	Reloads previously curtailed market flow	Reloads previously curtailed market flow	Prevents all market flow with TDF > 0% from starting or increasing	Curtails/reallocates market flow with TDF > 0% until relief request is met	Curtails/reallocates market flow with TDF > 0% until relief request is met	Curtails all market flow with TDF > 0%	Curtails market flow with TDF > 0%	Curtails all market flow with TDF > 0%	Curtails all market flow with TDF > 0%
Firm	Effect on current hour, firm tags	Reloads previously curtailed tags	Reloads previously curtailed tags	N/A	N/A	N/A	N/A	N/A	Curtails tags with TDF > 5% until relief request is met	Curtails all tags with TDF > 5%
	Effect on current hour, firm market flow	Reloads previously curtailed market flow	Reloads previously curtailed market flow	N/A	N/A	N/A	N/A	N/A	Curtails market flow with TDF > 0% until relief request is met	Curtails all market flow with TDF > 0%
	Effect on current hour, firm NNL	Reloads previously curtailed NNL	Reloads previously curtailed NNL	N/A	N/A	N/A	N/A	N/A	Curtails NNL with GLDF > 5% pro rata with firm tags and firm market flow until relief request is met	Curtails NNL with GLDF > 5%
	Effect on next hour, firm tags	Reloads previously curtailed tags	Reloads previously curtailed tags	N/A	N/A	N/A	N/A	Curtails tags with TDF > 5% until relief request is met	Prevents all firm tags with TDF > 5% from starting or increasing	Curtails all tags with TDF > 5%
	Effect on next hour, firm market flow	Reloads previously curtailed market flow	Reloads previously curtailed market flow	N/A	N/A	N/A	N/A	Curtails market flow with TDF > 0% until relief request is met	Prevents all firm market flow with TDF > 0% from starting or increasing	Curtails all market flow with TDF > 0%
	Effect on next hour, firm NNL	Reloads previously curtailed NNL	Reloads previously curtailed NNL	N/A	N/A	N/A	N/A	Curtails NNL with GLDF > 5% pro rata with firm tags and firm market flow until relief request is met	Keeps NNL at current hour levels	Curtails NNL with GLDF > 5%

Flowgates

How do flowgates work?



$$\text{AFC} = \text{Rating} - \text{GTL} - \text{Transmission Reservations} - \text{Reserve Margins}$$

$$\text{New AFC} = \text{Previous AFC} - \text{Transfer Amount} \times \text{TDF}$$

$$= 100 - 30 - 20 - 10 - 10 - 5 - 10 - 15 = 0 \text{ MW}$$

Energy Emergency Alerts

1. EEA 1 — All available generation resources in use.

Circumstances:

- 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.

2. EEA 2 — Load management procedures in effect.

Circumstances:

- The Balancing Authority is no longer able to provide its expected energy requirements and is an energy deficient Balancing Authority.
- 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.

Energy Emergency Alerts

During EEA 2, Reliability Coordinators and energy deficient Balancing Authorities have the following responsibilities:

- 2.1 Notifying other Balancing Authorities and market participants. The energy deficient Balancing Authority shall communicate its needs to other Balancing Authorities and market participants. Upon request from the energy deficient Balancing Authority, the respective Reliability Coordinator shall post the declaration of the alert level, along with the name of the energy deficient Balancing Authority on the RCIS website.
- 2.2 Declaration period. The energy deficient Balancing Authority shall update its Reliability Coordinator of the situation at a minimum of every hour until the EEA 2 is terminated. The Reliability Coordinator shall update the energy deficiency information posted on the RCIS website as changes occur and pass this information on to the neighboring Reliability Coordinators, Balancing Authorities and Transmission Operators.
- 2.3 Sharing information on resource availability. Other Reliability Coordinators of Balancing Authorities with available resources shall coordinate, as appropriate, with the Reliability Coordinator that has an energy deficient Balancing Authority.

Energy Emergency Alerts

- 2.4 Evaluating and mitigating Transmission limitations. The Reliability Coordinator shall review Transmission outages and work with the Transmission Operator(s) to see if it's possible to return to service any Transmission Elements that may relieve the loading on System Operating Limits (SOLs) or Interconnection Reliability Operating Limits (IROLs).
- 2.5 Requesting Balancing Authority actions. Before requesting an EEA 3, the energy deficient Balancing Authority must make use of all available resources; this includes, but is not limited to:
 - 2.5.1 All available generation units are on line. All generation capable of being on line in the time frame of the Emergency is on line.
 - 2.5.2 Demand-Side Management. Activate Demand-Side Management within provisions of any applicable agreements.

Energy Emergency Alerts

3. EEA 3 —Firm Load interruption is imminent or in progress.

Circumstances:

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

During EEA 3, Reliability Coordinators and Balancing Authorities have the following responsibilities:

- 3.1 Continue actions from EEA 2. The Reliability Coordinators and the energy deficient Balancing Authority shall continue to take all actions initiated during EEA 2.
- 3.2 Declaration Period. The energy deficient Balancing Authority shall update its Reliability Coordinator of the situation at a minimum of every hour until the EEA 3 is terminated. The Reliability Coordinator shall update the energy deficiency information posted on the RCIS website as changes occur and pass this information on to the neighboring Reliability Coordinators, Balancing Authorities, and Transmission Operators.

Energy Emergency Alerts

- 3.3 Reevaluating and revising SOLs and IROLs. The Reliability Coordinator shall evaluate the risks of revising SOLs and IROLs for the possibility of delivery of energy to the energy deficient Balancing Authority. Reevaluation of SOLs and IROLs shall be coordinated with other Reliability Coordinators and only with the agreement of the Transmission Operator whose Transmission Owner (TO) equipment would be affected. SOLs and IROLs shall only be revised as long as an EEA 3 condition exists, or as allowed by the Transmission Owner whose equipment is at risk. The following are minimum requirements that must be met before SOLs or IROLs are revised:
 - 3.3.1 Energy deficient Balancing Authority obligations. The energy deficient Balancing Authority, upon notification from its Reliability Coordinator of the situation, it will immediately take whatever actions are necessary to mitigate any undue risk to the Interconnection. These actions may include Load shedding.

Energy Emergency Alerts

- 3.4 Returning to pre-Emergency conditions. 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 the alert level.
 - 3.4.1 Notification of other parties. Upon notification from the energy deficient Balancing Authority that an alert has been downgraded, the Reliability Coordinator shall notify the neighboring Reliability Coordinators (via the RCIS), Balancing Authorities and Transmission Operators that its Systems can be returned to its normal limits.
- Alert 0 - Termination. When the energy deficient Balancing Authority is able to meet its Load and Operating Reserve requirements, it shall request its Reliability Coordinator to terminate the EEA.
- 0.1 Notification. The Reliability Coordinator shall notify all other Reliability Coordinators via the RCIS of the termination. The Reliability Coordinator shall also notify the neighboring Balancing Authorities and Transmission Operators.