

# Introduction to Ancillary Services

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# What are ancillary services?

- ▶ Ancillary services are defined as services necessary to support Capacity and the transmission of Energy from Resources to Loads while maintaining reliable operation of the transmission system in accordance with good utility practice
- ▶ Ancillary services are commonly known in the industry as a collection of secondary services offered to help insure the reliability and availability of energy to consumers.



# What ancillary services are NOT:

- ▶ Ancillary Services are NOT:
  - Buying or selling energy or generation capacity
  - Transmission Service – the ability to move energy around the transmission grid
  - Generation Interconnection Service – transmission needed to connect a generator to the transmission grid

# Who administers ancillary services?

- ▶ Ancillary services are offered by Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs)
- ▶ RTOs and ISOs are responsible for administering the transmission grid over large areas with the goal of providing nondiscriminatory access to the transmission system
- ▶ Missouri has electric utilities who are members of two RTO's: Midcontinent Independent System Operator and the Southwest Power Pool

# Ancillary Services required by RTO's/ISOs by FERC Order 888

- ▶ Schedule 1 – Scheduling, System Control, and Dispatch Service
- ▶ Schedule 2 – Reactive Supply and Voltage Control from Generation Sources Service
- ▶ Schedule 3 – Regulation and Frequency Response Services
- ▶ Schedule 4 – Energy Imbalance Service
- ▶ Schedule 5 – Operating Reserves – Spinning Reserve Service
- ▶ Schedule 6 – Supplemental Reserve Service

\* Schedules 3, 5, and 6 are included as part of MISO and SPP's ancillary services markets



# What do ancillary services provide?

- ▶ Services 3, 5 and 6
  - Flexible Capacity to be available when needed to maintain secure operation of the power system due to:
    - Loss or increase of Load (Demand)
    - Loss or increase of Resources (Generation/Transmission)

In sum, these services help to keep the system in balance

# Procurement of Ancillary Services

- ▶ Procurement of ancillary services can be cost-based or market-based
  - Cost-based: services offered at pre-determined regulated costs
  - Market-based: services provided at market rates, granted by state or federal authorities

# Ancillary Services Markets

- ▶ What are ancillary services markets?
  - Financial settlement markets for the efficient acquisition and pricing of ancillary services
  - Ancillary services markets price products that are most beneficial to the system (current or expected system conditions)
  - Clear identification of ancillary services products allows market participants to compete to provide services



# Operating Reserves

- ▶ Operating Reserves: products on the ancillary services market:
  - Regulating reserves
  - Spinning reserves
  - Supplemental reserves

# Regulation – regulating reserves

- ▶ Regulation Response Services, aka Automatic Generation Control (AGC), allow the system operator to physically balance supply and demand on a real-time, moment-to-moment basis
  - Provides just a little bit more or little bit less energy onto the system
- ▶ How is this accomplished?
  - Resource adjusts its output in response to a control signal
    - AGC: a software application that generates and transmits real-time control signals on a very short time frame (two to six seconds)

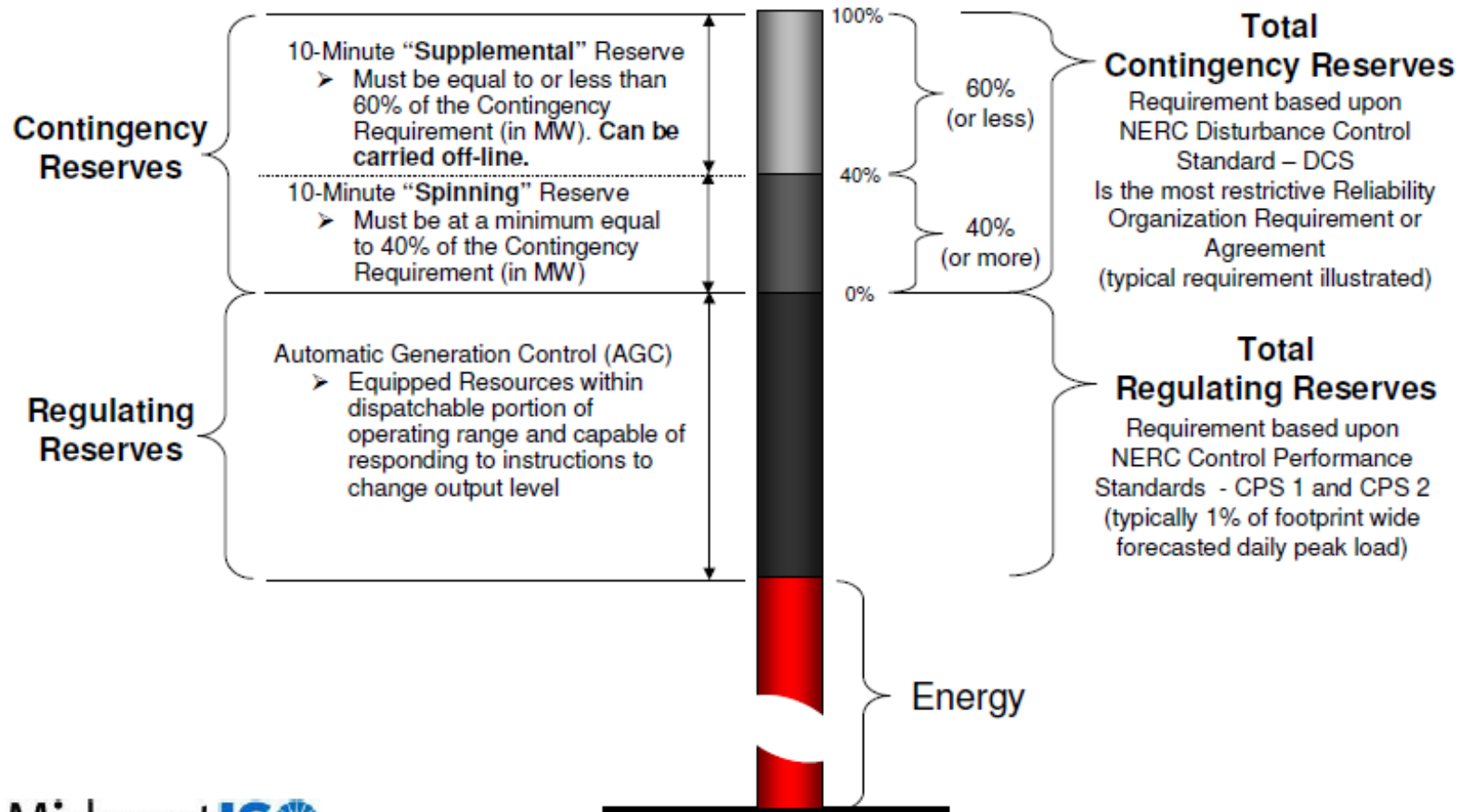
# Spinning Reserves

- ▶ Used to provide energy to meet demand on the system in the event of a sudden and unexpected loss of a generation or transmission resource
  - Capability of generation resources or other qualified resources already synchronized to the grid to reach their targeted output within ten minutes
- ▶ How is this accomplished?
  - Resources hold back or reserve a specified percentage of their capacity to meet the energy need

# Supplemental Reserves

- ▶ Used to provide energy to meet demand on the system in the event of a sudden and unexpected loss of a generation or transmission resource
  - Provided by generation resources, or other qualified resources, already synchronized or not currently synchronized to the grid, but which can be ramped up to supply energy within 10 minutes
- ▶ How is this accomplished?
  - Resources hold back or reserve a specified percentage of their capacity to meet the energy need.

# Operating Reserves Components



# Operating Reserves Requirements

- ▶ Set on two levels:
  - Market-wide operating reserves requirements
  - Zonal operating reserves requirements
    - Study run and published 2 days before the operating day
- ▶ Requirements set separately for regulating reserves and contingency reserves

# Goal of Reserve Zones

- ▶ Ensure deliverability into identified import constrained areas
- ▶ Provide a vehicle for electrical dispersion of reserves

# Co-Optimization of Energy and Operating Reserves Markets

- ▶ Co-optimization of energy and ancillary resources is intended to find the best option of resources for both reliability and economic purposes.
- ▶ The goal is to “keep the lights on” at the lowest possible price.



# Co-Optimization of Energy and Operating Reserves Markets

- ▶ Both the Day Ahead Market and Real Time Balancing Market will set prices for energy and operating reserve products as part of a co-optimized, least-cost solution
- ▶ Co-optimization will move reserves when it is more optimal to carry energy on a resource or vice versa
- ▶ Pricing mechanism will ensure the resource owner is indifferent to the product they are supplying

# Why Co-Optimize?

- ▶ There is a strong interaction between energy supply and the provision of operating reserve
  - Energy and operating reserve compete for available resource capacity
  - Co-optimization evaluates the lost opportunity costs trade-offs when allocating products (energy, operating reserves)

# Understanding Co-Optimization

- ▶ When clearing the market, the RTO must determine an operating schedule that:
  - Minimizes total production costs, based on market participants offers and bids
  - Maximizes market participants benefits for all market products on which they have submitted bids and offers

# Questions?