Operating Reserves Rules
Issues and Proposed Changes

RMWG
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Market Monitoring Unit

Top 10 operating reserve revenue units (by percent of total system): Calendar years 2001 to 2004

	Percent
2001	46.7%
2002	32.0%
2003	39.3%
2004	46.3%

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Top 10 operating reserve revenue units' markup: Calendar years 2001 to 2004

	Top Units' Markup	Steam Percent of Top 10	Steam Markup	Combined Cycle Percent of Top 10	Combined Cycle Markup
2001	0.03	60%	0.02	40%	0.07
2002	0.11	54%	0.08	46%	0.20
2003	0.17	50%	0.19	50%	0.11
2004	0.03	12%	0.00	88%	0.05

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Summary Data for Top Ten Operating Reserves Units

- The top ten units receiving operating reserve payments
  - Average = 41 percent of total operating reserve payments over last four years
  - Maximum = 47 percent
  - Minimum = 32 percent
- The mark up for all top ten units
  - Average = 9 percent
  - Maximum = 17 percent
  - Minimum = 3 percent
- The maximum mark up among the top ten units receiving operating reserve payments
  - Average = 44 percent over last four years
  - Maximum > 40 percent in each year

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- Operating reserve payments concentrated among a relatively small number of units/owners
- The top ten units generally have:
  - Relatively high mark ups
    - Price offer over cost offer
  - Relatively inflexible operating parameters
    - Long minimum run times
    - Small number of starts per day
    - Long minimum down time
- Need to understand selection process for units providing operating reserves
  - Aggregate market
  - Locational issues

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Issues

- Potential market power
  - Potential ability of unit owners to exercise market power in operating reserves markets
- Payment for flexibility
  - Pay operating reserves only to units that provide flexible operations
  - Flexible operations are determined by unit operating parameters

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Market Power Potential

- Current local market power rule in energy market
  - Resources needed to relieve transmission constraints
  - Offer capping
- Current operating reserves market
  - Limited number of resources are frequently taken for operating reserves by PJM
  - Local conditions may be relevant to choice of units
  - Potential local market power issue
  - Potential aggregate market power issue

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Operating Reserves Goals

- Limit exercise of local market power in operating reserve market
  - Mark up
- Limit exercise of market power in aggregate operating reserve market
- Ensure that only flexible units are paid operating reserves
  - Flexible operating parameters

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- When units have local market power
  - Limit operating reserves payments to the higher of LMP or cost-based offer
- Limit operating reserve payments to units with operating parameters based on the physical characteristics of the units
  - Specify operating parameters range for unit class

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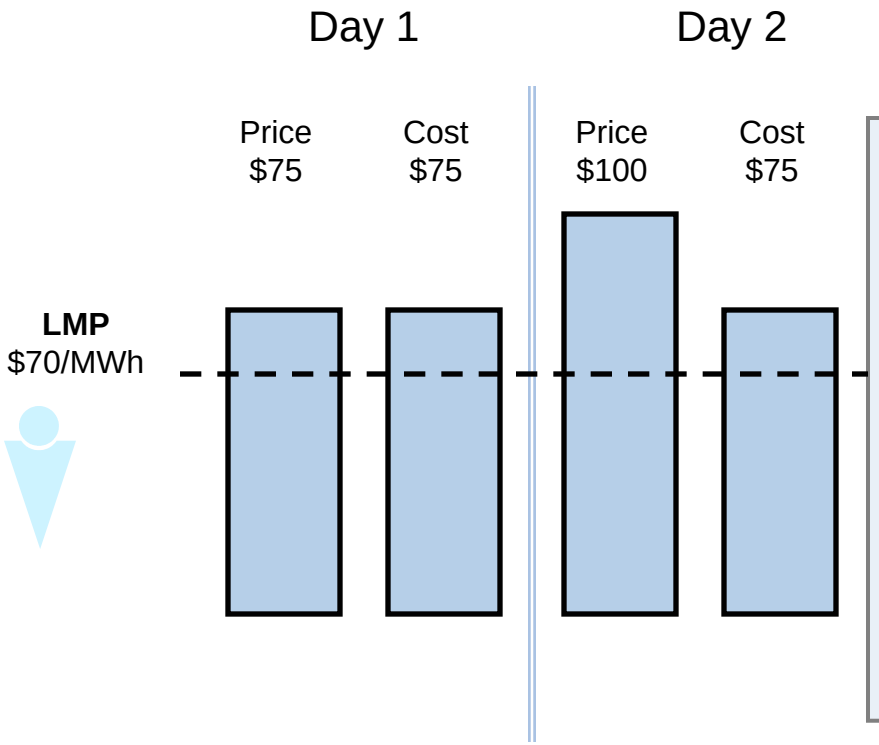
Mark Up Example - Current

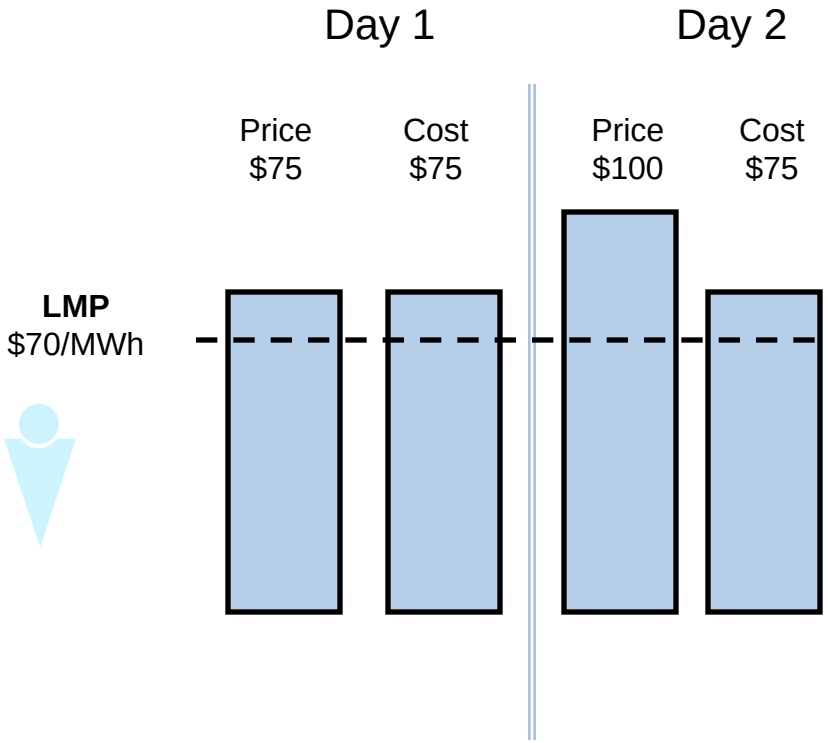


Example:

- Unit taken for Operating Reserves in Day 1
- LMP < Price Offer
- Day1 Operating Reserve payment= ($75 -$70) * RT_MWh

- Unit owner anticipates being taken for Operating Reserves in Day 2
- Unit price offer increased
- LMP < Price Offer
- Day 2 Operating Reserve payment = ($100-$70)* RT_MWh

Mark Up Example - Proposed



Example:

- Unit taken for Operating Reserves in Day 1
- Day 1 Operating Reserve payment =($75-70) * RT_MWh

- Unit owner anticipated being picked up for Operating Reserves in Day 2
- Unit's price offer increased
- Proposed operating reserve rule limits offers
- Day 2 Operating Reserve payment = ($75-$70)* RT_MWh

Unit Operating Parameters

- Current rules
  - No limit on unit operating parameters to qualify for operating reserves payments
  - Start time; minimum run time; maximum number of starts per day
- Concern
  - Same units taken frequently for operating reserves
  - Units may modify operating parameters to increase operating reserve payments
- Desired Outcome
  - Ensure that units provide flexibility in return for operating reserves payments
- Proposed Changes
  - To limit operating parameters to unit-type-specific technical parameters

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Operating Parameters Example - Current

Generation Type Specific Operating Parameters:
Min Run Time = 3 Hours ; Min Down Time = 5 hours;
Notification Time =1 Hour; Start Up Time = 1 Hour;

Day 1	Day 2
Unit picked up for Operating Reserves	Unit expects to be picked up for Operating Reserves
- Min Run time = 3 hours	- Min Run time = 20 hours
- Min Down time = 5 hours	- Min Down time = 14 hours
- Notification Time = 1 hour	- Notification Time = 1 hour
- Start Up Time = 1 hour	- Start Up Time = 1 hour

Example:

- System conditions look the same for Day 1 and Day 2
- Unit keeps the same price and cost, but changes parameters
- Unit needed by PJM for Day 2
- Day 2 scenario 1: PJM market does not pick this unit because of the Min Run Time
- Day 2 scenario 2: PJM picks this unit for operating reserves; Operating Reserve Credits based on modified operating parameters

Operating Parameters Example - Proposed

Generation Type Specific Operating Parameters:

Min Run Time = 3 Hours ; Min Down Time = 5 hours;
Notification Time =1 Hour; Start Up Time = 1 Hour;

Day 1	Day 2
Unit picked up for Operating Reserves	Unit expects to be picked up for Operating Reserves
- Min Run time = 3 hours	- Min Run time = 3 hours
- Min Down time = 5 hours	- Min Down time = 5 hours
- Notification Time = 1 hour	- Notification Time = 1 hour
- Start Up Time = 1 hour	- Start Up Time = 1 hour

Example:

- Limit unit parameters to their unit type specifications
- Notification of PJM in instances of parameters change
- No Operating Reserves payments for inflexible units