

Energy Gap & Load Bidding

RCSTF

April 9, 2025

Jane Wei



Monitoring Analytics

LOAD BIDDING



PJM Conclusion is Overstated

PJM conclusion: Day-ahead demand was underbid 5% to 11% compared to the PJM original forecast.

	Valley			Morning Peak			Evening Peak		
	DA Demand	Org Forecast	DA Over/Under Bid	DA Demand	Org Forecast	DA Over/Under Bid	DA Demand	Org Forecast	DA Over/Under Bid
January 2025									
Sat. 18	85,794	91,395	-5,601	97,106	102,019	-4,913	100,771	104,269	-3,498
Sun. 19	87,028	90,593	-3,565	99,515	106,347	-6,832	106,899	118,847	-11,948
Mon. 20	101,331	106,589	-5,258	121,746	130,045	-8,299	129,722	139,089	-9,367
Tue. 21	115,082	122,245	-7,163	133,314	144,024	-10,710	131,214	142,740	-11,526
Wed. 22	115,521	124,306	-8,785	133,802	145,104	-11,302	127,562	138,475	-10,913
Thu. 23	109,801	117,834	-8,033	131,558	138,618	-7,060	119,316	131,365	-12,049

The difference between LSE DA and RT load is overstated by this calculation.

[PJM Presentation: Cold Weather Operations January 18–23, 2025](https://www.pjm.com/-/media/DotCom/committees-groups/task-forces/rcstf/2025/20250312/20250312-item-02---january-2025-cold-weather-update-rsctf.pdf), Slide 29,

<https://www.pjm.com/-/media/DotCom/committees-groups/task-forces/rcstf/2025/20250312/20250312-item-02---january-2025-cold-weather-update-rsctf.pdf>

Data Issues

- **PJM forecasts should not be compared to DA load or DA demand directly.**
- **LSE DA bids should be compared to LSE RT load.**
- **The difference PJM observed between the forecast and DA demand is caused by many components that PJM did not identify.**
- **The evidence showed that the difference between LSE DA and RT load was not as significant as PJM believes.**

PJM Load Forecast

- **PJM Load Forecast estimates AGC load.**
- **AGC load is the instantaneous load calculated by the Automatic Generation Control System in real time.**
- **AGC load is the sum of net tie line, generation MW (Excluding pumped hydro), charging load and pumping load.**

AGC Load

- **AGC load is higher than RT metered load with losses.**
- **During 2025 Vortex Week, PJM Load Forecast (aiming AGC load) was 2,500 MWh higher than RT metered load with losses.**
- **Load Forecast should not be compared to LSE DA load, or to RT Load.**
 - **The load forecast is the amount of energy that PJM expects to supply.**
 - **The LSE DA load is the amount that LSEs intend to serve at the DA price.**
- **This part of the difference is not caused by bidding behavior in DA market.**

Losses

- **AGC load and PJM Load Forecast both include losses.**
- **The DA Demand posted by PJM does not include losses.**
- **During 2025 Vortex Week, DA losses averaged about 3,400 MWh per hour.**
- **This part of difference is not caused by bidding behavior in DA market.**

Virtuals

- **The DA Demand PJM posted includes net virtuals.**
- **Net virtuals do not participate in the RT market. Thus they should not be included.**
- **During 2025 Vortex week, net virtuals reduced DA Demand by 771 MWh on average.**
- **This part of difference is not caused by bidding behavior in DA market.**

LSE Load

- **The average hourly difference between LSE DA load and LSE RT load was 1,135 MWh, 1.3 percent of LSE RT load (2021-2024).**
- **On average, 1,160 MW LSE load does not participate in DA market in 2024 based on IMM inquiries.**
- **During the 2025 vortex week , the differences between LSE DA load and LSE RT load was between 0 to 4 percent not 5 to 11 percent. The average difference was 2 percent.**

LSE DA Load vs LSE RT load

LSE DA Load vs LSE RT load						
Date	Time	DA Demand (As Posted by PJM)	LSE DA Load	LSE RT Load	LSE DA Load - RT Load	Percent Difference
Valley						
Sunday, January 19, 2025	3:00:00 AM	87,028	85,999	87,762	(1,763)	(2.0%)
Monday, January 20, 2025	1:00:00 AM	101,331	101,371	104,083	(2,712)	(2.6%)
Tuesday, January 21, 2025	2:00:00 AM	115,082	115,156	117,870	(2,714)	(2.3%)
Wednesday, January 22, 2025	1:00:00 AM	115,521	115,771	120,984	(5,213)	(4.3%)
Thursday, January 23, 2025	2:00:00 PM	109,801	109,626	114,212	(4,586)	(4.0%)
Morning Peak						
Sunday, January 19, 2025	9:00:00 AM	99,514	98,397	99,713	(1,315)	(1.3%)
Monday, January 20, 2025	8:00:00 AM	121,746	122,346	122,725	(379)	(0.3%)
Tuesday, January 21, 2025	7:00:00 AM	133,314	134,695	134,973	(278)	(0.2%)
Wednesday, January 22, 2025	7:00:00 AM	133,802	137,123	138,768	(1,645)	(1.2%)
Wednesday, January 22, 2025	8:00:00 AM	132,060	136,343	140,043	(3,700)	(2.6%)
Thursday, January 23, 2025	7:00:00 AM	131,558	129,844	135,350	(5,506)	(4.1%)
Evening Peak						
Sunday, January 19, 2025	6:00:00 PM	106,844	110,459	113,091	(2,632)	(2.3%)
Monday, January 20, 2025	7:00:00 PM	129,722	129,528	129,782	(254)	(0.2%)
Tuesday, January 21, 2025	6:00:00 PM	131,214	133,231	135,100	(1,869)	(1.4%)
Wednesday, January 22, 2025	7:00:00 PM	127,562	130,785	132,526	(1,742)	(1.3%)
Thursday, January 23, 2025	6:00:00 PM	119,316	120,863	123,550	(2,687)	(2.2%)
Average		118,463	119,471	121,908	(2,437)	(2.0%)

Notes: DA demand = LSE DA load + Net virtuals + Economic DR

LSE DA Load vs LSE RT load

LSE DA Load vs LSE RT load						
Date	Time	DA Demand (As Posted by PJM)	LSE DA Load	LSE RT Load	LSE DA Load - RT Load	Percent Difference
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Average		118,463	119,471	121,908	(2,437)	(2.0%)

LSE DA load is greater than DA demand calculated by PJM.

Notes: DA demand = LSE DA load + Net virtuals + Economic DR

LSE DA Load vs LSE RT load

LSE DA Load vs LSE RT load						
Date	Time	DA Demand (As Posted by PJM)	LSE DA Load	LSE RT Load	LSE DA Load - RT Load	Percent Difference
Valley						
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Average		118,463	119,471	121,908	(2,437)	(2.0%)

The difference is much less than PJM's calculation.

On average, the difference 0% - 4% not 5% - 11%.

Notes: DA demand = LSE DA load + Net virtuals + Economic DR

DA Forecast vs RT Load with Losses

DA Forecast vs RT Load with Losses					
Date	Time	PJM DA Forecast	LSE RT Load with Losses	PJM DA Forecast - RT Load with Losses	Percent Difference
Valley					
Sunday, January 19, 2025	3:00:00 AM	90,866	89,681	1,185	1.3%
Monday, January 20, 2025	1:00:00 AM	106,846	106,434	412	0.4%
Tuesday, January 21, 2025	2:00:00 AM	123,332	120,892	2,440	2.0%
Wednesday, January 22, 2025	1:00:00 AM	124,330	124,177	153	0.1%
Thursday, January 23, 2025	2:00:00 PM	118,916	117,070	1,846	1.6%
Morning Peak					
Sunday, January 19, 2025	9:00:00 AM	105,683	101,956	3,727	3.7%
Monday, January 20, 2025	8:00:00 AM	130,479	125,507	4,972	4.0%
Tuesday, January 21, 2025	7:00:00 AM	144,024	138,356	5,668	4.1%
Wednesday, January 22, 2025	7:00:00 AM	145,037	142,468	2,569	1.8%
Wednesday, January 22, 2025	8:00:00 AM	144,144	143,714	430	0.3%
Thursday, January 23, 2025	7:00:00 AM	138,923	138,799	124	0.1%
Evening Peak					
Sunday, January 19, 2025	6:00:00 PM	119,608	115,826	3,782	3.3%
Monday, January 20, 2025	7:00:00 PM	138,871	133,097	5,774	4.3%
Tuesday, January 21, 2025	6:00:00 PM	143,532	138,362	5,170	3.7%
Wednesday, January 22, 2025	7:00:00 PM	140,380	136,000	4,380	3.2%
Thursday, January 23, 2025	6:00:00 PM	131,365	126,600	4,765	3.8%
Average		127,896	124,934	2,962	2.4%

Notes: This DA forecast data is the 10 AM forecast.

DA Forecast vs RT Load with Losses

DA Forecast vs RT Load with Losses					
Date	Time	PJM DA Forecast	LSE RT Load with Losses	PJM DA Forecast - RT Load with Losses	Percent Difference
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Wednesday, January 22, 2025	7:00:00 PM	140,380	136,000	4,380	3.2%
Thursday, January 23, 2025	6:00:00 PM	131,365	126,600	4,765	3.8%
Average		127,896	124,934	2,962	2.4%

PJM forecasting (aiming for AGC load) is higher than RT load with losses.

Notes: This DA forecast data is the 10 AM forecast.

DA Forecast vs RT Load with Losses

DA Forecast vs RT Load with Losses					
Date	Time	PJM DA Forecast	LSE RT Load with Losses	PJM DA Forecast - RT Load with Losses	Percent Difference
Valley					
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Thursday, January 23, 2025	6:00:00 PM	131,365	126,600	4,765	3.8%
Average		127,896	124,934	2,962	2.4%

On average, it's 2.4 percentage points higher.

Notes: This DA forecast data is the 10 AM forecast.

LSE Load is Not Required to Bid in DA Market



Virtual Transactions in the PJM Energy Markets

Load Serving Entities (LSEs) in PJM are not required bid their load into the Day-Ahead Market. This market design was chosen for two main reasons. First, it allows LSEs the maximum amount of flexibility in how they procure the needed supply to meet their load the following day. They may procure all of their energy needs day ahead, none, or somewhere in between depending on their willingness to pay along with their risk profile. Second, having the Day-Ahead Market clear based on the demand submitted by the members rather than the load forecasted by PJM removes the influence PJM's load forecast accuracy would have on the market both in the short and long term. This eliminates any biasing that could have existed based on load forecast accuracy and leaves the supply and demand dynamics of the market between market participants.

“Virtual Transactions in the PJM Energy Markets,” originally posted by PJM for the Markets Reliability Committee Meeting (October 12, 2015).



Conclusion

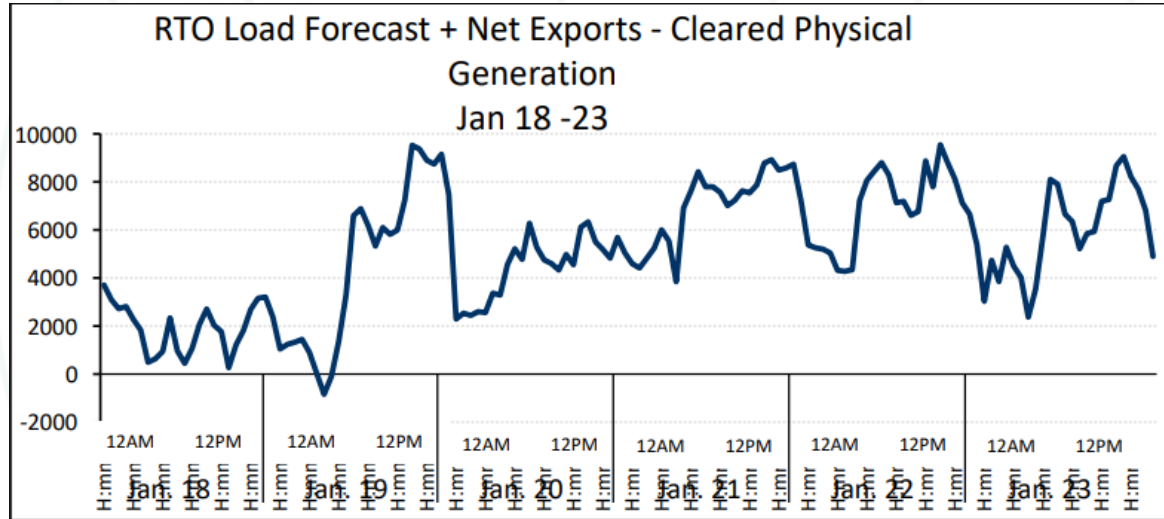
- **The difference between LSE DA and RT load was not as significant as PJM believes.**
- **The difference between LSE DA and RT load was consistent with PJM rules.**
- **Any rule change should be a part of a broad review of the role of DA market.**

ENERGY GAP



PJM Energy Gap Slides

Most of the Energy Gap was not caused by LSE bids or DA Market.



PJM Presentation: [RCSTF Work to Support Operations A review of MLK Weekend Challenges](#), Slide 6

<http://portal.ma.corp/Docs/PJM/Committees/RCSTF/2025.04.09/RCSTF/20250312-item-03---rcstf-work-and-mlk-challenges.pdf>

Energy Gap Explanation

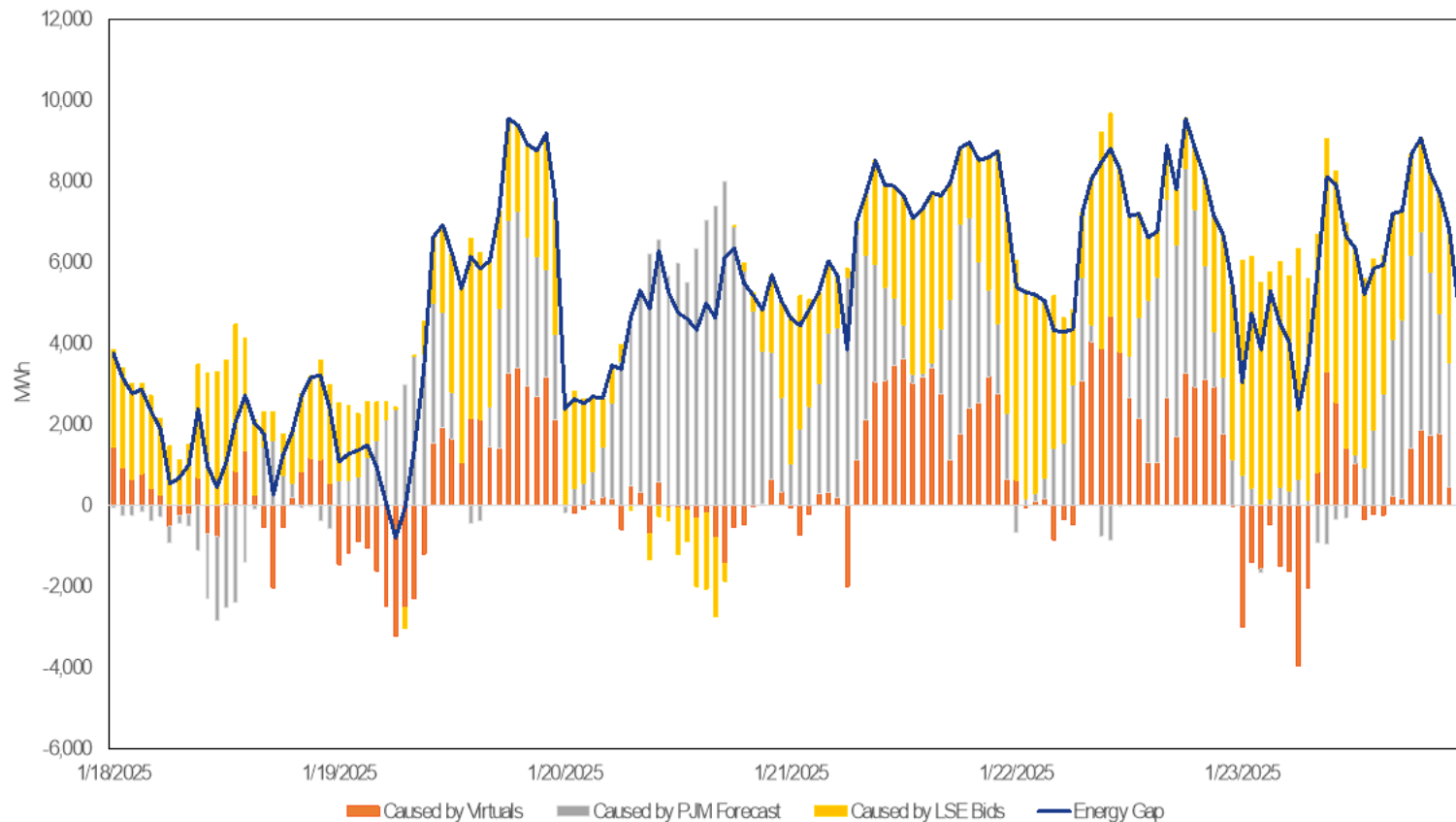
- **PJM defines the Energy Gap as the difference between the DA cleared gen and the PJM load forecast plus the DA net exports.**
- **However, the difference between PJM load forecast and the DA cleared gen is caused by different components that PJM did not identify.**
 - **Net Virtuals**
 - **AGC Load vs RT Load differences**
 - **PJM Forecast Error**
 - **LSE DA Market Participation**
- **The IMM analyzed all the components that caused the PJM defined Energy Gap and calculated the impact of each component.**

Energy Gap Explanation

- **Energy Gap = PJM Forecast + DA Net Export – DA Gen**
 - **PJM Forecast = AGC load + PJM Forecast Error**
= LSE RT Load + RT Losses + X + PJM Forecast Error
 - **DA Gen = LSE DA Load + DA Losses + (Export – Import) + (DEC – INC) - DR**
- **Energy Gap = (LSE RT Load + RT Losses + X + Forecast Error) + DA Net Export – (LSE DA Load + DA Losses + DA Net Export + Net Virtual - DR)**
= (LSE RT Load + RT Losses) – (LSE DA Load + DA Losses - DR)
+ (Forecast Error + X)
+ Net Virtual

Note: X is the difference between AGC load and RT metered load.

Components of The Gap



Components of The Gap

	Energy Gap PJM Defined	Caused by Virtuals		Caused by PJM Forecast		Caused by LSE Bids	
		MWh	Percent	MWh	Percent	MWh	Percent
Average	5,179	683	13%	2,004	39%	2,492	48%
Peak							
1/22/2025 18:00	9,542	3,267	34%	5,056	53%	1,221	13%
1/19/2025 18:00	9,538	3,260	34%	3,782	40%	2,492	26%
1/19/2025 19:00	9,376	3,382	36%	3,875	41%	2,119	23%

Note: PJM Forecast part includes the differences between AGC Load vs RT Load and PJM Forecast Error

Components For The Gap

	Energy Gap PJM Defined	Caused by Virtuals		Caused by PJM Forecast		Caused by LSE Bids	
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For those highest gap hours, the difference caused by the PJM forecast was significantly higher than that caused by the LSE load bid.

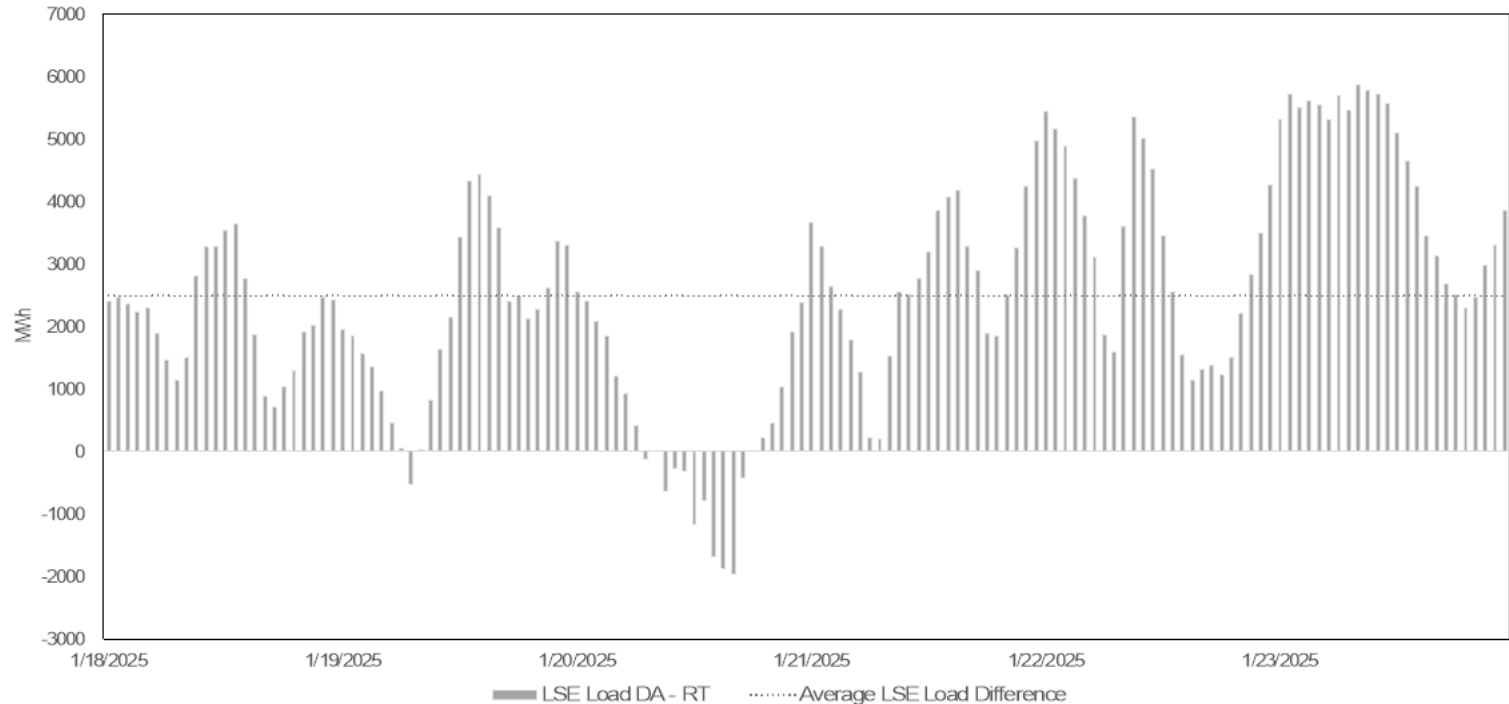
Note: PJM Forecast part includes the differences between AGC Load vs RT Load and PJM Forecast Error

Energy Gap Explanation

- **During the peaks, LSE load difference contributed less than 1/3 of the energy gap (as defined by PJM).**
- **LSE load is not required to bid in DA market.**
- **The rest was caused by net virtuals, AGC Load vs RT Load, and PJM Forecast Error.**

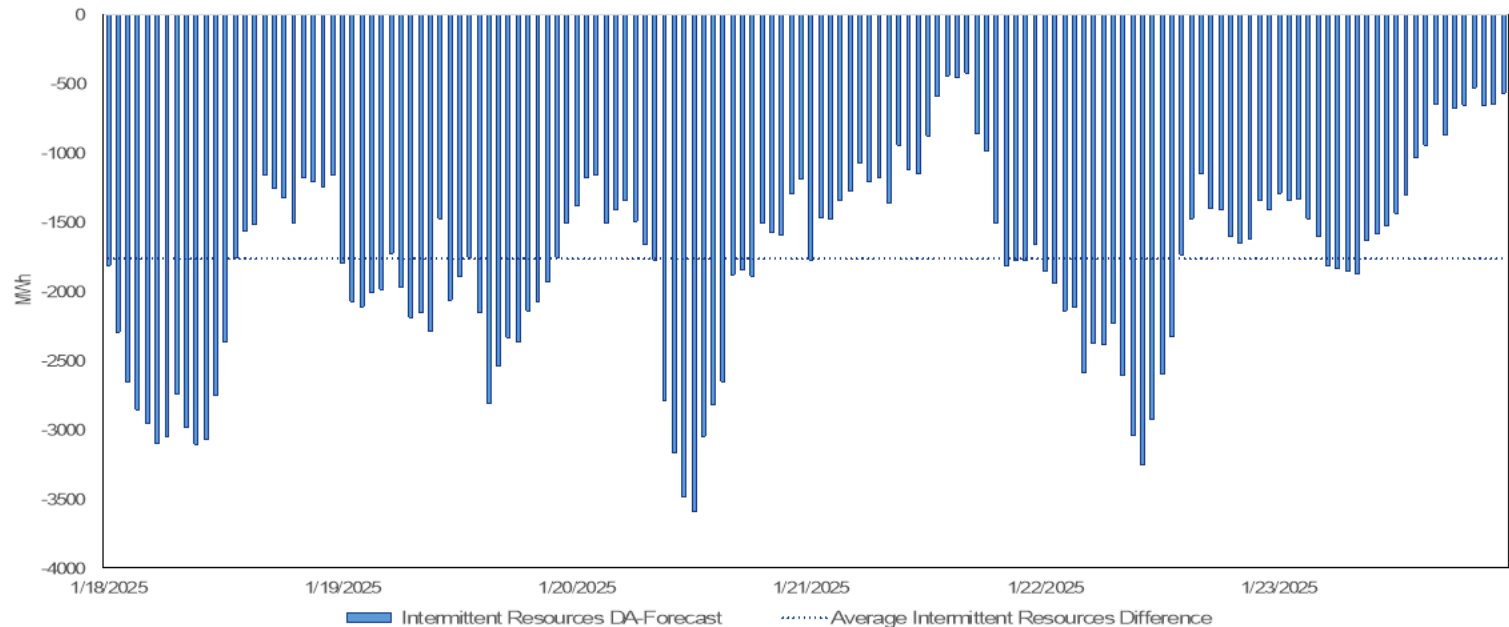
Impact of LSE Load Difference

During 2025 Vortex Week, the average difference between LSE DA load and RT load was 2,492 MWh. (RT – DA)



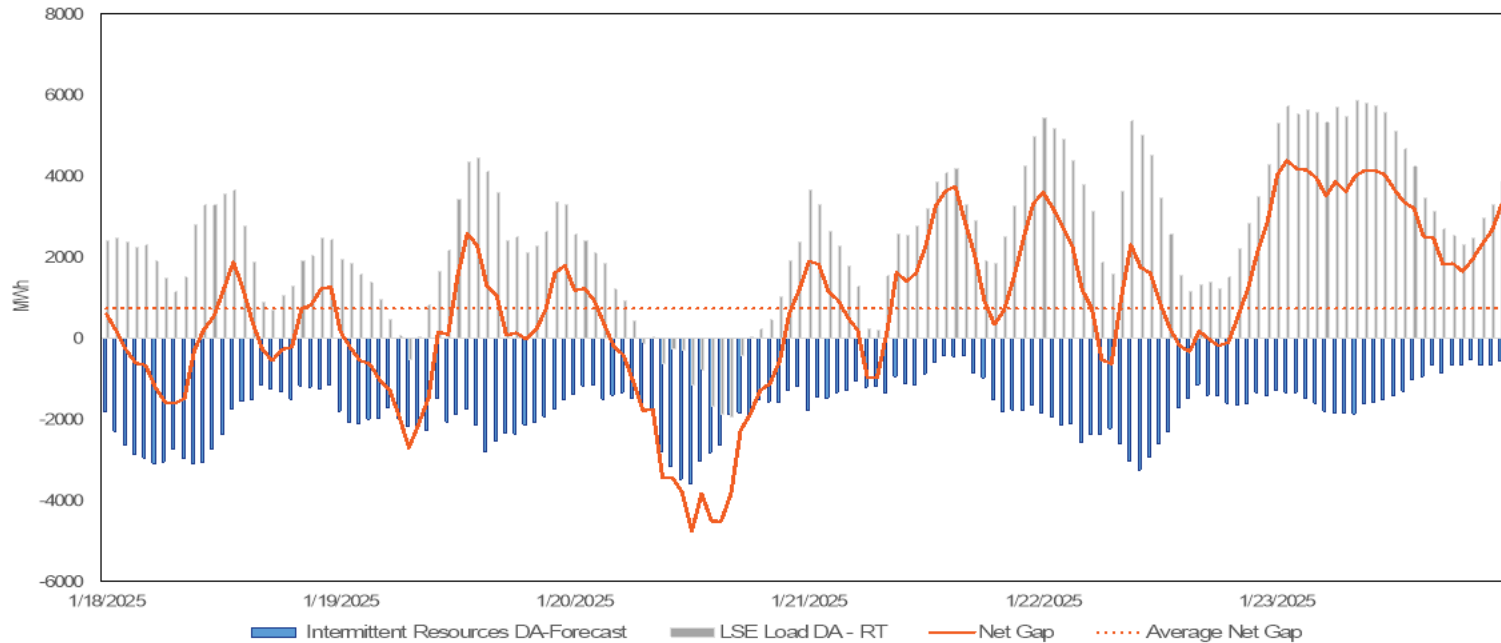
Impact of Intermittent Resources

- Most Intermittent Resources have higher output in RT than DA. (DA - RT)
- During 2025 Vortex Week, the average difference between Intermittent Resources DA committed and RT output forecast was 1,765 MWh.



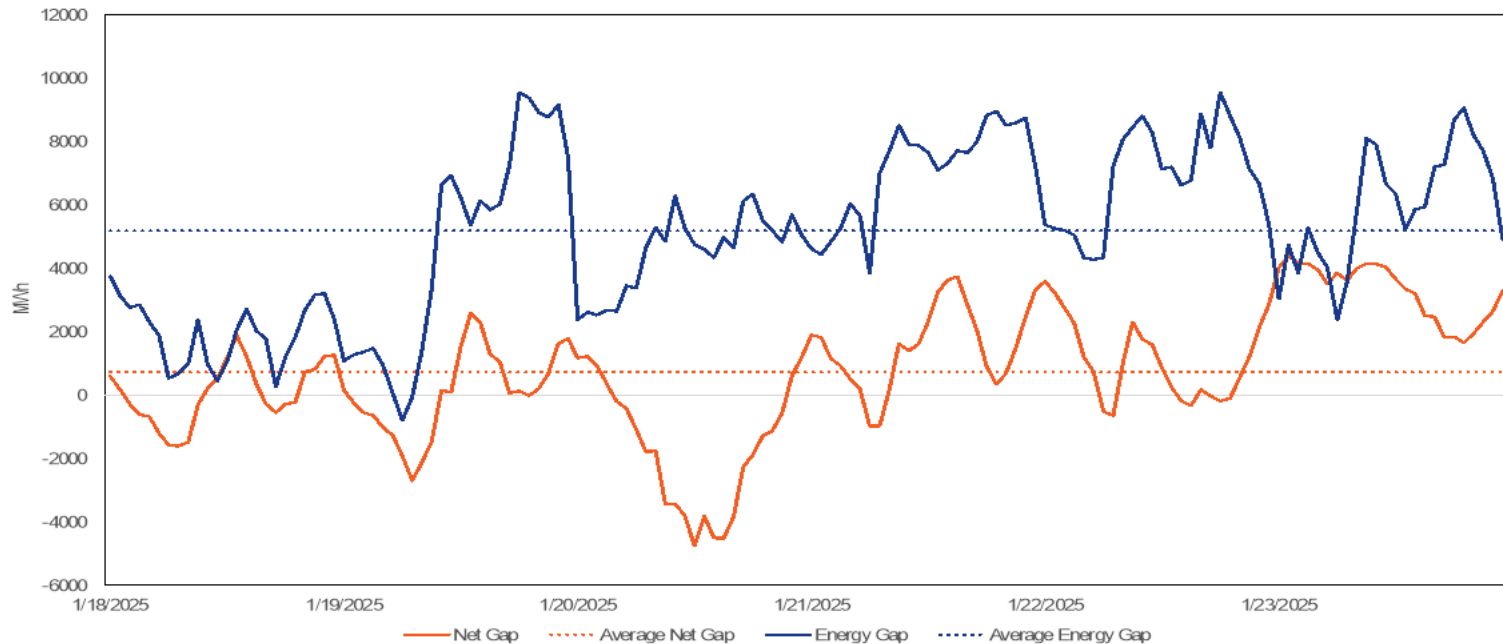
Net Gap

The net gap after taking consideration of the impact of Intermittent Resources. (RT – DA)



Actual Gap

- The average Energy Gap defined by PJM was 5,179 MWh.
- The average Net Gap was 727 MWh, which was 0.6% of average PJM RT load during the 2025 vortex week.



Conclusion

- **The IMM does not support the Energy Gap analysis presented by PJM.**



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