

Following Dispatch and Deviation Charges

MIC

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Monitoring Analytics

Background

- **“Following dispatch” is a generic term used to describe how well resources follow PJM’s instructions in the Energy Market.**
- **Following dispatch includes following:**
 - **Commitment instructions: Starting, shutting down**
 - **Dispatch instructions: Ramping up or down, operating at economic minimum or maximum.**
- **OA Section 3.2.3 (o): “Dispatchable pool-scheduled generation resources and dispatchable self-scheduled generation resources that follow dispatch shall not be assessed balancing Operating Reserve deviations.”**

Following dispatch

- **Following dispatch affects eligibility for:**
 - Receiving uplift credits
 - Paying uplift charges
- **PJM has several metrics used to determine if units are following dispatch for the purpose of requiring payment of uplift charges.**
- **These metrics are:**
 - Ramp Limited Desired MW
 - Dispatch Signal MW
 - Dispatch LMP Desired MW

Following dispatch

- **Ramp Limited Desired MW (RLD):** Output level that a resource should have achieved between dispatch signals.
- **Dispatch Signal MW:** Output level instructed by PJM. This is also known as the dispatch signal.
- **Dispatch LMP Desired MW:** Output level based on the RT LMP and the incremental offer curve. Value is not ramp limited.

Following dispatch to avoid uplift charges

- **Generally, a unit is deemed to be following dispatch when actual output is between the ramp limited desired and dispatch signal or within 10 percent.**
- **All CTs are deemed to be following dispatch when logged as operating as requested by PJM.**
- **There are other triggers and thresholds defined in Section 3.2.3 (o) of Schedule 1 of the OA.**
- **Section 3.2.3 (o) of Schedule 1 of the OA also contains how the deviation MWh are calculated.**

BOR Credits - 2021

Unit Type	BOR Credits (millions)	Share
AERO CT	\$25.9	20%
CC	\$3.3	3%
COAL	\$3.4	3%
FRAME CT	\$92.5	72%
OTHER	\$0.0	0%
RICE	\$0.9	1%
SOLAR	\$0.0	0%
STEAM OTHER	\$1.5	1%
WIND	\$0.1	0%
Total	\$127.5	100%

- **CTs received 92 percent of all BOR credits in 2021.**

RT Generation, Deviations and Charges - 2021

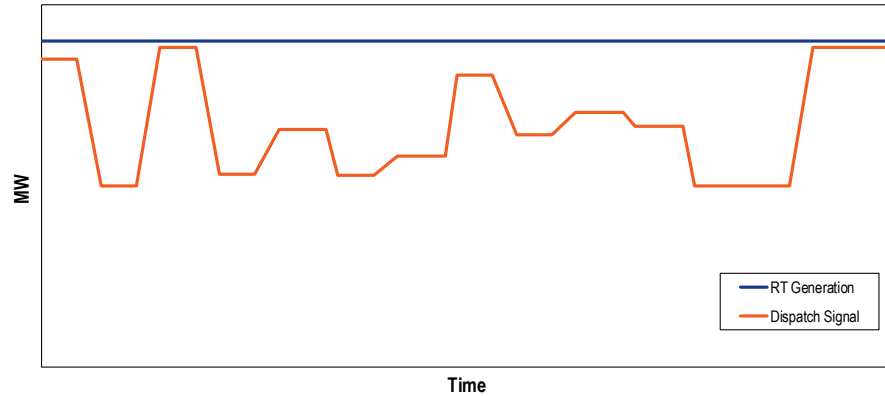
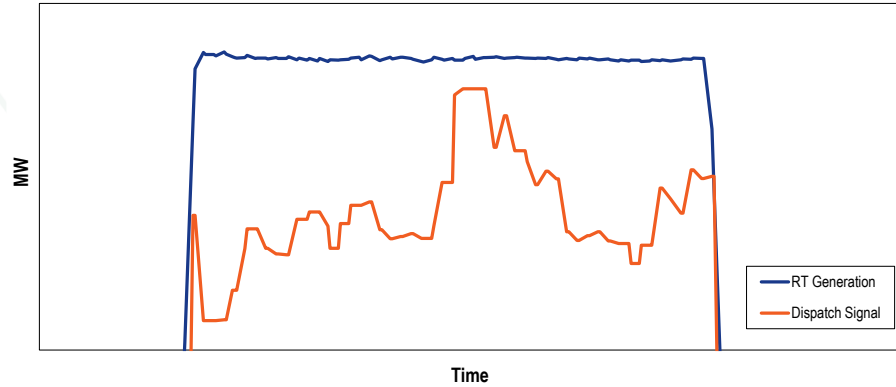
Unit Type	RT Generation (GWh)	Deviations (GWh)	Deviations (%)	Deviation Charges (millions)
AERO CT	4,466	286	6%	\$0.2
CC	288,891	9,508	3%	\$4.6
COAL	181,867	11,238	6%	\$4.8
FRAME CT	15,499	321	2%	\$0.2
OTHER	287,314	7,132	2%	\$3.3
RICE	1,730	49	3%	\$0.0
SOLAR	7,319	1,946	27%	\$0.9
STEAM OTHER	5,609	697	12%	\$0.4
WIND	27,630	7,314	26%	\$2.9
Total	820,325	38,491	5%	\$17.3

Deviation charges to units paid uplift - 2021

Unit Type	BOR Credits	BOR Deviation Charges
AERO CT	\$25,879,671	\$0
CC	\$3,313,928	\$12,771
COAL	\$3,416,832	\$5,660
FRAME CT	\$92,452,595	\$6,997
OTHER	\$944	\$0
RICE	\$860,320	\$11
SOLAR	\$434	\$0
STEAM OTHER	\$1,476,957	\$3,012
WIND	\$119,774	\$950
Total	\$127,521,455	\$29,400



Examples - CTs

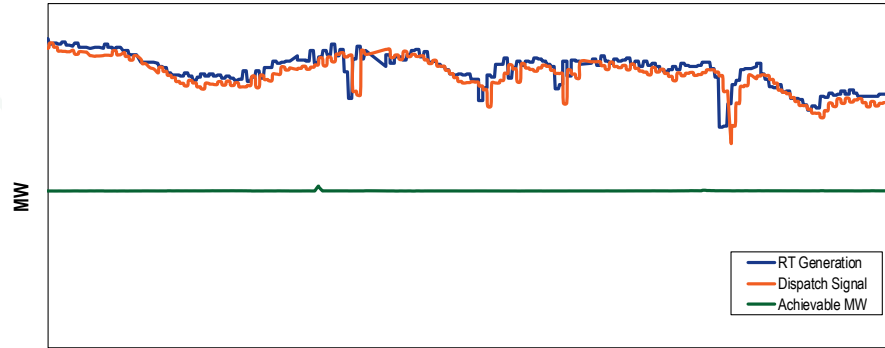


Examples - CTs

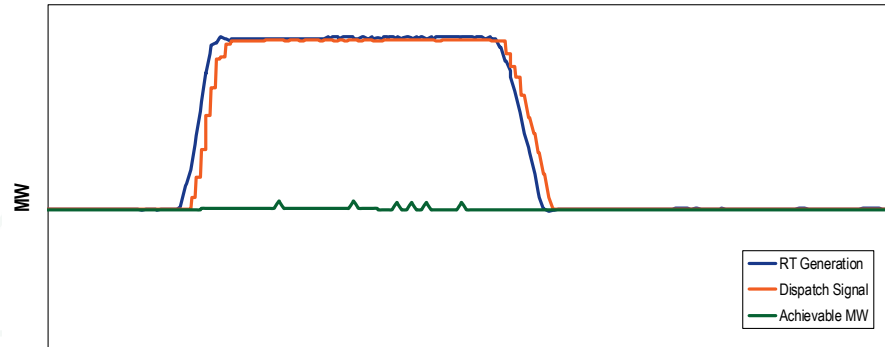
- **CTs logged as operating as requested by PJM are exempt from paying deviation uplift charges.**
- **Both of these units received uplift above \$10,000.**
- **Both of these units were exempt from paying deviations charges because they were deemed to be following dispatch, even though they were not.**



Examples - STs



Time



Time

Examples - STs

- **All other unit types are subject to the deviation thresholds and triggers.**
- **Slow ramping units tend to avoid paying deviations because the ramp limited desired MW and the dispatch signal are not far from their actual output.**
- **One of these units received uplift above \$100,000. It paid \$0.09 of deviation charges.**
- **The other received uplift above \$10,000. It paid \$234 of deviation charges.**



Appendix



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Ramp Limited Desired

- Ramp Limited Desired MW is calculated for all units with:
 - RT Eco Max $\leq$ 105% of DA Eco Max
 - RT Eco Min $\geq$ 95% of DA Eco Min
- Equation:

$$Ramp_Request_t = (Dispatchtarget_{t-1} - AOutput_{t-1}) / (LAtime_{t-1})$$

$$RL_Desired_t = AOutput_{t-1} + (Ramp_Request_t * Case_Eff_time_{t-1})$$

1. Dispatchtarget = Dispatch Signal for the previous approved Dispatch case
2. AOutput = Unit's achievable target MW at case solution time as defined in the PJM Manuals
3. LAtime = Dispatch look ahead time
4. Case_Eff_time = Time between signal changes
5. RL_Desired = Ramp-limited desired MW

Percent Off Dispatch

- **PJM calculates MW and percent off dispatch by using the lesser of:**
 - **Difference between actual output and dispatch signal.**
 - **Difference between actual output and ramp limited desired.**
- **If the dispatch signal or the ramp limited desired are not available, PJM uses the LMP Desired MW.**

Following Dispatch

- **A unit is following dispatch, for the purpose of not paying uplift charges, if:**
 - $RLD\ MW \leq Actual\ MW \leq Dispatch\ Signal\ MW$ or
 - $Dispatch\ Signal\ MW \leq Actual\ MW \leq RLD\ MW$ or
 - $Percent\ Off\ Dispatch \leq 10\%$ or
 - $abs \left[\frac{Actual\ MW - RLD\ MW}{RLD\ MW} \right] \leq 5\%$ or
 - $Hourly\ Deviation < 5\ MWh$ or
 - CT operating at the request of PJM (pool scheduled, not switching fixed gen between DA and RT).

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