

Regulation LOC and Overpayment of Uplift

RMDSTF

August 17, 2022

IMM



Monitoring Analytics

Regulation Lost Opportunity Cost

- **Forgone energy market revenue resulting from the provision of regulation.**
- **Only for resources providing both regulation and energy.**
- **Calculated only within economic limits of the unit.**
- **No LOC for self scheduled units.**
- **Units can receive ramp in, ramp out, and intrahour LOC.**
 - **Ramp in/out are evaluated for the 3, 5-minute intervals before/after the hour in question.**
 - **Assigned to the first or last 5-minute interval of an hour.**



Regulation LOC Calculation

- $RegLOC = |LMP - Offer_{RegSetPoint}| * |DesiredMW@LMP - MW@RegSetPoint|$
 - **LMP** = real-time LMP of the interval
 - **Offer_{RSP}** = energy market offer at the MW output of the regulation set point
 - **DesiredMW@LMP** = MW output of unit based on their energy market offer at the current LMP
 - **MW@RegSetPoint** = Current regulation set point MW output

Example LOC Calculation

- A unit has been backed down from 200 MW to 180 MW to provide 20 MW of regulation.
- The real time LMP = \$25/MW
- The unit's energy offer at 180 MW is \$20/MW
- The unit's DesiredMW@LMP is 200 MW
- $\text{RegLOC} = |\$25/\text{MW} - \$20/\text{MW}| * |200 \text{ MW} - 180 \text{ MW}|$
- $\text{RegLOC} = \$5/\text{MW} * 20 \text{ MW} = \100

Role of Regulation LOC and Uplift

- **Regulation LOC gets added to a unit's offer to create a total offer; Offer + LOC = Total Offer.**
- **Total offer of marginal unit sets the regulation market clearing price (RMCP).**
- **During settlements, RegLOC is calculated again but the RMCP is not. Each unit's final total offer is compared to the locked in RMCP.**
- **Units with a higher total offer than the RMCP are paid uplift.**

Regulation Uplift Overpayment

- **Existing PJM calculation of uplift in settlements is flawed.**
- **Regulation uplift does not take into account the ramp rate of the unit.**
- **The current rules result in the overpayment of LOC in the form of uplift in the regulation market in some cases.**
- **Some regulating units are paid uplift based on a target energy output that they cannot achieve based on their output and ramp rates.**



Regulation Uplift Overpayment

- **PJM calculates regulation LOC and uplift based on the difference between the desired MW of the regulating unit at LMP, and the current MW output at the regulation set point:**

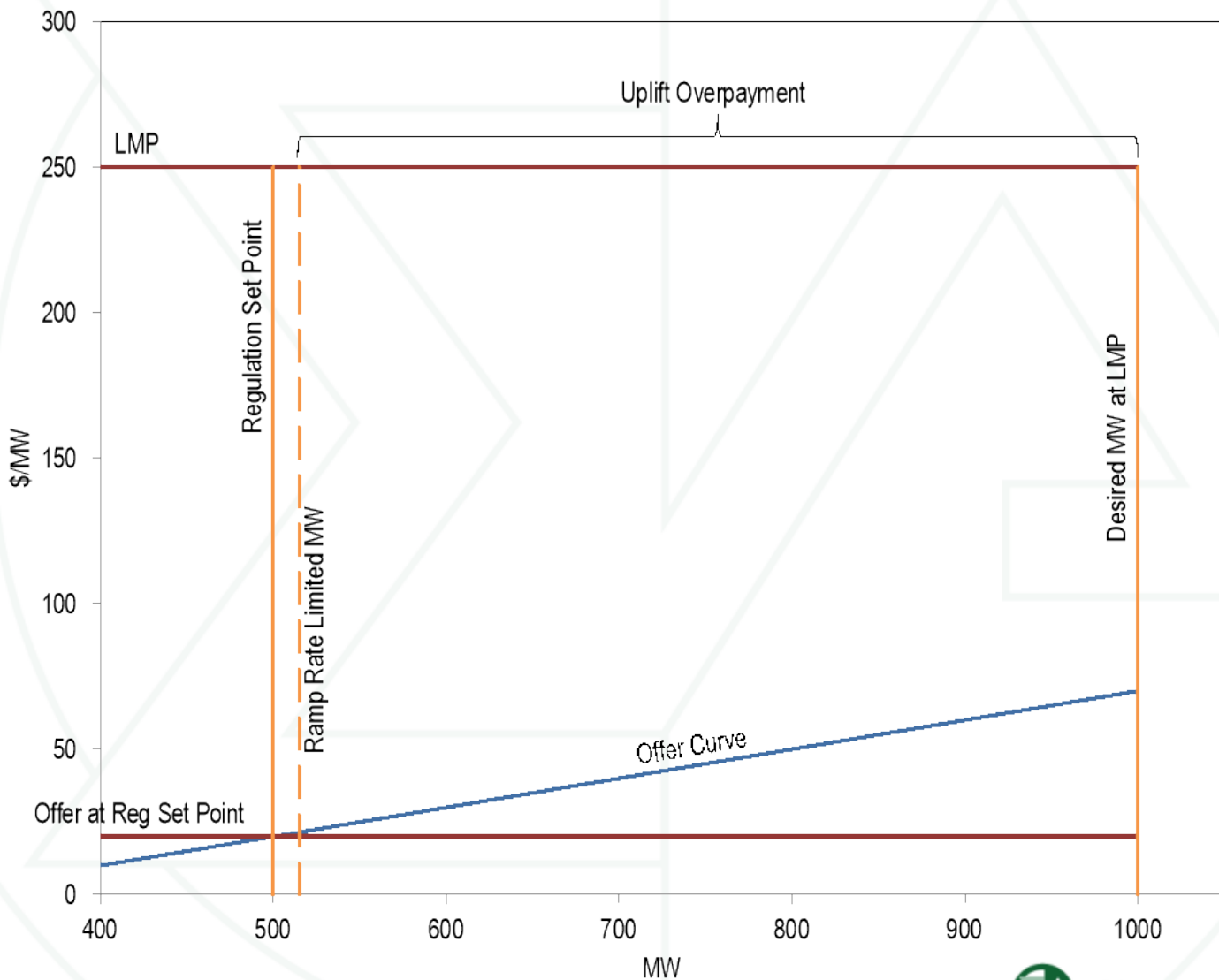
RegLOC

$= |LMP - Offer_{RegSetPoint}|$

$* |DesiredMW@LMP - MW@RegSetPoint|$

- **Where the DesiredMW@LMP is based on the energy offer curve but does not consider the ramp rate of the unit.**
- **The result is an uplift payment based on an output level that cannot be met.**

Regulation Uplift Overpayment Example



Top Ten Resources Paid Regulation Uplift

Rank	Parent Company	Unit Name	Fuel Type	Total Regulation Uplift Credit	Share of Total Regulation Uplift Credits
1	Arclight Capital Holdings LLC	PS LINDEN 1 CC	NATURAL GAS	\$452,045	5.4%
2	American Electric Power Company Inc	AEP MOUNTAINEER 1 F	COAL	\$447,128	5.3%
3	Ontario Power Generation Inc	AP LKLYN 1-4 H	HYDRO	\$412,276	4.9%
4	Constellation Energy Generation LLC	PE MUDDYRUN 1-8 H	HYDRO	\$372,410	4.4%
5	Arclight Capital Holdings LLC	PS LINDEN 2 CC	NATURAL GAS	\$346,263	4.1%
6	American Municipal Power Inc	FE FREMONT ENERGY CENTER 3 CC	NATURAL GAS	\$321,503	3.8%
7	American Electric Power Company Inc	AEP AMOS 1 F	COAL	\$258,421	3.1%
8	American Electric Power Company Inc	AEP BIG SANDY 1 F	NATURAL GAS	\$246,706	2.9%
9	American Electric Power Company Inc	AEP MITCHELL - KAMMER 2 F	COAL	\$237,217	2.8%
10	American Electric Power Company Inc	AEP ROCKPORT 2 F	COAL	\$236,984	2.8%
Total of Top 10				\$3,330,952	39.6%
Total Regulation Uplift Credits				\$8,410,168	100.0%

Impact of Regulation Uplift Overpayment

- **Incorrectly increases the amount of uplift credits received by units.**
- **Affects Coal and Natural Gas units.**
- **Uplift overpayment of \$7.1M in Q1 2022.**
 - **Based on recalculation using a ramp rate limited DesiredMW@LMP.**
- **Use of the ramp rate limited MW would eliminate the overpayment.**
 - **Pay units for uplift based on actual lost opportunity.**
 - **Based on physically achievable MW output.**

Year	Month	Uplift overpayment		
		Coal	Natural Gas	Total
2022	Jan	\$1,959,942	\$2,308,232	\$4,268,174
	Feb	\$432,077	\$1,103,635	\$1,535,711
	Mar	\$297,947	\$990,141	\$1,288,088
	Total	\$2,689,966	\$4,402,008	\$7,091,974