Education for Off SCED Control and Output Consistency Check Thresholds

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- Time period where Dispatchers are unable to dispatch the system using RTSCED due to scheduled or unscheduled events
- Dispatchers decide when to go Off SCED and come back On SCED control
- Dispatchers make an all-call to notify GOs and TOs that PJM is manually controlling the system (Off SCED)
- During such periods:
  – EMS system is used to send zonal dispatch rates (drates) via AGC to manage generation
  – Drates are calculated based on current total generation output and anticipated required total generation
  – Transmission constraints are manually controlled
  – M2M constraint coordination is suspended
  – CTS coordination is suspended
  – Current regulation assignments may be carried forward

- Loss or degradation of PJM systems
  - EMS capabilities
    - Telemetry (ICCP)
    - State Estimator
  - Dispatch tools and systems
- Miscellaneous/other

- Information Technology Impacts
  - Data transfer failures
  - Loss of internet
  - Network loss or degradations
  - Servers or database outages
  - System upgrades
  - Security patching
  - Code releases

- During the LMP verification process, LMPs and Ancillary Services prices need to be calculated for the impacted intervals
  - Using an approved RT SCED case closest to the event
  - Modify case input data to reflect the zonal dispatch rates communicated during the Off SCED period
  - Manually controlled constraints are reflected in the formation of LMPs
- During Off SCED periods, LMPs posted to the Operational Data page may be stale
  - May not reflect the current state of the system

Year	Number of Events	Total Number of 5 minute intervals	% of 5 minute intervals per year
2013	15	270	0.047%
2014	11	100	0.031%
2015	15	115	0.015%
2016	15	486	0.137%
2017	20	124	0.014%
2018	16	241	0.068%
2019	3	45	0.017%

- Very small number of Off SCED events over the past 6 years
- Average of 0.05% intervals per year over the past 6 years*
- 90% of the total events are less than 2 hours long
  - 61% of the total events are less than 1 hour

*Includes 2019 YTD

9.78%

7.61%

41.30%

21.74%

19.57%
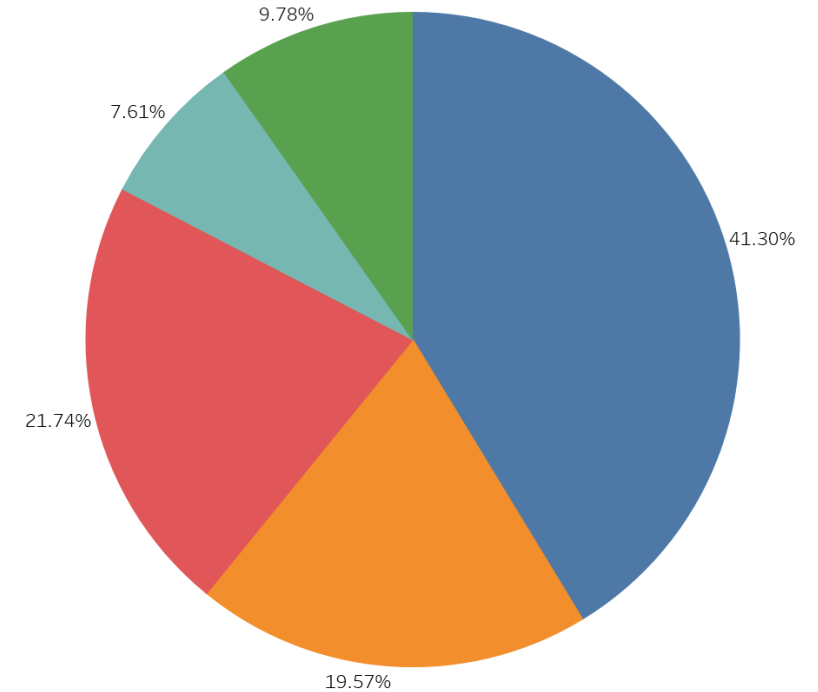
Man Disp Duration (# of Events)
- < 30 Minutes (38)
- 30 to 59 Minutes (18)
- 60 to 89 Minutes (20)
- 90 to 119 Minutes (7)
- > 120 Minutes (9)

- Overall process to calculate prices for the impacted LPC intervals is manual and cumbersome
  - Time consuming
  - Lack of Transparency
- Drates sent out during Off SCED control may not align with LMPs calculated through the optimization engine
- Depending on the severity of the event, it may cause delays in posting verified LMPs the next business day

- Create an automated and transparent process to calculate prices for the pricing intervals impacted by the Off SCED event

- Streamline the LMP Verification process for Off SCED Control

- Updated related documents (Tariff, Manuals, Internal Procedures)

- Provide member visibility for pricing intervals where Off SCED control occurred

LMP Output Consistency Checks

- Reasonability check of the LPC solution performed automatically in real-time for every LPC case.

- If the solution passes the OCC check, data is posted for market participants

- If the solution fails the OCC check, no data is posted for the given interval

- OCC check failures will be further investigated to determine if prices need to be revised

- Predefined thresholds established to prevent posting suspect LMPs

- **Price Bounding Thresholds:**
  - Total LMP : Maximum ($6000) and minimum (-$2000)
  - SRMCP: Maximum ($1701) and minimum ($0)
  - PRMCP: Maximum ($851) and minimum ($0)
  - Reg MCP/CCP: Maximum ($6000) and minimum ($0)
  - Price differences between RTSCED and LPC cases ($0.01)
    - Energy LMP, SRMCP, and PRMCP
  - Maximum (45%) and minimum (-30%) Loss Percentage LMP

- Transient Reserve Shortage observed on 4/8/2019 causing high Energy and Reserve prices
  - More [details](#) on the event
- The following Price Bounding Thresholds triggered
  - Max Total LMP Price (including congestion and loss LMP)
  - Max Total Regulation Market Clearing Price (MCP)
  - Max Total Regulation Capability Clearing Price (CCP)
- Thresholds updated after the April 8th event

Threshold Name	Observed Max Prices on April 8 ($/MWh)	OCC Threshold on April 8 ($/MWh)	New OCC Threshold* ($/MWh)
Maximum Total LMP	5118.44	3000	6000
Maximum MCP	5112.03	2000	6000
Maximum CCP	5111.23	2000	6000

*New Thresholds set on 4/16/2019

- Thresholds are predefined based on historical prices
- Designed to prevent posting prices that exceed predefined thresholds
  – QA check of the LPC solution
- Balance between posting suspect prices versus accurate prices