

Fast Start Implementation

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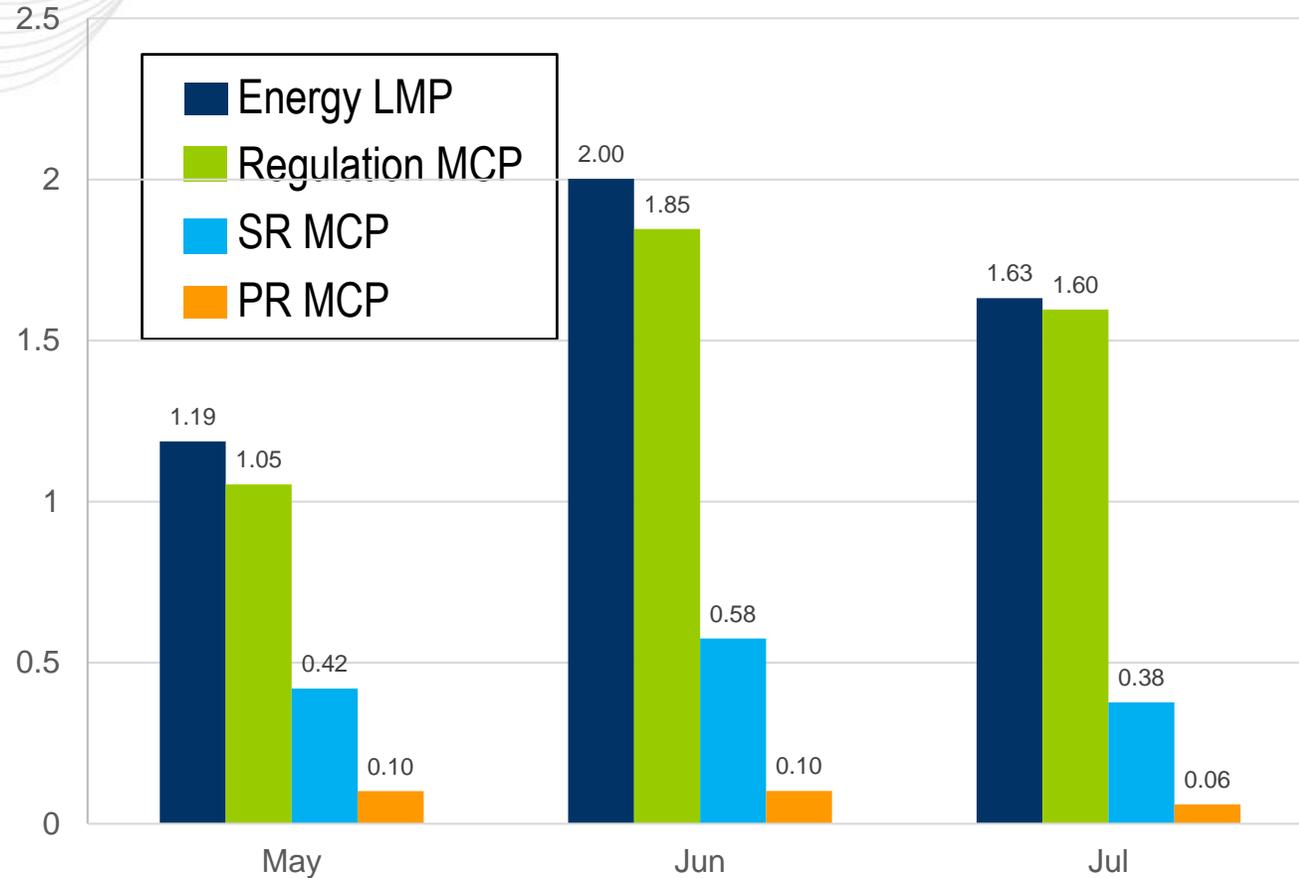
Pricing Impacts

Basic Statistics	Energy (P-D)*	Reg (P-D)*	SR (P-D)*	PR (P-D)*
Mean	1.60	1.49	0.46	0.09

* P-D = Pricing run – Dispatch run

Key Takeaway: Parallel operations result in an expected increase in LMPs.

Average Increase (\$/MWh)

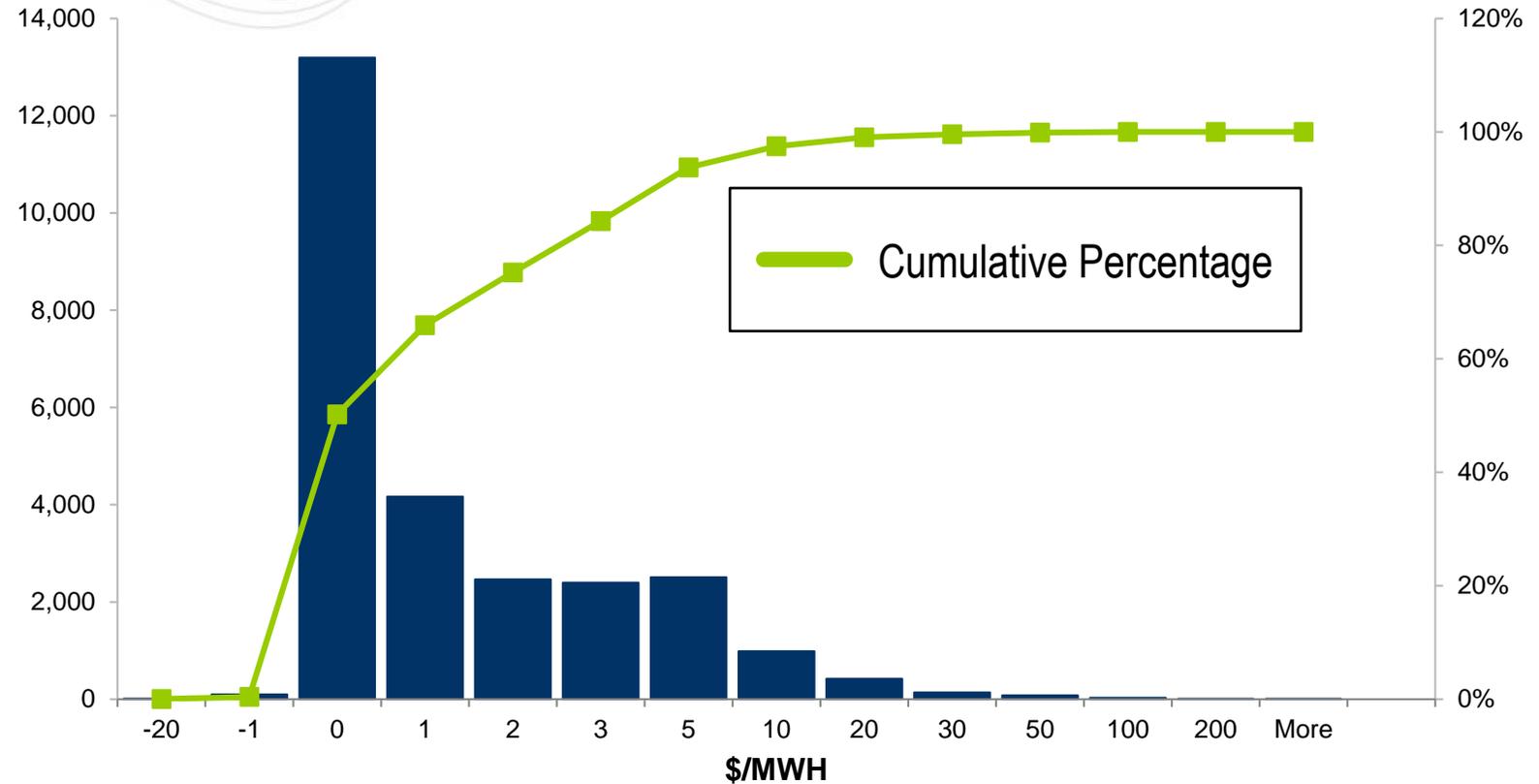




Fast-Start Energy LMP Increase (Histogram): May–July 2021

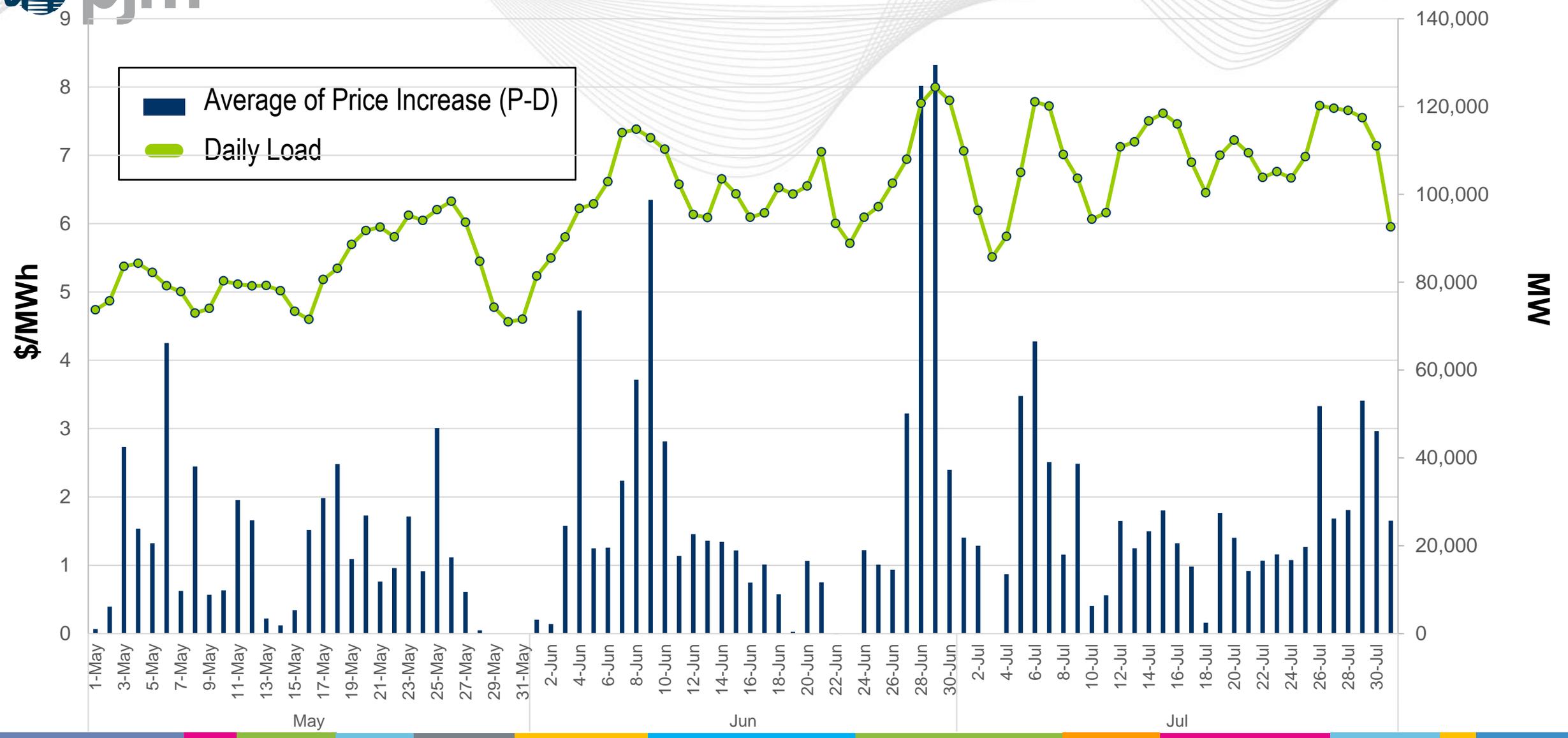
Energy LMP Increase	Frequency	Cumulative
-20	8	0.03%
-1	99	0.40%
0	13194	50.20%
1	4165	65.92%
2	2465	75.22%
3	2397	84.27%
5	2509	93.74%
10	988	97.47%
20	420	99.05%
30	140	99.58%
50	79	99.88%
100	29	99.99%
200	1	99.99%
More	2	100.00%

Frequency (Number of Intervals)



Key Takeaway: Over 50% of the time, there was zero impact on Energy LMPs.

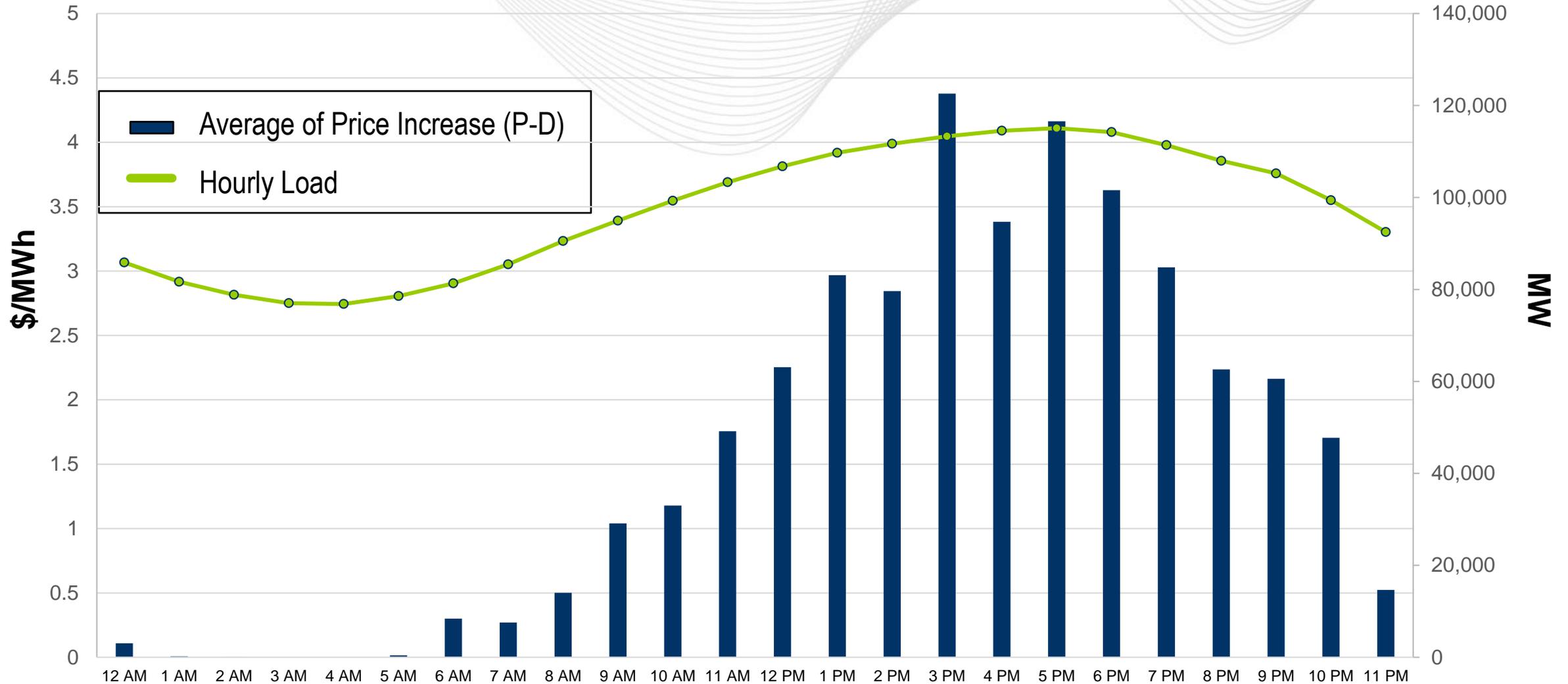
Fast-Start Daily Distribution: May–July 2021



Key Takeaway: LMP increases are more apparent on higher load days.



Fast-Start Hourly Distribution: May–July 2021



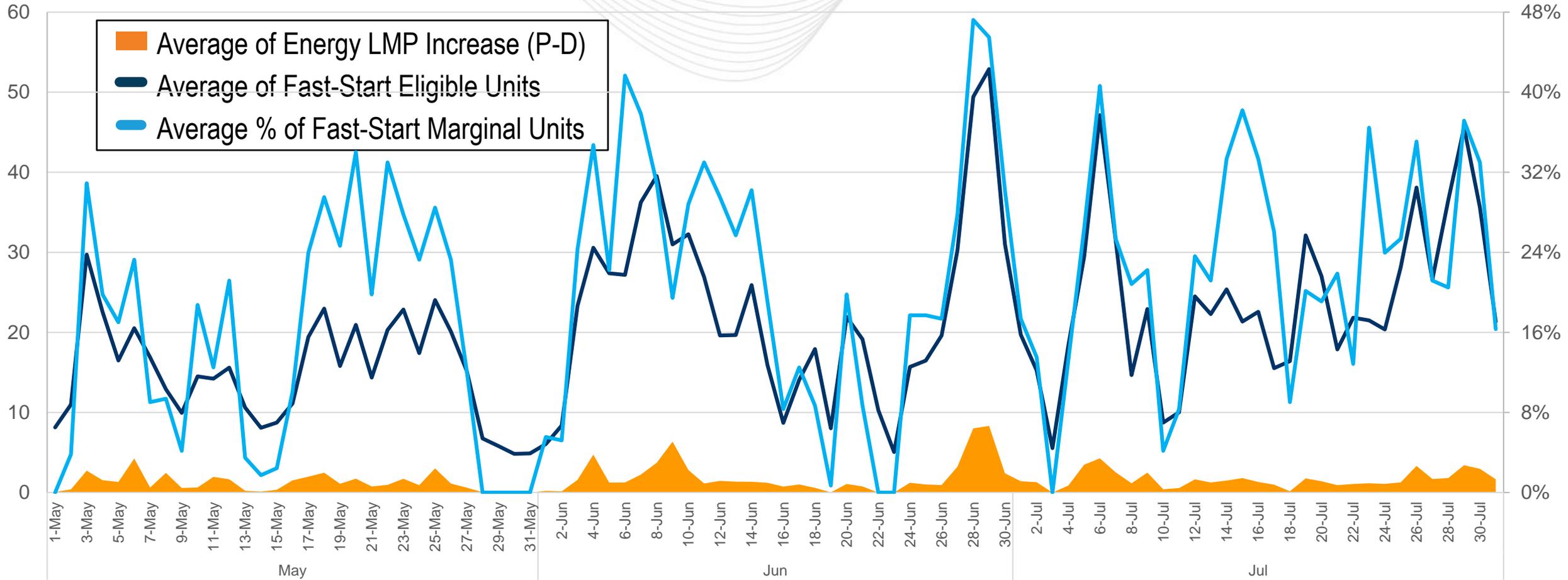
Key Takeaway: Largest impact on LMPs during on-peak hours.



Fast-Start Eligible and Marginal Units: May–July 2021

Units Count

Average %

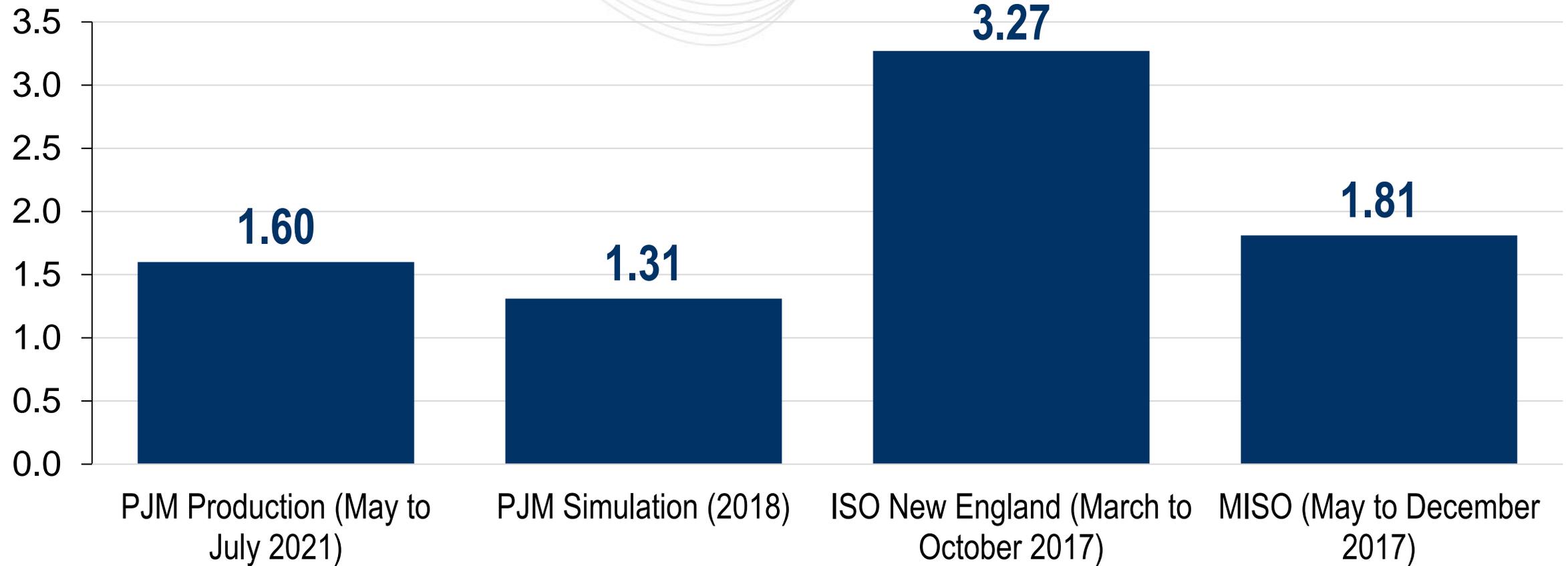


Key Takeaway: Fast-start units are marginal approximately 18% of time.



Fast-Start Comparison With Other ISOs

Average Energy LMP Increase (\$/MWh)



Key Takeaway: Results are comparable to the other data sources.

- Energy and Reserves are co-optimized in both the Dispatch and Pricing Runs to achieve optimal pricing
 - Consistent with PJM's approach
- LMPs and MCPs are finalized in the Pricing Run
 - After the verification process is complete, LMPs and MCPs are used in Settlement process

- Fast Start eligible resources can be Integer Relaxed in the Pricing Run
- Because Energy and Reserves are co-optimized in the Pricing Run, due to integer relaxation resultant SRMCPs may include amortized Start up and No Load costs
 - Only when the committed Fast Start resource is marginal
 - From May-July 2021, 180 intervals (0.68% of all intervals) would have been affected
- Language added in M-11, Section 4.2.9

From PJM's August 2019 Fast-Start compliance filing (Page 16)

- Reserve Market and Shortage Pricing: The establishment of distinct dispatch and pricing runs creates the question of when reserve shortage pricing should be triggered. Reserve shortage pricing should be determined only based on pricing run results. **Because energy and reserves are jointly cooptimized in both the dispatch and pricing runs, it follows that reserve market pricing should be based on the same run as energy market pricing, which occurs in the pricing run.** Thus, PJM is revising the rules for the Synchronized Reserve, Non-Synchronized Reserve, Regulation, and Day-ahead Scheduling Reserve markets to specify that prices for these markets are established in the pricing run of the real-time market (or day-ahead market for Day-ahead Scheduling Reserves).

<https://www.pjm.com/directory/etariff/FercDockets/4192/20190830-er19-2722-000.pdf>

In PJM's response to the IMM Fast Start protest, examples were provided highlighting how composite energy offers can impact Reserve Market pricing

- This falls under Part G of the response (beginning on page 14)
- Outcome of applying integer relaxation to the energy commitment variable and joint optimization of energy and reserves

<https://www.pjm.com/-/media/documents/other-fed-state/20191009-er19-2722-000.ashx>



Fast Start Compliance Order – December 17, 2020

In the December 17, 2020 order, FERC approves PJM's approach to co-optimization of energy and reserves in the pricing run and resultant Market Clearing Price impacts. (paragraph 79).

<https://ferc.gov/sites/default/files/2020-12/E-15-ER19-2722-000.pdf>

- Parallel operation is stable and results are reasonable.
- PJM is monitoring Fast Start on a daily basis for quality control and risk mitigation.
- LMPs and MCPs from Fast Start are available in DM2.
- PJM is ready to implement Fast Start Pricing on September 1.

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Fast Start Implementation



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