Minimum Operating Parameters Matrix Update

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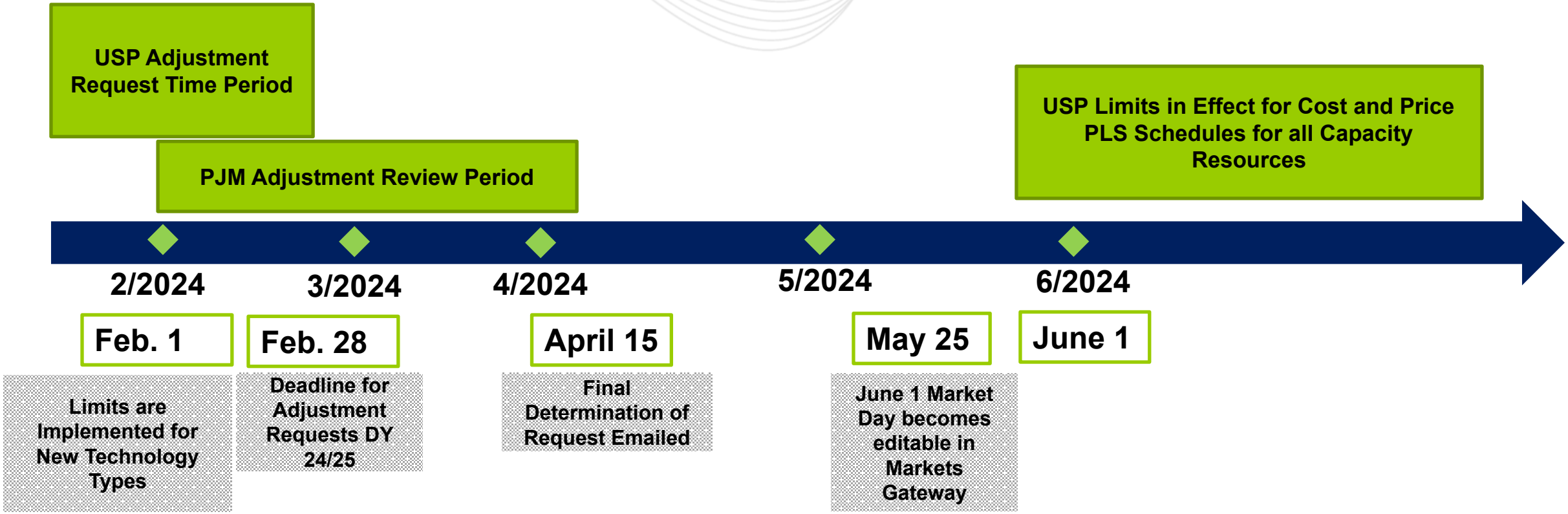
Background

1. Unit specific parameter limits are applied to all Capacity Resources regardless of commitment status or type (RPM vs FRR)
   - Unit specific parameter limits apply to Cost and Price Based PLS schedules
   - Price Based PLS schedules are only considered in DA and RT Dispatch when certain Emergency Conditions are in effect*
2. If the unit can not meet the proxy parameters due to an actual constraint, you may submit an adjustment request using the **Unit Specific Parameter Adjustment Process SharePoint site (PJM Connect)** by February 28
3. Approved parameters will remain in place unless a change is communicated to PJM
   - Parameters which were approved and implemented in previous years do NOT have to be submitted each year

*Refer to OATT, Attachment K Appendix, Sec 6.6 Minimum Generator Operating Parameters

DY 2024/25 Unit Specific Parameter (USP) Timeline



Tariff Language

Tariff, Attachment K-Appendix, Section 6.6 and Operating Agreement Schedule 1

For the 2018/2019 and 2019/2020 Delivery Years for Base Capacity Resources, and for the 2016/2017 Delivery Year and subsequent Delivery Years for Capacity Performance Resources, the Office of the Interconnection shall determine the unit-specific achievable operating parameters for each individual unit on the basis of its operating design characteristics and other constraints, recognizing that remedial and ongoing investment and maintenance may be required to perform on the basis of those characteristics, for the following parameters:

(i)Turn Down Ratio;
(ii) Minimum Down Time;
(iii) Minimum Run Time;
(iv) Maximum Daily Starts;
(v) Maximum Weekly Starts;
(vi) Maximum Run Time;
(vii) Start-up Time; and
(viii) Notification Time.

Summary of Matrix Updates

- Additions:
  - Nuclear Resources
  - Run-of-River Resources
  - Solar Resources
  - Wind Resources
- Modifications:
  - Intermittent-Storage Hybrid Resources
  - Capacity Storage Resource
    - Battery
    - Pumped Hydro

Matrix Update - Definitions

- **Nuclear:** A generating resource which uses nuclear fission as a fuel. This includes both Boiling Water Reactors (BWR) and Pressurized Water Reactors (PWR).
- **Run-of-River:** A generating resource which uses topographic elevation difference on a river to generate.
- **Solar:** An intermittent generating resource that generates using solar radiation.
- Wind: An intermittent generating resource which generates using wind
- **Battery:** A resource that stores energy as electrical energy in a battery or mechanical energy in a spinning flywheel.
- **Pumped Hydro:** An generating/pumping resource which pumps water to an elevated pond/basin and generates by discharging the water to a lower pond or basin.

Matrix Update - Parameters

Technology Classification[2]	Min Down Time Hrs	Min Run Time Hrs	Max Daily Starts	Max Weekly Starts	Start-up Time			Notification Time Cold/Warm/ Hot Hrs	Turn Down Ratio	Max Run Time
					Hot Hrs.	Warm Hrs.	Cold Hrs.			
~~Capacity~~ Pumped Hydro~~Storage~~ Resource	Shall not exceed 1 hr.	1	12	84	Start Time + Notification Time shall not exceed 1 hr.				N/A	24 hrs.
Battery	0	0	Unlimited	Unlimited	0				N/A	24 hrs.
Intermittent-Storage Hybrid	0	0	~~No limit~~Unlimited	~~No limit~~Unlimited	0	0	0	0	N/A	24 hrs.
Solar Units	0	0	Unlimited	Unlimited	0	0	0	0	N/A	24 hrs.
Wind Units	0	0	Unlimited	Unlimited	0	0	0	0	N/A	24 hrs.
Run-of-River Hydro Units	0	0	Unlimited	Unlimited	0	0	0	0	N/A	24 hrs.
Nuclear Units	48	24	1	1	48	72	96	1	1.0 or more	24 hrs.

Appendix: Unit Specific Parameter and Adjustment Process Reference Material

Unit Specific Parameter References

Reference Materials:

- **Minimum Operating Parameter Matrix-** https://www.pjm.com/-/media/committees-groups/committees/elc/postings/20150612-june-2015-capacity-performance-parameter-limitations-informational-posting.ashx?la=en
- **Tariff-** OATT Attachment K Appendix Section 6.6
- **Manual 11-** Section 2.3.4 https://www.pjm.com/~/media/documents/manuals/m11.ashx
- **FAQs-** https://www.pjm.com/-/media/committees-groups/committees/elc/postings/20150715-cp-unit-specific-adjustment-request-faqs.ashx?la=en
- **Request Template-** https://www.pjm.com/-/media/committees-groups/committees/elc/postings/cp-unit-specific-adjustment-process-template.ashx?la=en
- **Parameter Definitions-** http://www.pjm.com/~/media/documents/manuals/m11.ashx
- **PJM Connect Site**- https://connect.pjm.com/adjustments/SitePages/Home.aspx

Unit Specific Parameter Adjustment Process Overview

Unit Specific Operating Parameter Adjustment Process Details	
Why was the process implemented?	PJM was directed by FERC in ER15-623-000, EL15-29-000, ER15-623-001 (CP Order) to implement unit specific parameter limitations for Generation Capacity Resources
What is the Unit Specific Operating Parameter Adjustment Process?	Capacity Market Sellers that do not believe their individual resources can meet the proxy operating parameters due to actual operating constraints may submit adjustment requests for the parameters for their cost based and price-based parameter limited schedules to the PJM team for review. The team includes IMM team members
What parameters are included in the unit specific operating parameter adjustments?	Turn Down Ratio, Minimum Down Time, Minimum Run Time, Maximum Daily Starts, Maximum Weekly Starts, *Hot Start, *Warm Start, *Cold Start, *Notification Time, and *Maximum Run Time ** Additional Parameters for Capacity Performance Resources*

Unit Specific Parameter Adjustment Process Overview

Unit Specific Operating Parameter Adjustment Process Details	
Who should use the process?	• Capacity Performance resources for DY 2024/25 and Uncommitted Capacity Resources for DY 2024/25 • Replacement Capacity Performance resources for DY 2024/25 • Re-submitted adjustments for the same parameters if there is physical change or updated/changed information or documentation
What are adjustments used for?	• Make whole payments • Do not excuse a unit for not performing during a Performance Assessment Interval
How long are the parameters effective for?	Parameters will remain in place until PJM determines a change is needed based on changed operational capabilities of the resource
When must adjustments be submitted by?	The requests must be submitted by the February 28 and will be evaluated by April 15 (prior to the applicable delivery year).
When are adjustments effective?	June 1 for the applicable delivery year
How do you submit adjustments?	Submit requests in the template with documentation and data to the Unit Specific Parameter Adjustment Process SharePoint Site.

Acronyms

PJM Glossary

Acronym	Term & Definition
RPM	**Reliability Pricing Model** is defined as PJM's capacity market design that includes a series of auctions to satisfy the reliability requirements of the PJM region for a Delivery Year.
FRR	**Fixed Resource Requirement Capacity Plan** is defined as an FRR entity's advance commitment of capacity resources to satisfy their unforced capacity obligation and any specific locational or product-type resource requirements for a delivery year.
PLS	**Parameter Limited Schedules** are defined as schedules containing pre-determined limits that could be imposed on the parameters in generation offers when certain operational circumstances exist. Cost based offers are parameter limited. Price based offers can be parameter limited or not.
DA	**Day-Ahead Energy Market** is defined as a day-ahead hourly forward market in which PJM market participants may submit offers to sell and bids to buy energy. The results of the Day-Ahead Energy Market are posted daily by 1:30 p.m. and are financially binding. The Day-Ahead Energy Market is based on the concept of Locational Marginal Pricing and is cleared using least price security-constrained unit commitment and dispatch programs.
RT	**Real-Time Energy Market** is defined as a balancing market in which the clearing prices are calculated every five minutes based on the actual system operations security-constrained economic dispatch. The Real-Time Energy Market is based on the concept of Locational Marginal Pricing and is settled based on actual hourly (integrated) quantity deviations from day-ahead scheduled quantities and on real-time prices integrated over the hour.

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Minimum Operating Parameter Matrix Update

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