



Operating Reserves Rules Real Time Update

RMWG

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Market Monitoring Unit



Market Power Issues: Operating Reserves Goals

- Goal is competitive outcome
- Ensure that units are paid operating reserves only if they provide flexibility
 - Require flexible operating parameters
 - Require operating parameters consistent with unit capabilities

- Market power may be exercised via inflexible operating parameters compared to unit capabilities
 - Long minimum run times
 - Small number of starts per day/week
 - Long minimum down times
 - Set economic minimum equal to or close to economic maximum



Market Power Issues: Proposed Changes

- Operating parameters proposal:
 - Limit operating reserve payments consistent with operating parameters based on the market data for actual PJM market offers by unit class, where relevant.
 - Limit operating reserve payments consistent with operating parameters based on physical parameters for specific units, where relevant. This is the exception process.
 - Limit operating reserve payments consistent with economic minimum and economic maximum points set consistent with unit capabilities
 - Limit operating reserves to units that may provide operating reserves – exclude nuclear units from operating reserves credits eligibility



Definitions of Operating Parameters

- **Minimum Down Time** — The minimum number of hours between starts, calculated as the difference between when the unit shuts-down and the next time the unit is put online, as measured by telemetry available to PJM.

- **Minimum Run Time** — The minimum number of hours a unit must run, from the time the unit is put online to the time the unit is shut down (as measured by PJM's state estimator).

- **Maximum Daily Starts** — The maximum number of times that a unit can be started in a day under normal operating conditions.

- **Maximum Weekly Starts** — The maximum number of times that a unit can be started in a week under normal operating conditions.



Definitions of Operating Parameters

- **Cold Start Lead Time** — The time interval, measured in hours, from the time of PJM notification to the actual unit start sequence to the unit breaker closing for a generating unit in its cold temperature state.
- **Hot Start Lead Time** — The time interval, measured in hours, from the time of PJM notification to the actual unit start sequence to the unit breaker closing for a generating unit in its hot temperature state.
- **Warm Start Lead Time** — The time interval, measured in hours, from the time of PJM notification to the actual unit start sequence to the unit breaker closing for a generating unit in its warm temperature state.

eMKT User Guide - <http://www.pjm.com/etools/downloads/emkt/ts-userguide.pdf>

- Diesel unit parameters are the same as Small Frame CT and Aero Units.
- Modified Medium Frame CT parameters
 - Max daily starts
 - Max weekly starts
- Modified Large Frame CT parameters
 - Max daily starts
 - Max weekly starts
- Petroleum and Natural Gas Fired steam units: Pre 1985
 - Traditional utility steam generators
- Petroleum and Natural Gas Fired steam units: Post 1985
 - QF applications - dedicated steam host



Proposed Parameters

- Proposed parameter levels based on actual unit characteristics in PJM in table

PJM Unit Parameter Matrix Summary (Revised Feb. 21, 2006)

All Figures in Hours

Lead Time = Start Time Plus Notification Time

Small Frame CT and Aero CT Units - Up to 29 MW ICAP

Parameter	Minimum Down Time	Minimum Run Time	Maximum Daily Starts	Maximum Weekly Starts	Hot Start Lead Time	Warm Start Lead Time	Cold Start Lead Time
Recommended Parameter Range	2.0 or Less	2.0 or Less	3 or More	21 or More	.75 or less	.75 or less	.75 or less

Medium Frame CT and Aero CT Units - 30 MW to 65 MW ICAP

Parameter	Minimum Down Time	Minimum Run Time	Maximum Daily Starts	Maximum Weekly Starts	Hot Start Lead Time	Warm Start Lead Time	Cold Start Lead Time
Recommended Parameter Range	2.0 or Less	3.0 or Less	3 or More	21 or More	.75 or less	.75 or less	.75 or less

Medium-Large Frame CT Units - 65 MW to 125 MW ICAP

Parameter	Minimum Down Time	Minimum Run Time	Maximum Daily Starts	Maximum Weekly Starts	Hot Start Lead Time	Warm Start Lead Time	Cold Start Lead Time
Recommended Parameter Range	3.0 or Less	5.0 or Less	2 or More	14 or More	1.5 or Less	1.5 or Less	1.5 or Less

Large Frame CT Units - 135 MW to 180 MW ICAP

Parameter	Minimum Down Time	Minimum Run Time	Maximum Daily Starts	Maximum Weekly Starts	Hot Start Lead Time	Warm Start Lead Time	Cold Start Lead Time
Recommended Parameter Range	4.0 or Less	5.0 or Less	2 or More	14 or More	1.5 or Less	1.5 or Less	1.5 or Less

Combined Cycle Units

Parameter	Minimum Down Time	Minimum Run Time	Maximum Daily Starts	Maximum Weekly Starts	Hot Start Lead Time	Warm Start Lead Time	Cold Start Lead Time
Recommended Parameter Range	4.0 or Less	6.0 or Less	2 or More	11 or More	4.0 or Less	5.5 or Less	6.5 or Less

Petroleum and Natural Gas Steam Units - All Units

Parameter	Minimum Down Time	Minimum Run Time	Maximum Daily Starts	Maximum Weekly Starts	Hot Start Lead Time	Warm Start Lead Time	Cold Start Lead Time
Recommended Parameter Range	5.0 or Less	6.0 or Less	2 or More	8 or More	5.5 or Less	7.5 or Less	11.5 or Less

Petroleum and Natural Gas Steam Units - Pre-1985

Parameter	Minimum Down Time	Minimum Run Time	Maximum Daily Starts	Maximum Weekly Starts	Hot Start Lead Time	Warm Start Lead Time	Cold Start Lead Time
Recommended Parameter Range	7.0 or Less	8.0 or Less	1 or More	7 or More	6.0 or Less	8.0 or Less	12.0 or Less

Petroleum and Natural Gas Steam Units - Post-1985

Parameter	Minimum Down Time	Minimum Run Time	Maximum Daily Starts	Maximum Weekly Starts	Hot Start Lead Time	Warm Start Lead Time	Cold Start Lead Time
Recommended Parameter Range	3.5 or Less	5.5 or Less	2 or More	11 or More	4.0 or Less	7.0 or Less	8.0 or Less

Sub-Critical Coal Units

Parameter	Minimum Down Time	Minimum Run Time	Maximum Daily Starts	Maximum Weekly Starts	Hot Start Lead Time	Warm Start Lead Time	Cold Start Lead Time
Recommended Parameter Range	9.0 or Less	15.0 or Less	1 or More	5 or More	8.5 or Less	12.5 or Less	15.5 or Less

Super-Critical Coal Units

Parameter	Minimum Down Time	Minimum Run Time	Maximum Daily Starts	Maximum Weekly Starts	Hot Start Lead Time	Warm Start Lead Time	Cold Start Lead Time
Recommended Parameter Range	84.0	24.0 or Less	1 or More	2 or More	14.0 or Less	18.0 or Less	22.0 or Less