

Locational Price Calculator (LPC) Background

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- Produces financially binding LMPs and reserve market clearing prices
- Kicks off 90 seconds after the target interval for the respective target interval
 - Case for 10:15 interval kicks off at 10:16:30
- Cases are auto executed and auto approved
- Calculates LMPs for the entire PJM network model and Regulation MCPs and reserve MCPs for each locale
- Automatic solution data verification checks performed to allow posting of 5 minute LMPs/MCPs
 - Posted as preliminary in Data Viewer and Operational Data Page
- Detailed description in Manual 11, Section 2.7

- Uses the latest approved RT SCED case as its reference case
 - Uses the input files from the RT SCED case
 - EMS inputs - SE File & Dfax Files
 - Constraint Control
- Additional inputs to LPC
 - Regulation Offers
 - Regulation Performance Scores
 - Regulation Requirement and Benefit Factor Curve

- Required to produce LMPs for all pricing nodes (pnodes) in the PJM network model for all intervals, including de-energized pnodes
- Automated dead bus replacement logic in LPC is used to find the closest suitable live pnode for a given de-energized pnode
 - Same station, same voltage level
 - Same station, different voltage level
 - Nearest neighboring station
 - If the automated process cannot find a suitable replacement the pnode is manually replaced as part of the LMP verification process

- 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: 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

- Market Operators perform verification during and after the operating day is complete
- During verification Market Operators may rerun LPC cases to correct any issues identified during the verification process
- Market Operators also perform bus replacements to provide an LMP for de-energize buses or replacements that were done automatically which are determined to be sub-optimal
- Verified prices are posted the next business day to DataMiner2 and used in settlements
- Obligated to post verified prices by 10:30 AM the next business day otherwise notify market participants of any delays

- A reposting occurs if verified prices that have already been posted need to be corrected
- Market participants must be notified of potential re-postings within 2 business days of the operating day in question; otherwise prices are deemed final and cannot be further revised.
- Section 1.10.8 (e) of Attachment K of the PJM Tariff and Schedule 1 of the Operating Agreement provides guidelines for potential LMP reposting

- **Data Input Failures**
 - Stale data
 - Data transfer faults/failures
 - Incorrect operational data
- **Other Upstream Data Issues**
 - Telemetry
 - Performance Score Calculation
- **Jan 1 – June 30, 2019**
 - 52,116 five minute intervals
 - 141 reruns
 - Less than 1% of cases rerun for 2019

- During periods where RTSCED application is not available, PJM will control the system manually
 - PJM EMS system is used to send zonal dispatch rates during these periods
- During the verification process, LMPs and Ancillary Services prices are calculated based on the zonal dispatch rates for these periods using the last approved RTSCED case
 - Constraints that dispatch was manually controlling are reflected in these LMPs and AS prices
 - M2M coordination is suspended during these periods
- Operators will modify case inputs to generate a solution to align with the zonal dispatch rate
- LMPs posted to Operational Data Page may be suspended during these periods

Year	Manual Dispatch Intervals	Percentage of total intervals
2017	124	0.12%
2018	241	0.12%
2019*	28*	0.05%

*Jan 1-July 31 for 2019