

Regulation Market Redesign Phase 2

Manual Revisions: M11, M12, M28

Markets and Reliability Committee

October 28, 2026

Disclaimer: While materials are current at the time of publishing, applicable requirements may change. PJM Governing Documents control.





Manual 11, Energy & Ancillary Services Market Operations

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Adding Phase 2 Business Rules while preserving still relevant existing language



No major organizational and section structure change for Phase 2, just one new subsection.



Added contextual information to continue to build out detail from the existing market and the redesign.

*** M11, Version 138 to conform with ER24-1772***

The changes and additions to Manual 11, Section 3 are moderate, mostly breaking down concepts into the new two product/service paradigm.

Widespread additions to delineate concepts by product/service. (i.e. RegUp/RegDn, “by a product/service”, “for a product/service” etc.)

Addition of one new subsection to discuss the new concept of Product Bidirectionality and Symmetry.

Section 3.7.2.2

Please allow adequate time for review of full posted redline and bring forth any questions/comments as early as possible, preferably before the next stakeholder meeting via email.

Section 2	Additional description added to describe target and effective times for energy and ancillary service products (updated since first read with additional detail)	2.5.3.5
	Relocated reference of marginal resource identification and marginal clearing price determination; Cleanup references of Performance Clearing Price to Mileage Clearing Price	2.7
	Addition of detail on how stability limits apply to RegUp and RegDn	2.18
Section 3	Updates to Introduction for two products	3.1
	Updates to Regulation Range Limits for two products (updated formulas for RegUp/RegDn not showing as red in posted redline)	3.2.6
	Updates to cost and price-based offer rules	3.2.4.1 / 3.2.4.2
Section 5	Cleanup of outdated ASO timing	5.2.4

Overall: Grammatical, reference, and organizational updates with additional detail added where appropriate.

Manual 12, Balancing Operations

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Revision 58 (12/01/2026): Confirming Changes to Regulation Redesign Phase II

- Revised language to accommodate two new market products, Regulation-Up and Regulation-Down in Sections 3.1.2, 3.1.3, 4.3 and 4.4.
- Updated definitions for Markets Database, Dispatch Management Tool and PI Vision in Section 2.1.2.
- Removed Resource Dispatching Exhibit and Regulation Assignment Exhibit as these exhibits are not relevant anymore.
- Updated PJM Member Interface Exhibit and Assigned Regulation Exhibit to accommodate RegUp and RegDn.
- Removed irrelevant sentence related to synchronized reserves and regulation in Section 4.1.2.

- Revised language to accommodate two new market products, Regulation-Up and Regulation-Down in Sections 3.1.2, 3.1.3, 4.3 and 4.4.

PJM calculates one Regulation signal, as shown by the PJM Regulation Signal Exhibit. The Regulation control signal is a combination of Regulation-Up (RegUp) and Regulation-Down (RegDn).

The following information is sent by PJM to the Generation Owners:

- Economic Limits
- Assigned Regulation megawatt (ARegUp and/or ARegDn)
- Spin awards
- Desired megawatt (economic basepoint)
- Regulation control signal

The following information is sent by the PJM Members to PJM:

- Actual PJM/external tie line megawatt
- Unit status and MW output
- Total assigned Regulation megawatt that is fleet based (TRegUp and/or TRegDn) (fleet)
- Total current Regulation megawatt that is fleet based (CRegUp and/or CRegDn) (fleet)
- Actual net interchange megawatt

4.3 Regulation

The PJM RTO is a single Balancing Authority Area consisting of multiple Control Zones. Resource owners providing Regulation are required to comply with standards and requirements of Regulation capability and dispatch, as described in this section.

PJM requires that all regulating generation resources be equipped with an Automatic Generator Control (AGC) scheme to receive, process and respond to a Regulation control signal that bifurcates into two market products, Regulation Up (RegUp) and Regulation Down (RegDn). Demand response resources providing Regulation must have a similar control system to accommodate RegUp and RegDn-

- Updated definitions for Markets Database, Dispatch Management Tool and PI Vision in Section 2.1.2.

2.1.2 PC Applications

- Markets Database (MDB) —This database is used by ~~PJM Market Operations~~~~the Day-Ahead and Market-Based Regulation Systems~~. Market Participants update the MDB continuously via XML and Web-based interfaces.
- Dispatch Management Tool (DMT) — The DMT enables PJM dispatchers to manage resource information, transmission constraint information and administer the ~~ancillary service markets and operations~~~~Regulation Market~~. The DMT automatically logs resource status changes and provides an electronic source of logging information for Market Settlements.
- PI Vision – ~~Internet-based~~ ~~V~~visualization ~~system that tool utilized to~~ displays telemetered data.

- Removed Resource Dispatching Exhibit and Regulation Assignment Exhibit as these exhibits are not relevant anymore.

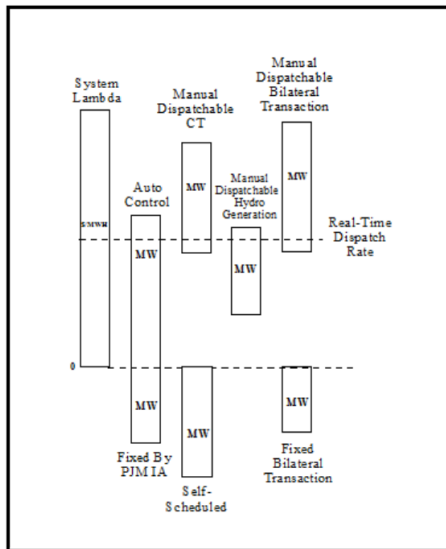


Exhibit 3: Resource-Dispatching

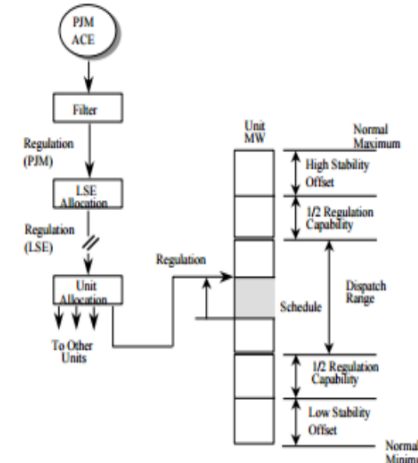


Exhibit 8: Regulation-Assignment

- Updated PJM Member Interface Exhibit and Assigned Regulation Exhibit to accommodate RegUp and RegDn.

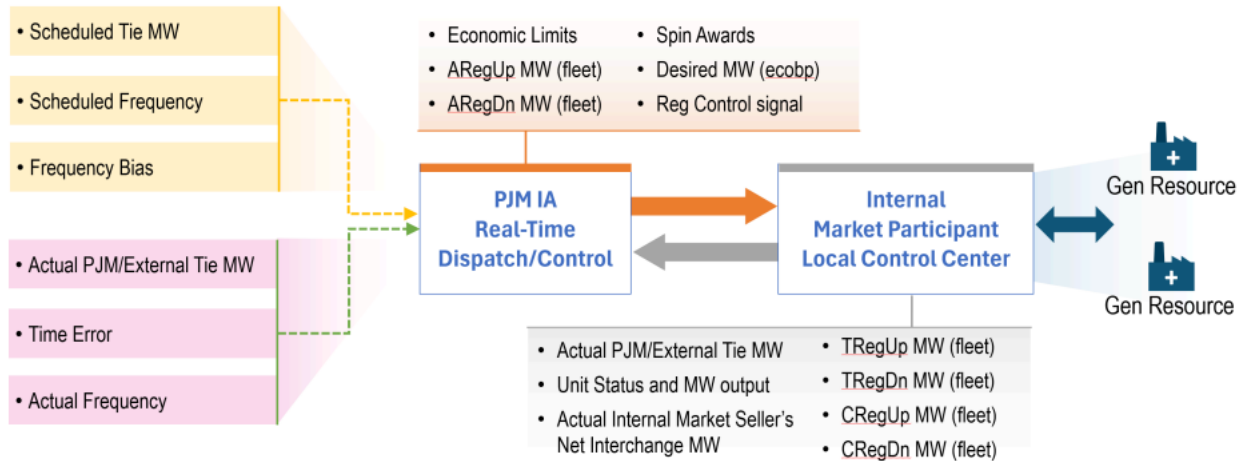


Exhibit 5: PJM Member Interface

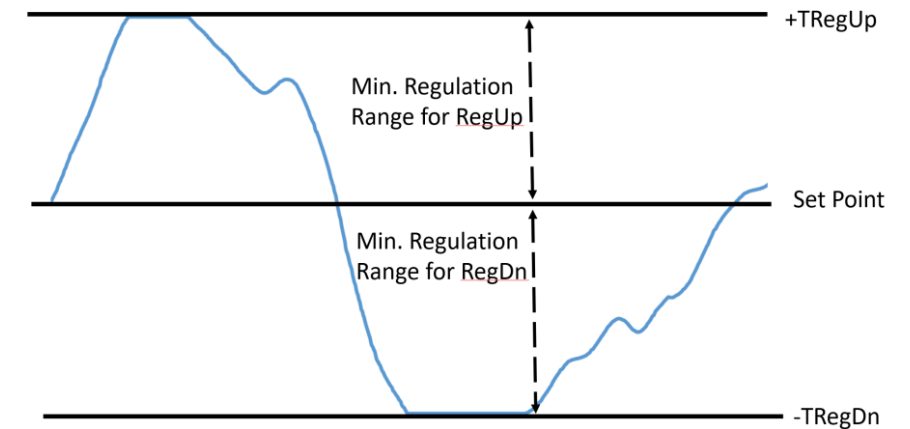


Exhibit 6: Assigned Regulation and Regulation Range Requirements

- Removed irrelevant sentence related to synchronized reserves and regulation in Section 4.1.2. Loading Reserves.

PJM Members Actions

- Resource owners that elect to use their assets to respond to an event shall, without regard to price and as quickly as possible, load the requested percentage of Synchronized Reserve and Non-Synchronized Reserve immediately after receiving either the PJM ICCP signal, DNP3 signal, or PJM All-Call Message. PJM Members responding to the event will continue to load resources until directed by the PJM dispatcher to discontinue. Resources currently providing Regulation service and all other resources with no real-time Synchronized Reserve effective assignment will not have their basepoint as the summation of the deployed reserve megawatt and current output. should only provide Synchronized Reserves to the extent that they can quickly resume accurate Regulation control following the event.
- Upon cancellation, the Generation Owner dispatchers unload the Synchronized and Non-Synchronized Reserve, as directed by the PJM dispatcher.

Manual 28 – Operating Agreement Accounting

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

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 =	$\text{RegUp Obligation} + \text{RegUp Bilateral Sale} - \text{RegUp Bilateral Purchase}$
RegDn Adjusted Obligation =	$\text{RegDn Obligation} + \text{RegDn Bilateral Sale} - \text{RegDn Bilateral Purchase}$

- Updated to reflect hourly Clearing Price charges by product type

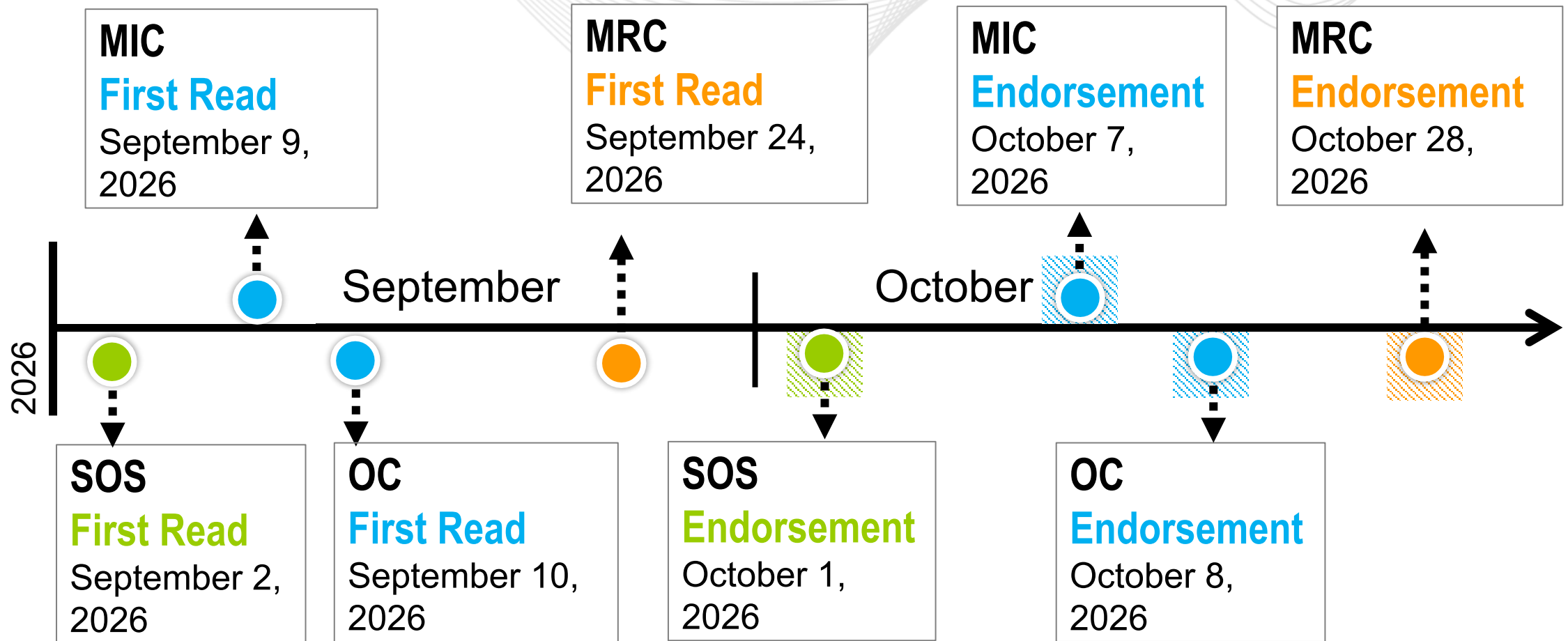
RegUp Capability Clearing Price charge =	Total RegUp RMCCP credits x	RegUp Obligation
		Total PJM RegUp Obligation
RegUp Mileage Clearing Price charge =	Total RegUp RMMCP credits x	RegUp Obligation
		Total PJM RegUp Obligation

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.



Manual 12: SOS & OC
Manual 11 and Manual 28: MIC

SME/Presenters:

M11: Joey Tutino,
Joseph.Tutino@pjm.com

M12: Ilyana Dropkin,
Ilyana.Dropkin@pjm.com

M28: Suzanne Coyne,
Suzanne.Coyne@pjm.com



Member Hotline

(610) 666 – 8980

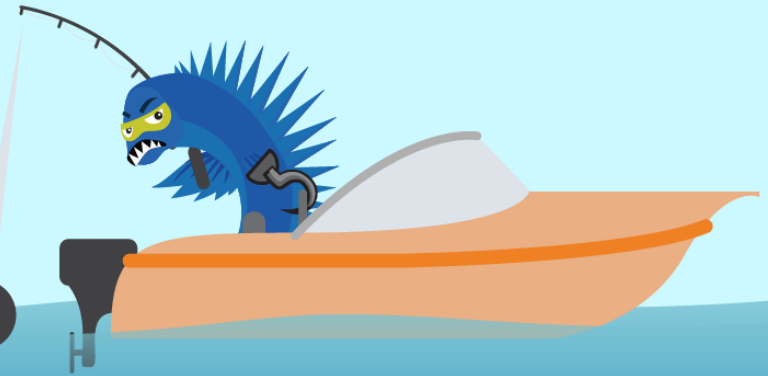
(866) 400 – 8980

custsvc@pjm.com

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