



# Capacity Interconnection Rights for ELCC Resources Second Read of Solution Package I

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Markets & Reliability Committee  
January 25, 2023

- [CIRs for ELCC Resources](#) approved at April 2021 PC
  - Proactively prepare for rapidly evolving resource mix, the variable output capability of new resource types, and PJM's recent adoption of Effective Load Carrying Capability (ELCC) analysis
  - Ensure the appropriate application of CIRs to Generation Capacity Resources, with an emphasis on Effective Load Carrying Capability (ELCC) Resources
- Over 25 meetings of the PC Special Session, producing six packages composed of five defined solution design components:
  - CIR request policy
  - CIR verification, testing and retention policy
  - CIRs in ELCC methodology and AUCAP calculations
  - Implementation / effective dates
  - Transition mechanisms

- General agreement on long-term approach for new queue units:
  - CIR request policy
  - CIR verification, testing and retention policy
  - CIRs in ELCC methodology and AUCAP calculations
- Debate over transition mechanism and effective dates:
  - FERC approval requirements to start including CIRs in ELCC methodology
  - Cost responsibility for additional CIRs for wind and solar ISA holders
  - Ability to process CIR uprate requests during the interconnection process transition period versus at the end of the queue



# PC Endorsement and Package I Highlights

- On January 10, the Planning Committee endorsed solution package I with 82% in favor
  - 71% prefer solution package I over the status quo
  - No other solution package received above 35% support

Package Component	Package D	Package E	Package G	Package I	Package K
<b>Design Component 1: CIR Request Policy</b>	Cycle 1*	Cycle 1*	Transition Cycle 1*	Cycle 1*	Cycle 1*
- Higher CIRs wind and solar ISA holders	2023 RTEP (Load Pays)	Cycle 1* (Generation Pays)	Transition Cycle 1* (Generation Pays)	Cycle 1* (Generation Pays)	Cycle 1* (Generation Pays)
-RPM Transitional System Capability study	2025/26 BRA	Not applicable	Not applicable	2025/26 BRA	2025/26 BRA
<b>Design Component 2: CIR Retention Policy</b>	2023	2023	2023	2023	2023
<b>Design Component 3: CIRs in ELCC Method</b>	2025/26 BRA (Targeted)	2025/26 BRA (Mandatory)	2025/26 BRA (Mandatory)	2025/26 BRA (Targeted)	2025/26 BRA (Mandatory)

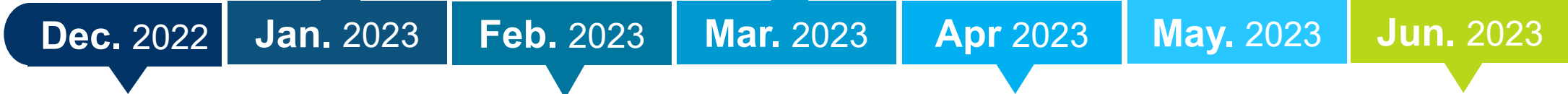


# CIR for ELCC Targeted Timeline

- PC Endorsement Jan 10
- Page turn of applicable governing document and manual redlines at special MRC session Jan 13
- MRC / MC same day endorsement Jan 25

- Close CIR request window Mar 2
- PJM begins transitional studies Mar 3

- Complete ELCC studies May 15



- *PC First Read Dec 6*
- *MRC First Read Dec 21*

- PJM Board Approval Feb 1
- FERC Filing Feb 2
- Open CIR uprate request 30 day window Feb 2

- FERC approval Apr 2
- Transitional studies completed Apr 21

- 25/26 BRA opens Jun 14

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### Member Hotline

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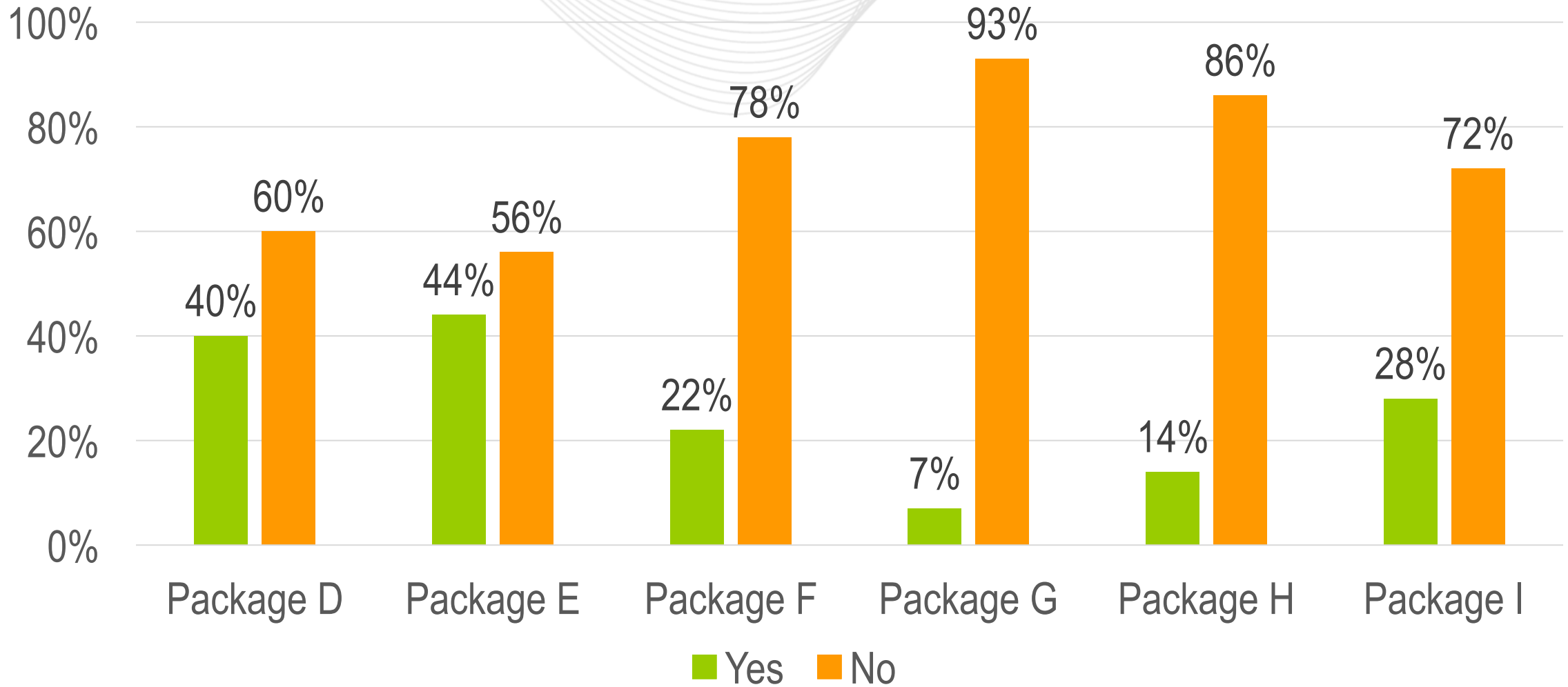
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# Appendix

# October 17 Non-binding Poll Results

Total responses: 260: 256 Members, 4 Non-members





- Modified Package I
  - Compromise solution based on feedback
  - Transition mechanism modified
- Package F, H withdrawn by sponsor
  - Based on results from non-binding poll and subsequent discussions
- Package J offered, later withdrawn by sponsor
- Package K recently offered at December PC

Five solution packages  
(D, E, G, I & K)  
remain for  
consideration



# Targeted Implementation/Effective Dates Associated with Packages

Package Component	Package D	Package E	Package G	Package I	Package K
<b>Design Component 1: CIR Request Policy</b>	Cycle 1*	Cycle 1*	Transition Cycle 1*	Cycle 1*	Cycle 1*
- <b>Higher CIRs wind and solar ISA holders</b>	2023 RTEP (Load Pays)	Cycle 1* (Generation Pays)	Transition Cycle 1* (Generation Pays)	Cycle 1* (Generation Pays)	Cycle 1* (Generation Pays)
- <b>RPM Transitional System Capability study</b>	2025/26 BRA	Not applicable	Not applicable	2025/26 BRA	2025/26 BRA
<b>Design Component 2: CIR Retention Policy</b>	2023	2023	2023	2023	2023
<b>Design Component 3: CIRs in ELCC Method</b>	2025/26 BRA (Targeted)	2025/26 BRA (Mandatory)	2025/26 BRA (Mandatory)	2025/26 BRA (Targeted)	2025/26 BRA (Mandatory)

*\*Transition Cycle 1 is the interconnection queue transition cycle for processing AE1-AG1 queue requests targeted to begin near the beginning of 2024; Cycle 1 is the first non-transitional cycle in the new interconnection process for studying AH2 and beyond set to begin sometime in mid-2026.*

Resource Type	Package D, E, I and K	Package G
Variable	<p>Up to the expected 95th percentile hourly summer net output of the resource between hour ending 11AM and 10PM Eastern Prevailing Time (inclusive) where summer = June/July/Aug inclusive).</p> <p>1 MW CIR = 1 MW summer, single contingency deliverability</p>	<p>Allow the Interconnection Customer (IC) to Choose the CIR level based the IC's expectations of net output 10am to 10pm EPT June, July, Aug, Sept, and May of each Delivery Year. Note that today Attachment N (Feasibility Study Agreement) does not limit the amount of CIRs requested). This means the IC can request up to the MFO for CIRs.</p> <p>1 MW CIR = 1 MW summer, single contingency deliverability</p>
Limited Duration, Hybrid, Dispatchable Hydro, Unlimited	Status quo	<p>Allow the IC to request up to the MFO in CIRs based on expectations of output over a chosen duration. Note that today Attachment N (Feasibility Study Agreement) does not limit the amount of CIRs requested). This means the IC can request up to the MFO for CIRs.</p>



# Long Term Approach

## *CIR Verification, Testing, and Retention Policy*

Resource Type	Package D, E, I and K	Package G
Variable	Maximum of last 3 summers' retention metric, where the retention metric is the 95th percentile hourly summer net output of the resource between hour ending 11AM and 10PM Eastern Prevailing Time (inclusive), and where summer = June/July/Aug (inclusive).	Maximum of last 3 Delivery Years' output of the resource between hour ending 10AM and 10PM Eastern Prevailing Time June, July, August, September, May that closest meets or exceeds the CIR value currently in place.
Limited Duration	Maximum of average output across X consecutive hours over last 3 summers, where "X" is the duration of the class. Includes hours between hour ending 11AM and 10PM Eastern Prevailing Time (inclusive), summer = June/July/Aug inclusive).	Maximum of last 3 Delivery Years' output of the resource over X consecutive hours X defines the duration class, as chosen by the IC at the time of interconnection request, between hour ending 10AM and 10PM Eastern Prevailing Time June, July, August, September, May that closest meets or exceeds the CIR value currently in place.
Hybrid	Sum of CIR retention metrics for components	Sum of CIR retention metrics for components in 2A and 2B above in this package
Dispatchable Hydro, Unlimited	No change from status quo	No change from status quo



Resource Type	Package D, E, I and K	Package G
Variable	Hourly output used in ELCC model and in unit-specific Performance Adjustment (i.e. based on 10 years of 200CPx2 hourly output values cannot exceed: a) during the months of May through October (inclusive), the CIR value; and b) during the months of November through April (inclusive), the winter deliverability MW. Also: UCAP cannot exceed CIRs. An estimate of curtailed MWh is “added back” to the output data in applicable hours.	Hourly output used in ELCC model and in unit-specific Performance Adjustment (i.e. based on 10 years of 200CPx2 hourly output values) cannot exceed: a) during the months of May through October (inclusive), the CIR value; and b) during the months of November through April (inclusive), the lesser of the winter deliverability MW or CIR value. Also: AUCAP cannot exceed CIRs.
Limited Duration	CIRs cap Effective Nameplate Capacity ("ENC"). Recall that under status quo for ELCC, Accredited UCAP for Limited Duration Resources = $ENC * ClassRating * (1 - EFORd)$ .	Same as Package D. CIRs cap Effective Nameplate Capacity ("ENC"). Recall that under status quo for ELCC, Accredited UCAP for Limited Duration Resources = $ENC * ClassRating * (1 - EFORd)$ .
Dispatchable Hydro	CIRs cap MaxMW parameter.	CIRs cap MaxMW parameter.
Unlimited	ICAP cannot exceed CIR (no change from status quo)	ICAP cannot exceed CIR (no change from status quo)

Resource Type	Package D, E, I and K	Package G
Hybrid	<p>1. ELCC model: cap hourly output of each hybrid at the CIR value during the months of May through October (inclusive), and cap hourly output using the winter deliverability MW during the months of November through April, inclusive.</p> <p>2. UCAP &amp; AUCAP: a) the Effective Nameplate Capacity (ENC) of the storage component cannot exceed the CIR value; b) for May through Oct. (inclusive), the hourly output values of the Variable Resource component is capped at CIR value minus storage component ENC; c) for November through April (inclusive), hourly output values of Variable Resource component is capped at the winter deliverability MW minus storage component ENC; d) except that, when the hybrid's total CIR value equals MFO, there is no capping of any ENC or hourly output. Also: UCAP cannot exceed CIRs. An estimate of curtailed MWh is “added back” to the output data in applicable hours.</p> <p>Mixed Technology Facilities with multiple Co-Located Resources have a single CIR value that is allocated among its component Co-Located Resources. Each component cannot be allocated more CIRs than they are expected to be capable of retaining. Interconnection customer chooses initial allocation of CIRs to the components and their retention is calculated separately.</p>	<p>1. Hourly output used in ELCC model and in unit-specific Performance Adjustment (i.e. based on 10 years of 200CPx2 hourly output values) cannot exceed: a) during the months of May through October (inclusive), the CIR value; and b) during the months of November through April (inclusive), the lesser of the winter deliverability MW or CIR value. Also: UCAP cannot exceed CIRs.</p> <p>2. UCAP &amp; AUCAP: a) the Effective Nameplate Capacity (ENC) of the storage component cannot exceed the CIR value; b) for May through Oct. (inclusive), the hourly output values of the Variable Resource component is capped at CIR value minus storage component ENC; c) for November through April (inclusive), hourly output values of Variable Resource component is capped at the lesser of the winter deliverability MW or CIR minus storage component ENC; d) except that, when the hybrid's total CIR value equals MFO, there is no capping of any ENC or hourly output. Also: UCAP cannot exceed CIRs.</p> <p>Mixed Technology Facilities with multiple Co-Located Resources have a single CIR value that is allocated among its component Co-Located Resources. Each component cannot be allocated more CIRs than they are expected to be capable of retaining. Interconnection customer chooses initial allocation of CIRs to the components and their retention is calculated separately.</p>

### Package D, E, I and K

CIRs can be transferred in accordance with Manual 14G, Section 4. (No change from status quo).

### Package G

Same as Package D, but adding that resources using existing CIRs can be entered directly into the commencement of the next cluster cycle since those CIRs are already modeled for deliverability and will not affect subsequent or existing queue studies.





Design Component	Package D	Package E	Package G	Package I	Package K
Effective Date	<p>a. New generator deliverability test and higher CIRs for wind and solar ISA holders will be applied starting with 2023 RTEP and Transition Cycle 2 (AG2/AH1 queue)</p> <p>b. Design Component 1 will begin with Cycle 1 (AH2 queue)</p> <p>c. Design Component 2 will begin in 2023</p> <p>d. Design Component 3 will begin with the 2025/26 BRA (estimated).</p>	<p>1) Properly accredit Existing Variable Resources (Variable Resources with executed ISAs) immediately upon approval by the stakeholders. Proper accreditation means to determine the deliverability of these resources by only using the energy up to the CIRs granted in the executed ISAs without using the energy above the CIRs to determine the deliverability. The accreditation is to be corrected to reflect this level of deliverability. This will not require FERC approval nor any amendments to the existing ISAs and only requires PJM to make the change in Capacity Exchange.</p> <p>2) All Existing Variable Resources (Variable Resources with executed ISAs) have the option of maintaining their current CIR's and the resulting lower accreditation (as described 1) or they may enter the end of the queue, request higher CIRs, pay for the necessary transmission upgrades (if any) to accommodate the higher CIRs, amend the existing ISAs to reflect the higher CIRs, and have the AUCAP adjusted to reflect the higher CIRs.</p>	<p>a. New generator deliverability test will be applied starting with 2023 RTEP (2028 Bases Case Year) and Transition Cycle 2 (AG2/AH1 queue)</p> <p>b. Design Component 1 will begin with Transition Cycle 1 that allows resources to request additional CIRs prior to the start of that Cluster.</p> <p>c. Design Component 2 will begin in the 2023/2024 Delivery Year</p> <p>d. Design Component 3 will begin with the 2024/25 BRA Scheduled in December 2022 at this time.</p>	<p>Same as Package E except Design Component 3 will begin with 2025/26 BRA (targeted), or the first BRA that occurs two months after FERC accepting the proposal</p>	<p>Effective with the June 2023 BRA for DY 25/26.</p> <p>In addition, whether the stakeholders approve Package I or not, PJM, with PJM Board approval, will submit as soon as possible in a separate Section 205 filing with FERC to remove Energy Resource energy (energy above the CIRs) from the accreditation process. This separate filing will revise/clarify RAA Section 9.1 establishing CIRs as an hourly upper limit for the UCAP accreditation (AUCAP) commencing with the June 2023 BRA for 25/26 Delivery Year i.e., hourly energy output above CIRs will not be used in calculating the accredited UCAP for Variable Resources, the ELCC portfolio, or the ELCC Class Values.</p>



Unit Status	Package D	Package E	Package G
Existing Units	<p>Existing wind and solar units as of effective date of this proposal will be transitioned to higher default CIRs and load will pay for any required baseline upgrades</p>	<p>Additional CIRs can be requested through the PJM Queue Process immediately upon necessary approvals/endorsements (including FERC if applicable) of the solution developed in this stakeholder process.</p> <p>For clarity, "Existing Units" are defined as Variable Resources with executed ISAs.</p> <p>CIRs will be established as an upper limit for the UCAP accreditation (AUCAP) for the 25/26 Delivery Year. Upon stakeholder approval of Package E, PJM will adjust the accredited UCAP for Existing Units reflect the accreditation limited to the CIRs granted in the ISAs without using any Energy above the CIRs and without using any available headroom in the transmission system.</p>	<p>PJM will adjust the AUCAP for Existing Units participating in the Base Residual Auctions commencing with the 2024/2025 BRA and subsequent BRAs to reflect the CIRs in the current effective ISAs modeled by PJM in the ELCC calculation where delivered energy cannot exceed CIRs in determining AUCAP. Hourly historic performance data for the performance adjustment will be used and will not exceed awarded CIRs.</p> <p>Existing wind and solar, defined as having signed ISAs as of the date FERC approval, can request additional CIRs in accordance with Design Component 1 above by entering the Interconnection Queue in accordance with the interconnection rules. Any modification to CIR and associated accreditation will only be represented in the auction when i) an amended/new ISA is in place reflecting the increase in CIRs if requested, ii) any and all necessary transmission system upgrades are implemented and paid for by the resource owner, and iii) associated Tariff changes are approved by a final, non-appealable FERC order.</p>



Unit Status	Package I & K
Existing Units	<p>Same as Package E except Design Component 3 will begin with 2025/26 BRA (targeted), or the first BRA that occurs two months after FERC accepting the proposal, and this package supports a Transitional System Capability study prior to each BRA during the Transition Period for CIR uprate requests for all resource types. Transitional Resources that submit a request for higher CIRs to PJM within 30 days of stakeholder approval of this proposal will have their CIR uprates processed in Cycle 1 and will be part of a Transitional System Capability study prior to each BRA (estimated 2025/26 through 2029/30 BRAs) during the Transition Period to determine whether the transmission system is capable of delivering outputs above their CIRs. Such eligible Transitional Resources will have their hourly output capped in the ELCC study and accreditation process at the resource’s Transitional System Capability, which will consider summer generator deliverability testing (single and common mode outages) and other reliability tests as needed to ensure the resources are deliverable for the Delivery Year under consideration. The Transitional System Capability assigned to the resource will be the greater of the eligible CIRs for the resource for the applicable BRA Delivery Year or the Transitional Resource MW Ceiling.</p> <p>Transitional Resource: Any resource that, as of the effective date of this proposal, either has an ISA (“existing unit”) or is active in the PJM interconnection queue (“existing queue unit”) and submits a CIR uprate request into Cycle 1 within 30 days of stakeholder approval of this proposal. Only CIR uprate requests that do not involve a physical modification to the resource will be eligible for Transitional Resource designations. The submittal of the CIR uprate request into Cycle 1 and any subsequent withdraw of the request from Cycle 1 will be done and treated in a manner that is consistent with the PJM manuals and PJM governing documents. The resource will no longer be considered a Transitional Resource if it withdraws its CIR uprate request.</p> <p>Transitional Resource MW Ceiling: For Variable Resources, up to the lower of the regional percentile output for the resource type that enables the full UCAP to be achieved or the requested CIRs. For other resource types, up to the lower of their MFO or requested CIRs.</p> <p>Transition Period: The period of time required to process a CIR uprate request for a Transitional Resource in the PJM Interconnection Queue such that the CIR uprate is eligible to participate in RPM. During the Transition Period a Transitional Resource may receive Transitional System Capability up to the Transitional Resources’ MW Ceiling. After the Transition Period or upon withdraw of the CIR uprate request from the PJM interconnection queue, the designation of Transitional Resource is removed.</p> <p>Transitional System Capability: Identified locational transmission system injection capability that is available in the full summer generator deliverability test (single contingency and common mode outage) for the applicable BRA Delivery Year during the Transition Period beyond that required to support all PJM CIRs considered in the interim CIR study. It is calculated for Transitional Resources that are eligible to participate in the BRA Delivery Year under study and is capped at the Transitional Resource MW Ceiling. It may vary for each BRA during the Transition Period. It is subject to other known locational reliability restrictions such as stability and voltage. The allocation of the Transitional System Capability prior to each BRA during the Transition Period will be based on a cluster approach using the distribution factors and the Transitional Resource MW Ceilings along with identified reliability constraints.</p>

Unit Status	Package D	Package E
<p><b>Existing Queue Units</b></p>	<p>Wind and solar units with an ISA as of effective date of proposal will be transitioned to higher default CIRs and load will pay for any required baseline upgrades.</p> <p>Remaining wind and solar units in the Fast Track, Transition Cycle 1 and Transition Cycle 2 will not be transitioned to higher CIRs and will need to get back into the queue to request higher CIRs if desired.</p> <p>This package supports a Transitional System Capability study prior to each BRA during the Transition Period for CIR uprate requests for all resource types. Transitional Resources that submit a request for higher CIRs to PJM along with a request to be considered as a Transitional Resource within 30 days of stakeholder approval of this proposal will have their CIR uprates processed in Cycle 1 and will be part of a Transitional System Capability study prior to each BRA (estimated 2025/26 through 2029/30 BRAs) during the Transition Period to determine whether the transmission system is capable of delivering outputs above their CIRs. Such eligible Transitional Resources will have their hourly output capped in the ELCC study and accreditation process at the resource’s Transitional System Capability, which will consider summer generator deliverability testing (single and common mode outages) and other reliability tests as needed to ensure the resources are deliverable for the Delivery Year under consideration. The Transitional System Capability assigned to the resource will be the greater of the eligible CIRs for the resource for the applicable BRA Delivery Year or the Transitional Resource MW Ceiling.</p>	<p>These Units will be processed in accordance with the interconnection rules in place today or the new interconnection rules currently before FERC for approval as applicable.</p>

Unit Status	Package G	Package I & K
<p>Existing Queue Units</p>	<p>"Existing Queue Units" are defined as Variable Resources in the PJM Queue without an executed ISAs as the date of March 31, 2023 and are not in the Fast Track process.</p> <p>Resources in the Fast Track Process must submit queue positions for any subsequent CIR requests. Allow Resources in the Fast Track process to request more CIRs but then be bumped into the Transition Cycle 1 process.</p> <p>Existing Queue Units in Transition Cycle 1 and Transition Cycle 2 will have the option to request higher CIR values prior to the model build for each transition cycle. Those existing queue resources that choose not to request higher CIRs prior to the transition cycles will need to get back into the queue to request higher CIRs if desired.</p>	<p>Same as Existing Units</p>

Unit Status	Package D	Package E	Package G	Package I & K
New Queue Units	New wind and solar units can request higher CIRs.	These Units will be processed in accordance with the interconnection rules in place today or the new interconnection rules currently before FERC for approval as applicable.	Same as Package D	Same as Package E

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