



Minimum Reserve Requirements and Operational Capacity Emergencies

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NERC Disturbance Control Performance Standard (BAL-002):

- Each Balancing Authority or Reserve Sharing Group shall activate sufficient Contingency Reserve to cover the most severe single contingency.
- A Balancing Authority shall recover its ACE 100% of the time within the default Disturbance Recovery Period (15 minutes after the start of a Reportable Disturbance).

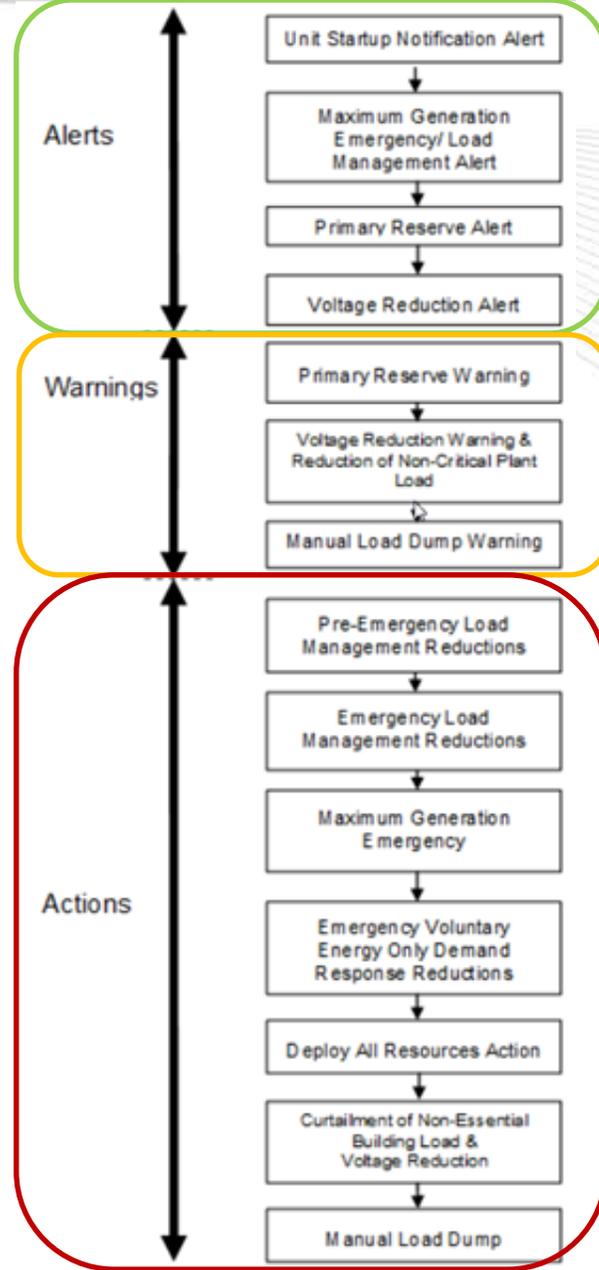
ReliabilityFirst Regional Criteria: Operating Reserves

Each Balancing Authority should have a minimum *Operating Reserves-Spinning* requirement of at least 50% of the Balancing Authority's most severe single contingency and the remainder of the Contingency Reserves to be made up of any combination of *Operating Reserves-Spinning* and *Operating Reserves-Supplemental*.

PJM Manual 13: Emergency Operations Section 2: Capacity Emergencies

Day-ahead Scheduling (Operating)	Contingency (Primary)	Synchronized Reserve ("Spinning")
Annual % (2018: 5.28%)	150% Largest Single Contingency	Largest Single Contingency

As system conditions dictate, PJM Dispatch will load Synchronized and Primary Reserves.

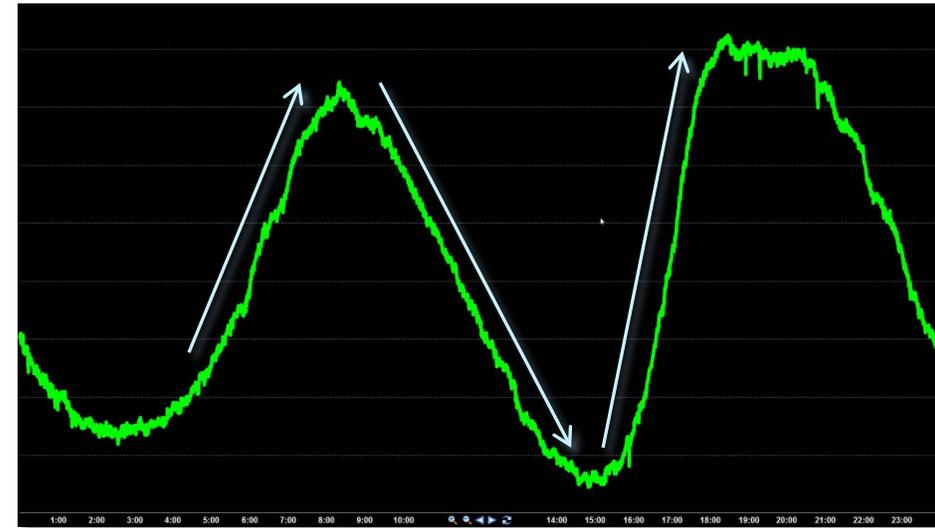


Alerts – issued **one or more days in advance** of the operating day for elevated awareness and to give time for advanced preparations.

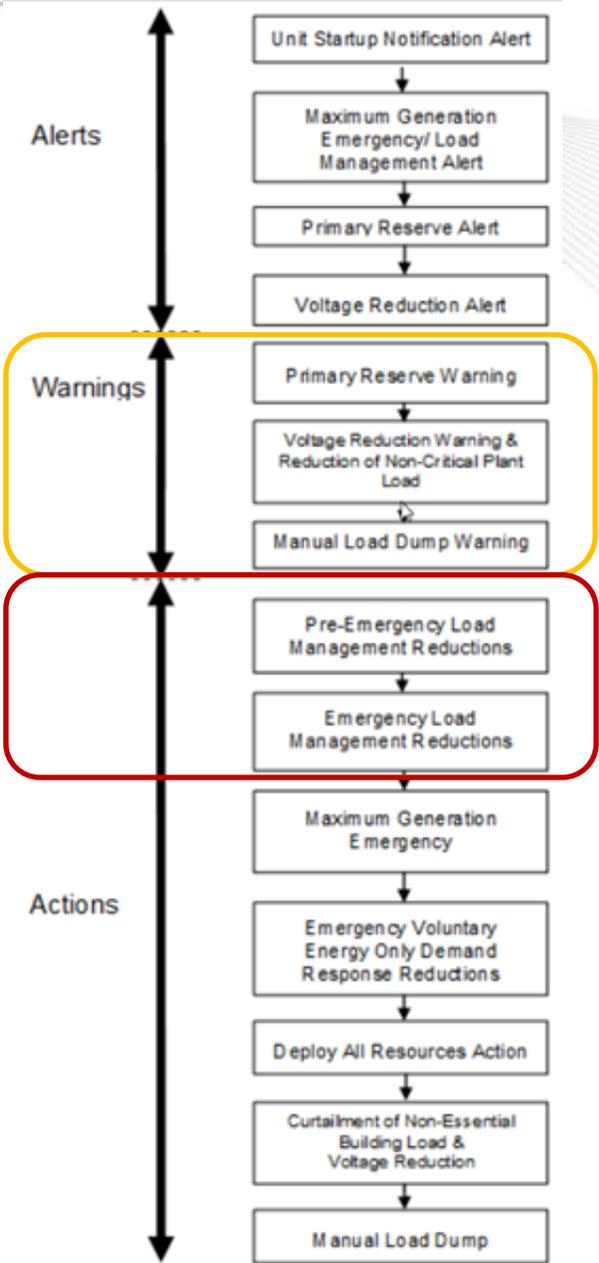
Warnings – issued **real-time**, typically preceding, and with an estimated time/window for a potential future Action

Actions – issued **real-time** and requires PJM and/or Member response (PJM actions are consistent with NERC EOP standards.)

PJM Manual 13: “PJM dispatchers have the flexibility of implementing the emergency procedures in whatever order is required to ensure overall system reliability.”



Procedures such as *Load Management Reduction Actions* require advance notice and will normally be issued prior to Warnings in order to ensure sufficient reserves are maintained.



Reserve Price Max: \$850/\$1700 (PR/SR)

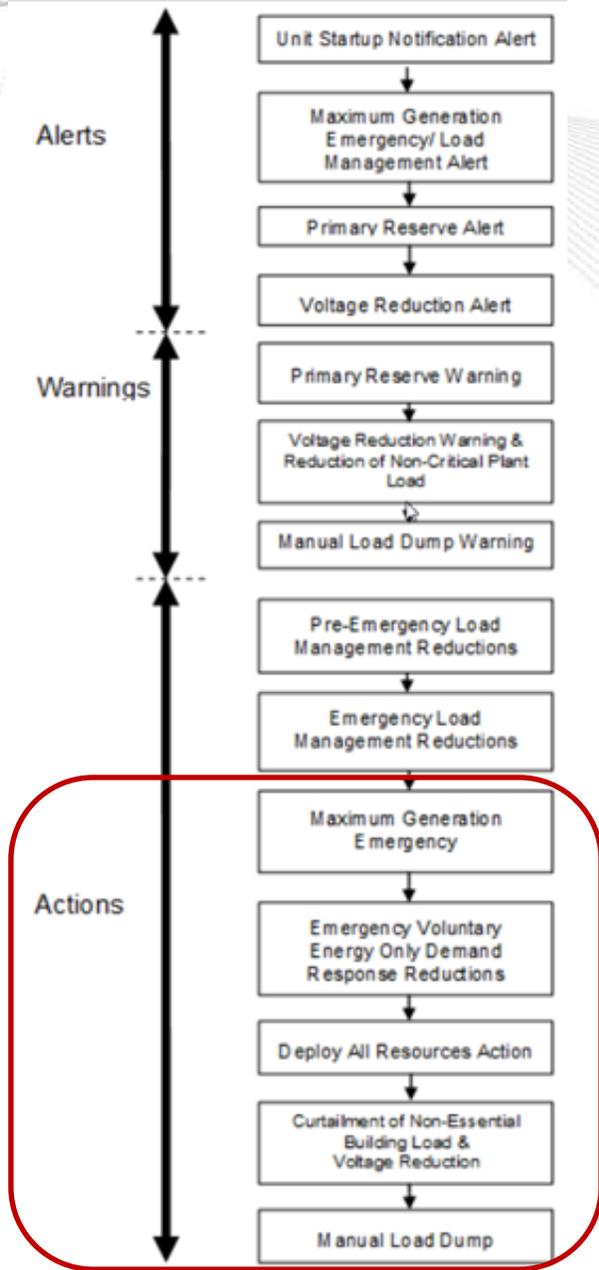
Load Management Reduction Actions: Dispatch Demand Response resources; Max **Energy** Offers of:

- 2 hours: \$1,100/MWh
- 1 hour: \$1,425/MWh
- 30 minutes: \$1,849/MWh

Primary Reserve Warning: Primary Reserve capacity is less than the Primary Reserve requirement.

Voltage Reduction Warning: Synchronized Reserve capacity is less than the Synchronized Reserve requirement

Manual Load Dump Warning: Primary Reserve capacity is less than the largest operating generator (or a transmission tripping jeopardizes reliable operations).



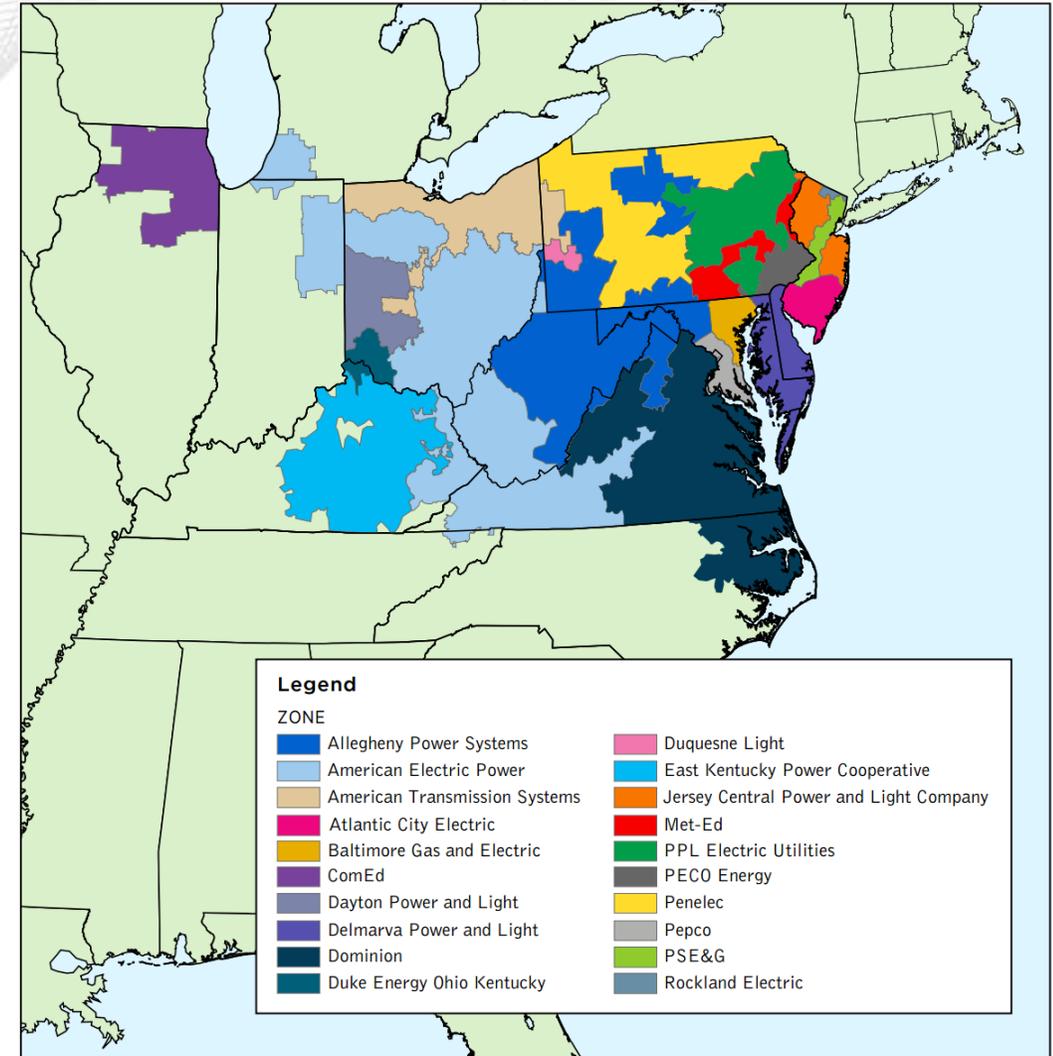
Maximum Generation Emergency Action: Generation is needed beyond the Economic Max MW energy level of all resources. (Units may be dispatched to Emergency Max MW limits.) Emergency Energy bids are requested. Energy Offers can be \$2000+/MWh.

Voltage Reduction and Manual Load Dump Actions: Initiation of these procedures causes automatic pricing of:

- Reserves: At the maximum level of the demand curve (\$850/\$1700).

Actions Implemented by Zone, Subzone or RTO

Warnings/Actions can be issued for the entire PJM RTO, specific Control Zone(s) or a subset of a Control Zone if transmission limitations exist.



- **NERC Standard BAL-002-0**
<https://www.nerc.com/files/BAL-002-0.pdf>
- **Reliability *First* Regional Criteria: Operating Reserves**
https://www.rfirst.org/ProgramAreas/Standards/Criteria/Regional%20Criteria%20Library/RFC_Criteria_BAL-002-02.pdf
- **PJM Manual 13** (Section 2: “Capacity Emergencies”)
<http://www.pjm.com/~media/documents/manuals/m13.ashx>