

# NERC

NORTH AMERICAN ELECTRIC  
RELIABILITY CORPORATION

# Bulk Power Operating Reserves

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**RELIABILITY | ACCOUNTABILITY**




- Three types of reserves
  - Frequency Response
  - Regulating
  - Contingency

- Frequency Response Reserve
  - Used to arrest Frequency decline
  - Deploys immediately
  - No System Operator intervention necessary

- Regulating Reserve
  - Used to keep resource and demand in balance
  - Deploys within seconds
  - Deploys automatically from resources connected to the system and on Automatic Generation Control (no System Operator intervention necessary)

- Contingency Reserve
  - Used to respond to system emergencies
  - Deploys in different time frames
  - Two types of Contingency Reserve
    - Spinning Reserve
      - Deploys in seconds from resources connected to the system and on Automatic Generation Control (no System Operator intervention necessary)
      - Deploys in minutes from resources connected to the system but not on Automatic Generation Control (System Operator intervention required)
    - Non-spinning Reserve
      - Deploys within 10-minutes from resources not connected to the system (i.e., fast start gas turbines, interruptible load, Demand Response)
      - System Operator intervention required



- Event occurs

- Frequency responsive reserves deploy immediately

- Regulating reserves deploy within seconds
- Spinning portion of AGC Contingency Reserves deploy within seconds

- Spinning portion of non-AGC Contingency Reserves deploy within minutes (System Operator action)

- Non-spinning (10 minute) reserves deploy (System Operator action)

- Frequency responsive reserves and Regulating Reserves re-established

$$ACE = \sum \text{generation} - \sum \text{load} - \text{losses}$$

- Following an event
  - Return ACE to zero if positive or zero pre-contingency
  - Return to pre-contingency ACE if negative
- Have Operating Process to determine Most Severe Single Contingency and have Contingency Reserve  $\geq$  MSCC
- Following an event, restore Contingency Reserve to MSCC





# Questions and Answers