Reliability Resource Initiative
MRC Update

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Markets and Reliability Committee
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Feedback from PC Special Session

Thank you for your feedback at our last presentation of the Reliability Resource Initiative at the October 18 PC Special Session

- We've modified our proposal to try and address the concerns expressed and plan to walk through our revised proposal today. We appreciate your continued feedback.
- We wanted to start our conversation today by addressing why we believe it is urgent to seek further interconnection queue solutions at this time.

Key Conclusions of “4R” Report from February 2023

High Demand Growth Rates

The growth rate of electricity demand is likely to continue to increase from electrification coupled with the proliferation of high-demand data centers in the region.

Retirements At Risk of Outpacing New Construction

Thermal generators are retiring at a rapid pace due to government and private sector policies as well as economics. Retirements are at risk of outpacing the construction of new resources, due to a combination of industry forces, including siting and supply chain, whose long-term impacts are not fully known.

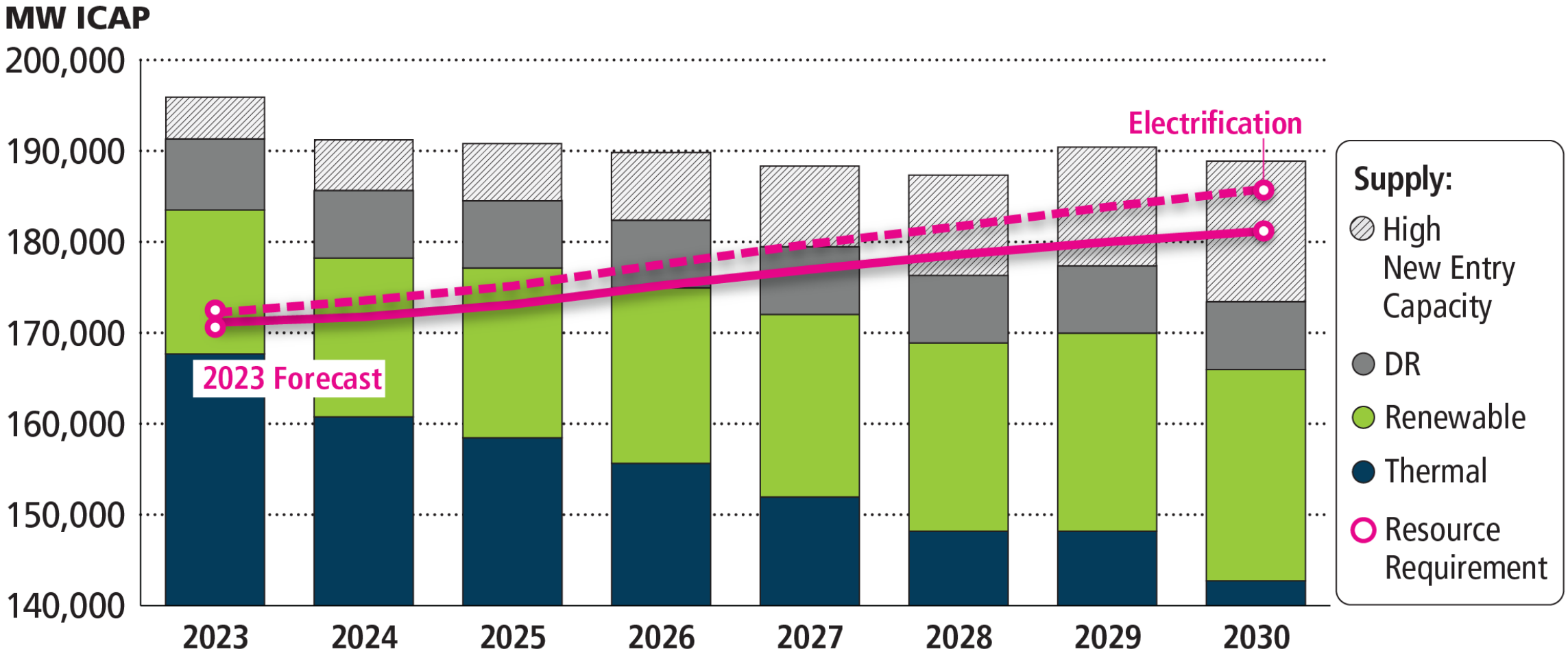
Interconnection Queue Mostly Intermittent & Limited Duration Resources

PJM’s interconnection queue is composed primarily of intermittent and limited-duration resources. Given the operating characteristics of these resources, we need multiple megawatts of these resources to replace 1 MW of thermal generation.

If these trends continue, our models show increased risk of having insufficient resources later in this decade to maintain the reliable electric service that consumers expect.

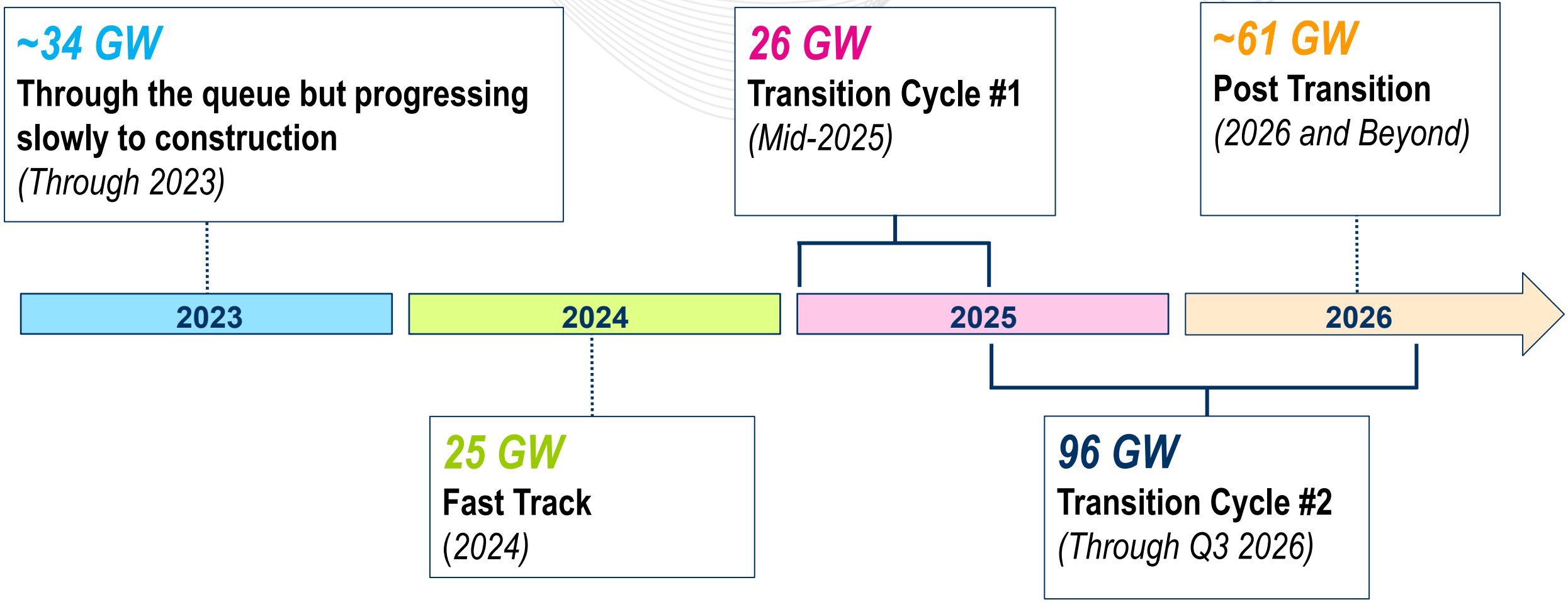
Growing Resource Adequacy Risk per 4R Paper

February 2023



Energy Transition in PJM: Resource Retirements, Replacements & Risks, Figure 7, p. 17, Feb. 2023

Comprehensive Queue Reform is Advancing on Schedule



Existing Agreements + Fast Track + TC1 + TC2 = 181 GW nameplate

However, Existing Queue May Not Be Sufficient

Data as of Oct. 25, 2024

Fuel Type	Final Agreement ELCC Adjusted GW	Fast Lane ELCC Adjusted GW	TC1 ELCC Adjusted GW	TC2 ELCC Adjusted GW	Total ELCC Adjusted GW
Storage	0.9	1.4	1.7	11.0	**15**
Natural Gas	3.7	0.8	0.4	2.0	**6.9**
Offshore Wind	1.1	0.3	0.9	4.0	**6.3**
Solar	1.4	0.8	0.9	2.7	**5.9**
Hybrid ◆	0.3	1.1	0.8	5.9	**8.1**
Wind	0.8	0.16	0.6	0.6	**2.1**
Other	0.1	0	0	0.1	**0.2**
Total	**8.3**	**4.6**	**5.3**	**26.3**	**44.5**

◆ Assumes Hybrid ELCC Average of 35% - *for illustrative purposes, final number may be different*

PJM 2030 Reliability Scenario Balance Sheet

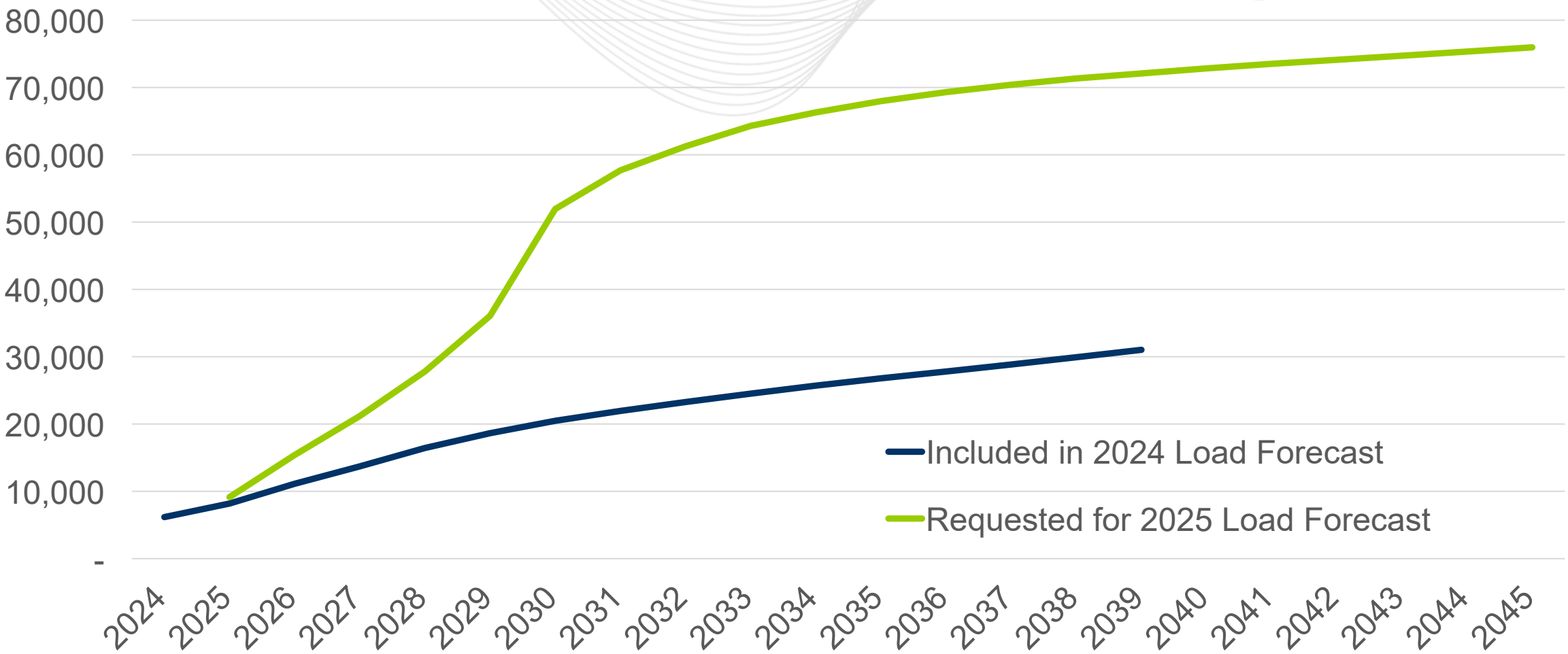
Study Year: **2030/31** Forecasted Summer Peak: **167,876** Preliminary Forecast Pool Requirement: **0.9296**		**Scenario**			
		0% New Entry (GW)	**40%*** New Entry (GW)	**62%** New Entry (GW)	**100%** New Entry (GW)
Supply	2025/26 ELCC Adjusted Offered Capacity◆	145	145	145	145
	ELCC Adjusted Forecasted Deactivations (2025-2030)	-17	-17	-17	-17
	ELCC Adjusted New Resource Entry Rate	0%	40%	62%	100%
	ELCC Adjusted New Resource Entry	-	18	28	45
	Total ELCC Adjusted Available Capacity	128	146	156	173
Demand	**Preliminary Reliability Requirement** *(Forecast Summer Peak * Forecast Pool Requirement)*	156	156	156	156
	Balance Sheet	**-28**	**-10**	**0**	**+17**

◆Includes estimated FRR resources committed for the 25/26 Delivery Year.

◆As stated when presenting the ELCC Class Ratings for the period, the IRM/FPR values are "for informational purposes" only. The values are not and should not be interpreted as a PJM forecast of IRM/FPR. Rather, they are the outcome of running the ELCC model using a specific assumed resource portfolio for each delivery year in the period. Significant uncertainty surrounds each assumed resource portfolio.

*40% still higher than historical average

Further, Large Load Submissions Have Increased Since 4R Report



- 2025 load forecast still under review with PJM

Current Queue Reform Discussions

CIR Transfer	**Target:** Resources using interconnection service from a deactivating generator
	Potential Outcome: Tariff modifications to provide for new processing of CIRs
Reliability Resource Initiative	**Target:** Resources not currently in the interconnection queue
	Potential Outcome: One-time expansion of the eligibility criteria for Transition Cycle #2 beyond active requests received prior to September 2021
Surplus Interconnection Service	**Target:** Operating generators that are not able to operate continually 24/7/365
	Potential Outcome: Potential Tariff modifications to provide for new processing of Surplus Interconnection Service

PJM's Considerations

Unique Circumstances and One-Time Process

The transition clusters are limited to only projects that were already in the queue during the reform discussions. Once the transition is over, new projects will have an open application window to submit projects on a regular basis for study and processing.

Minimize Timing Impact to TC2

Allowing additional projects that meet specific criteria into the TC2 queue minimizes timing delays versus a separate parallel process that risks delays to the existing schedule.

Quick Action

There is a limited window of opportunity to make an impact within the existing transition. PJM Board & FERC approval will be requested on accelerated timeline with a time-bound stakeholder engagement period.

Feedback from PC Special Session

PJM has heard stakeholders express concerns that RRI could be viewed as discriminatory against certain resources.

The proposal has been modified to reflect feedback:

- Eliminated gating criteria – all projects can apply
- Reduced number of projects eligible under RRI
- Proposed a scoring approach to select projects in case RRI is oversubscribed
    - Informed by recent CAISO and MISO orders
- Added a locational component to formula proposal

Proposed Reliability Resource Initiative

Expand eligibility criteria to address resource reliability for projects that can be evaluated in Transition Cycle #2 (TC2).

Today, TC2 is only open for projects that already have an active queue position in the AG2 and AH1 queues (applied between October 2020 and September 2021).

PJM's proposal will include **an application window and specific criteria for projects to determine eligibility and limits on the number of entrants.**

- Projects do not need to currently be in PJM Cycle #1 and can be submitted prior to the RRI application window.

MISO Cap Order

January 19, 2024:
Commission denies MISO request to apply caps in
Docket Nos. ER24-340-000 and ER24-341-000:

MISO's proposal was to implement a cap on the total MW value of interconnection requests that may be studied in a cluster.

Commission rejected MISO proposal:

- Exemptions to the cap have the potential to undermine it;
- Cap is not consistent with the Commission's open access requirements;
- The description of the cap was not adequate and
- Ignores resource adequacy and reliability.

CAISO Cap Order

September 30, 2024,
Commission approved CAISO's proposal in Docket No. ER24-2671-000
(request for rehearing filed October 30, 2024-Clean Energy Associations)

CAISO proposes a cap on the number of interconnection requests processed in each Deliverable Zone equal to 150% of the total available transmission capacity in the zone.

CAISO's proposed scoring criteria will prioritize those requests that are most viable, ready and needed

After ranking the interconnection requests received according to the scoring criteria, CAISO proposes to apply a cap to the MW value of interconnection requests that will be studied within a Deliverable Zone, based on available deliverability at the relevant transmission constraint in a zone.

Cap scoring criteria will be based on the resource needs and transmission capacity:

Project Viability (max 35 points)	System Need (max 35 points) and	Commercial Interest (max 30 points)

Other sub categories: engineering design plan attested to by PE; expansion of existing generating facility; local capacity resource in an area of need.

"[W]e find that the proposed cap will help to ensure that interconnection customers are able to interconnect to the transmission system in a reliable, efficient, transparent, and timely manner." (P. 92)

- Reflective of CAISO's resource adequacy needs
- Does not present open access concerns
- Prioritizes those requests that are most viable, ready, and needed
- Sufficient clarity and transparency with respect to the calculation of the cap

RRI Formula Proposal

Updated proposal based upon stakeholder feedback

- Formula developed to determine relative score for each project
- Removed gating criteria
  - All resources can apply
  - No cap on applications

Formula Factors:

Market Impact

- UCAP
- ELCC
- Zonal need

Project Viability

- Target in-service date
- Constructability
- PPA

Rank and then choose
~ 75 projects based on resultant score

- Reduced from original proposal of 100

RRI Formula Proposal – Draft and Seeking Input

RRI Formula Proposal:

UCAP (40 points)* Rank highest to lowest UCAP	**ELCC** (20 points)* ELCC ranking	**Project Viability** (20 points)* PPA and constructability considerations	**In-Service Date** (10 points)* 2028 ISD highest and lower score for later years	**Location** (10 points)* Adder for locating in a zone that cleared above the rest of the RTO in the 2025/26 BRA

** Weightings are preliminary and for discussion purposes only*

RPM Must Offer Requirements

RRI projects that remain in the study process and reach their final interconnection service agreement **will be required to participate in RPM**

Target Delivery Year to align with projected in-service date	**Agreement milestone** to be negotiated at time of GIA drafting
Participation requirement will be in place for 10 Delivery Years	

Preliminary 2028/2029 BRA ELCC Class Rating

- Project will be required to maintain the project ELCC value through to commercialization

  Maintain both size and fuel types

- Projects covered by an SAA are not eligible

ELCC Class	2028/2029 Preliminary ELCC Class Rating
Landfill Intermittent	56%
4-hr Storage	51%
6-hr Storage	61%
8-hr Storage	64%
10-hr Storage	72%
Nuclear	96%
Coal	85%
Gas Combined Cycle	83%
Gas Combustion Turbine	68%
Gas Combustion Turbine Dual Fuel	80%
Offshore Wind	47%
Diesel Utility	92%
Steam	75%
Onshore Wind	28%
Fixed-Tilt Solar	5%
Tracking Solar	7%
Hydro Intermittent	37%

Hybrid ELCC Calculations for RRI

No published ELCC class for hybrid units

Hybrid resources receive unit-specific ELCC ratings

PJM has developed RRI ELCC calculations for storage plus solar

RRI Hybrid ELCC values only for RRI selection process, not market participation

Equations take into account:

- Open versus closed loop storage charging
- Relative sizes of the fuel types to each other and overall facility output
- Output class of the storage as either 4 or 10 hour
- Solar is assumed to be installing single axis tracking

RRI Hybrid Solar/Storage ELCC Example

Example with a hybrid solar/storage with the following parameters

50 MW Total facility output	**50 MW** Solar *(100% Solar Share of MFO)*	**40 MW** Storage *(80% Storage Share of MFO)* Charging from the grid (open loop), 4 hour class

RRI Hybrid ELCC = Solar Share + Storage Share + Open Loop

= 0.00094 x 100 + 0.0048 x 80 + 1.4%

= 49.2%

Potentially Impacted Tariff Sections for RRI

Eligibility Criteria

- Tariff, Part VII, Subpart C, section 305 "Introduction, Overview and Eligibility"
- Adds additional eligibility to TC2 only

Application Procedure

- Tariff, Part VII, Subpart C, section 306 "Application Rules"
- Allows for separate application process from status quo TC2 projects

If unable to obtain FERC approval prior to start of TC2 Phase I then status quo rules will prevail

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Surplus Interconnection Service in Order 845

Surplus Interconnection Service (SIS) is the unused portion of service for a facility ***that cannot or does not operate 24/7/365.***

Does not increase the maximum output of the generation fleet, but improves ability to use these limited resources

Expedited process that must remain outside of the interconnection queue to allow the generator owner, affiliate or non-affiliate to install generation resources to use the unused service.

Outside the queue because a SIS request does not trigger any new network upgrades.

Surplus Interconnection Service in Order 845

Surplus Interconnection Service:

Does not increase the capacity rights or net output of a generating facility.

Can change the duration or seasonal performance of a generating facility.

Units cannot generate in excess of the original queue output, even during emergency situations.

Reason to Consider Changes

- Part of PJM's broader look at resource adequacy (near and long-term)
- Surplus interconnection service can improve the overall performance of a facility.
- PJM's approach may be more conservative than other RTOs.
- Stakeholders have provided feedback on how the current approach is too restrictive to maximize the system benefits.

Recommended Change

Remove all references to the criteria to assess impacts to other interconnection customers in the OATT similar to other RTO/ISO's.

One instance from OATT, Part VIII, Subpart E, Section 414A

Surplus Interconnection Service cannot be granted if doing so would require new Network Upgrades ~~or would have additional impacts affecting the determination of what Network Upgrades would be necessary to New Service Customers already in the New Services Queue~~ or ~~that~~ have a material impact on short circuit capability limits, steady-state thermal and voltage limits, or dynamic system stability and response.

Recommended Change

PJM Manual 14H will be revised to document the review methodology.

Considerations:

- Remains outside of the queue (Order 845 requirement)
- Determine what case should be used for analysis (interconnection or RTEP)
- How do unbuilt baselines and network upgrades impact when service begins
- How and when surplus units are captured in PJM cases (dispatch criteria)
- Required changes to ISAs and GIAs (new agreement or amend existing)

Potential Future Planning Enhancements

Review Planning study criteria related to batteries

- Incorporate observations on how batteries use PJM markets
- Stakeholder interest in “storage as a transmission asset”
- Ensure flexibility for advanced technologies

Timeline

October 2024

Oct. 8
Planning Committee update

Oct. 18
Special PC to present proposal and gather feedback.

November 2024

Nov. 21
Notice to Members Committee*

Nov. 7
Special MRC to review markets components and continue discussion.

December 2024

Dec. 17
TC2 Application Deadline for status quo-eligible projects

December
Anticipated FERC filing

Q1 2025

Open TC2 window for eligible projects.

**Notice will also be provided at a TOA-AC meeting.*

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