

Manual 28 – Regulation Market Redesign, Phase 2

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Section 4	Capability Clearing Price credits and Mileage Clearing Price credits by product type (RegUp and RegDn)	4.2.1
	Regulation LOC Credit updated to account for both RegUp and RegDn product types	4.2.2
	Added intra-commitment opportunity cost calculation details and illustrative examples	4.2.2.1
	Hourly obligation and adjusted obligation calculations by product type	4.3.1 (new)
	Capability Clearing Price charges and Mileage Clearing Price charges by product type	4.3.2
	LOC Charge updated to include purchases by product type	4.3.3
Section 5	Phase 1 cleanup - removed reference to marginal benefit factor	5.2.6.4 / 5.2.8

Clearing Price credits updated to account for RegUp and RegDn product types

- Calculated for each five-minute interval
- If actual five-minute performance score by product type < 0.25, credit = \$0.

Regulation Market Capability Clearing Price credit **by product type**

$$\text{RegUp MW} \times \text{RegUp Actual Performance Score} \times \frac{\text{RegUp RMCCP}}{12}$$

$$\text{RegDn MW} \times \text{RegDn Actual Perf Score} \times \frac{\text{RegDn RMCCP}}{12}$$

Regulation Market Mileage Clearing Price credit **by product type**

$$\text{RegUp MW} \times \text{Reg Up Actual Perf Score} \times \frac{\text{RegUp Actual Mileage}}{\text{Reg Up Daily Historic Mileage}} \times \frac{\text{RegUp RMMCP}}{12}$$

$$\text{RegDn MW} \times \text{RegDn Actual Perf Score} \times \frac{\text{RegDn Actual Mileage}}{\text{RegDn Daily Historic Mileage}} \times \frac{\text{RegDn RMMCP}}{12}$$

Regulation LOC Credit updated to account for both product types

If a pool-scheduled resource is not compensated for its offer plus any opportunity costs via the clearing prices, a resource receives an uplift credit referred to as the Lost Opportunity Cost Credit.

Lost Opportunity Cost credit =

$$\frac{(\text{Regulation Offers} + \text{Intra-commitment opportunity cost} * \text{Actual Performance Score} + \text{Shoulder opportunity cost})}{12} - \text{Regulation Clearing Price credits}$$

If applicable 5-minute performance score < 0.25, LOC credit = \$0

- If a resource is providing both RegUp and RegDn products in the interval,
 - Regulation Offers = RegUp Offer + RegDn Offer
 - Regulation Clearing Price credits = RegUp Clearing Price credits + RegDn Clearing Price credits
 - A single intra-commitment opportunity cost is calculated and the weighted average of the RegUp and RegDn performance scores is used.
- Intra-commitment opportunity costs and shoulder interval opportunity costs for Economic Load Response Participant resources and regulation only resources are zero.

- Updated with calculations and illustrative examples for the following:
 - Non-hydro Resources: Bias adjusted tracking regulation set point and intra-commitment opportunity cost
 - Hydro Resources: Bias adjusted deviation MW and intra-commitment opportunity cost
 - Performance Adjusted Intra-commitment Opportunity Cost
 - Intra Commitment Opportunity Cost is multiplied by the applicable actual performance score. If resource is providing both RegUp and RegDn products in the interval, a single intra-commitment opportunity cost is calculated and the weighted average of the RegUp and RegDn performance scores is used.
 - Shoulder opportunity cost: Replaced set point calculation with use of the tracking set point consistent with markets.

- New section detailing hourly obligation and adjusted obligation calculations by product type

RegUp Obligation =	Total Effective RegUp x $\frac{\text{RT Load}}{\text{Total PJM RT Load}}$
RegDn Obligation =	Total Effective RegDn x $\frac{\text{RT Load}}{\text{Total PJM RT Load}}$

Total Effective Regulation by product type is the hourly integrated sum of the 5-minute interval Regulation MW multiplied by the actual performance score for all pool-scheduled and self-scheduled resources.

RegUp Adjusted Obligation =	RegUp Obligation + RegUp Bilateral Sale – RegUp Bilateral Purchase
RegDn Adjusted Obligation =	RegDn Obligation + RegDn Bilateral Sale – RegDn Bilateral Purchase

- Updated to reflect hourly Clearing Price charges by product type

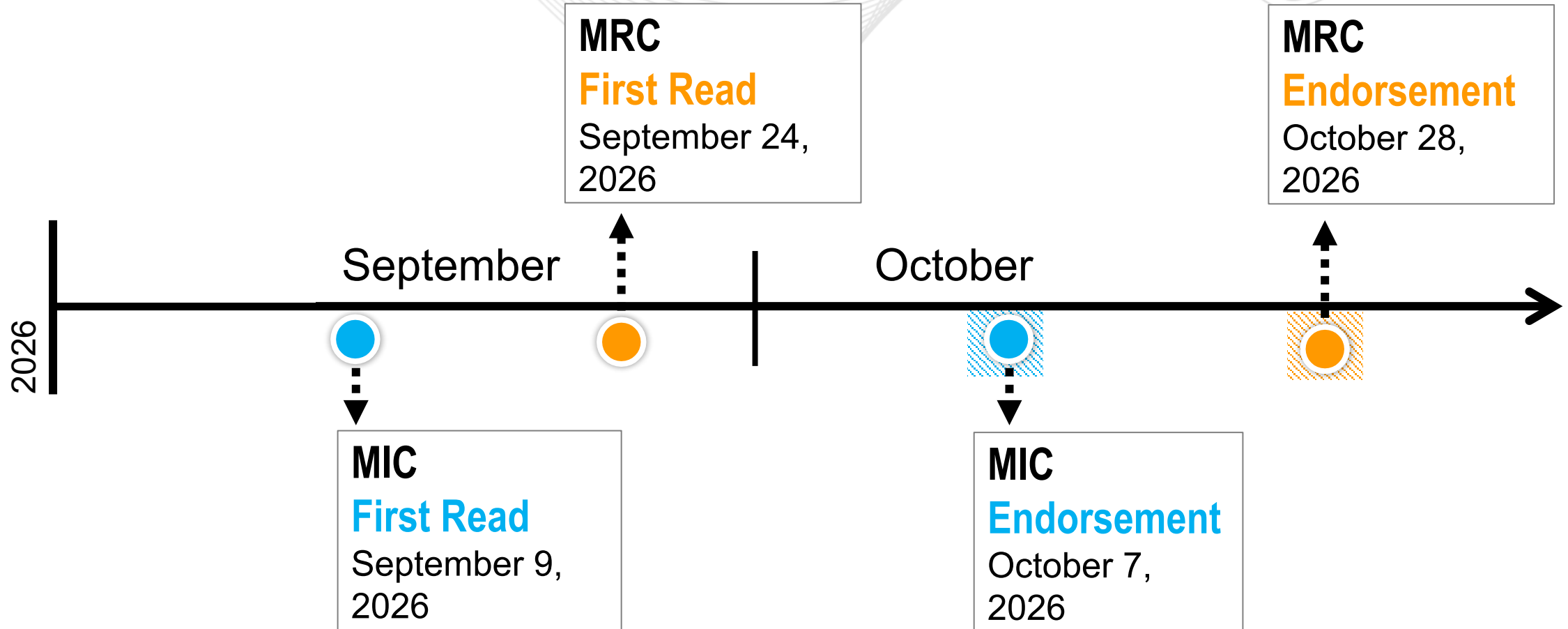
RegUp Capability Clearing Price charge =	Total RegUp RMCCP credits x	RegUp Obligation
		Total PJM RegUp Obligation
RegUp Mileage Clearing Price charge =	Total RegUp RMMCP credits x	RegUp Obligation
		Total PJM RegUp Obligation

RegDn Capability Clearing Price charge =	Total RegDn RMCCP credits x	RegDn Obligation
		Total PJM RegDn Obligation
RegDn Mileage Clearing Price charge =	Total RegDn RMMCP credits x	RegDn Obligation
		Total PJM RegDn Obligation

- Updated to include purchases by product type

RegUp Purchases =	Max (RegUp Obligation – RegUp Self Scheduled Regulation MW, 0)	
RegDn Purchases =	Max (RegDn Obligation – RegDn Self Scheduled Regulation MW, 0)	
Reg Lost Opportunity Cost charge =	Total Lost Opportunity Cost credits x	$\frac{\text{RegUp Purchases} + \text{RegDn Purchases}}{\text{Total PJM RegUp and RegDn Purchases}}$

- Section 5.2.6.4 and 5.2.8 – Removed reference to marginal benefit factor that was missed during Regulation Phase 1 manual updates.



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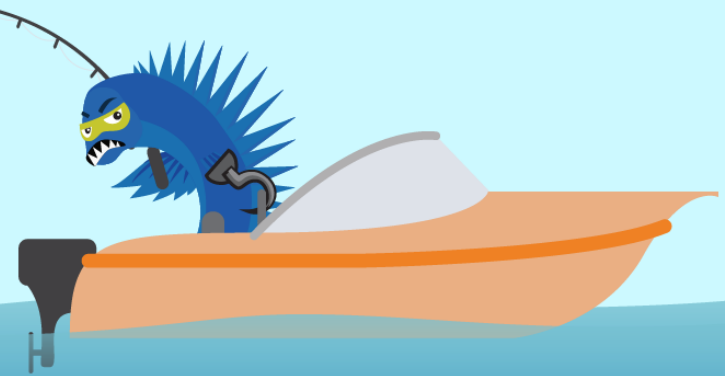
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