



# → PJM's interconnection reforms: Implications for queued projects and developers

By Shankar Chandramowli, Himali Parmar, Amit Agrawal, Mansi Agrawal, ICF

## Executive summary

After more than a year of deliberations, PJM has proposed their preferred approach for interconnection queue reforms. The reforms package was recently approved by PJM Planning Committee. PJM expects to file necessary tariff changes to reflect these interconnection reforms with the Federal Energy Regulatory Commission (FERC) in May 2022.

The queue reform process is timely given the size of the queue and significant delays in processing time. The current size of the PJM queue is approximately 245 GW versus a 150 GW projected 2022 peak demand for the entire RTO. Projects have experienced high network upgrade cost exposure and frequent drop-offs in initial interconnection studies. The net effect has been significant delays and expectations for things to worsen. The overall throughput from the interconnection queue (i.e., ratio of projects entering the queue to projects achieving COD) has declined to about 15% in recent clusters.

In this paper, we summarize PJM's preferred approach and the transition plan. We also provide a case study to demonstrate the uncertainties active queue projects may face during the transition plan. PJM is proposing October 1, 2022, as the transition date for the new process. Projects in AD2 cluster and before—and projects with executed ISA/WMPA—are exempted from this reform process.



## Shareables

- PJM is looking to migrate to a three-phased, cycle-based interconnection process (similar to MISO's DPP).
- PJM wants to work through the backlog of queued projects before fully transitioning to the new process by 2025–2026.
- Queued projects from AE1 to AH1 clusters (nearly 205 GW of active projects) will be subject to Transition Cycle with interconnection upgrade and timing cost implications.
- Active projects with less than \$5 million of assigned network upgrades costs have the option of a Fast Lane.

- Active projects in Transition Cycle #1 (AE1 – AG1) have to post immediate readiness deposit (\$4000/MW) later this year and post up to 20% of assigned network upgrades before ISA/CSA execution.
- Active projects in Transition Cycle #2 (AG1 and AH1) have 2+ years of wait time before they are assessed.
- The proposal package is working its way through the PJM stakeholder committees. PJM is expected to file the proposed reforms and tariff changes with FERC in May 2022. PJM expects the transition to the new interconnection regime by Q4 2022 or Q1 2023.

## Key features of PJM's preferred approach

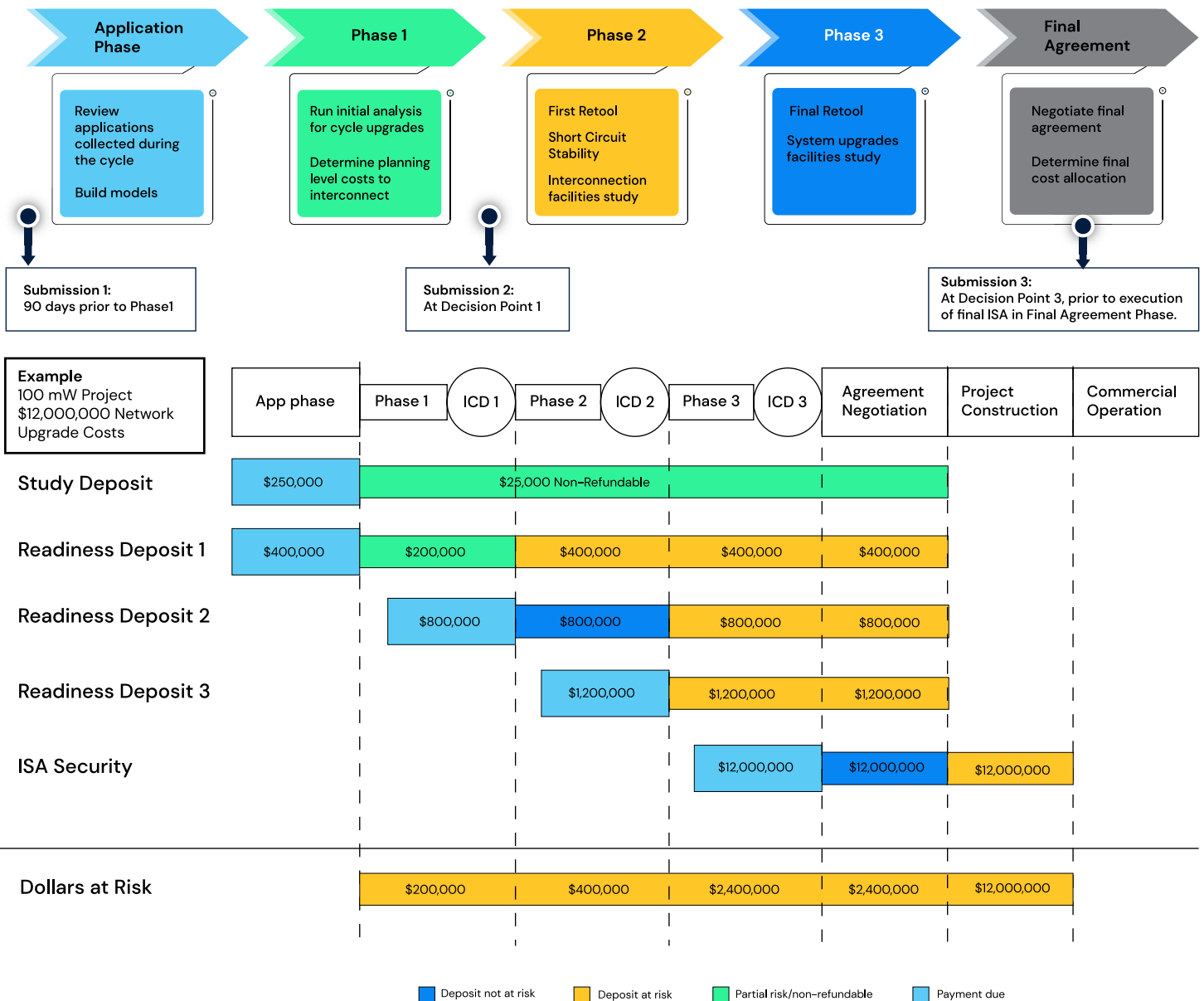
- Migration to a cluster-based approach (much like MISO's DPP) from the current serial study approach.
- Moving away from a "First come, first served" paradigm to a "First ready, first served," wherein readiness is demonstrated by site control and financial milestones.
- The future interconnection process will be a three-phased approach where priority will be defined by the cycle and the order in which the projects enter the cycle does not matter. The subsequent cycle will commence only when the third phase of the prior cycle has started.
- Each cycle will have three phases. The first phase is a system impact study (SIS)-type assessment to determine a planning-level cost estimate of network upgrades. The second phase is a retool assessment with short circuit stability analysis as well to finalize the network upgrade costs. The third phase is a final retool study confirming the network upgrade cost exposure for projects.
- Three decision points set at the end of each phase to either withdraw projects or continue with the queue process. Projects have limited option for size reduction, POI adjustment, or

other related changes provided no material modifications are not triggered. PJM expects the cycle process to last around 710 days.

- No inter-cycle network upgrade cost allocation. Simplified cost allocation based on 5% distribution factor (DFAX) threshold irrespective of voltage level or nature of upgrades.
- Strict, time-bound milestones on cycle progression. Phase 3 of the subsequent cycle can only begin if the final agreements of the prior cycle have been fully executed. Likewise, Phase 1 can only start after Phase 3 of the prior cycle has also started.
- Inclusion of a "Readiness Deposit" that is tied to the network upgrade costs in addition to initial study deposits at the time of queue entry (like MISO's DPP model)<sup>1</sup>. PJM is proposing to introduce Readiness Deposit 1 of \$4000/MW at the time of queue entry. At the Decision Point 1 (end of Phase I), the Readiness Deposit 2 is up to 10% of network upgrade costs adjusted for prior payments. At Decision Point 2 (end of Phase II), the Readiness Deposit is up to 20% of assigned network upgrades adjusted for all prior payments.

<sup>1</sup> The study deposit is tied to MW size of the project. It ranges from \$75,000 to \$400,000 depending on project size. A 100 MW solar project is expected to cost \$250,000. In addition, a readiness deposit of \$4000/MW is also due at the time of queue entry.

Exhibit 1. PJM's proposed interconnection queue process and expected study deposit timeline



Source: PJM - IPRTF

Exhibit 2. Summary of key changes in PJM queue process

Attributes	Current process	New interconnection process
<b>Drivers</b>	First to cause the need for the network upgrade pays 100%	Upgrades are driven by the cycle the violation is identified
<b>Inter-queue</b>	<p>&lt;=\$5 million Network upgrades: Allocated in queue identified</p> <p>&gt;\$5 million Network upgrades: Allocated to cost causer for 5 years after completion of network upgrade</p>	No inter-cycle cost allocation. All contained within a cycle
<b>DFAX cutoff</b>	<500 kV facilities: 5% >500 kV facilities: 10%	5% irrespective of kV level
<b>Thresholds</b>	Based on DFAX and MW contribution to the network upgrade for those first to cause and higher (100% and above)	Based on DFAX and MW contribution to the network upgrade for all projects



## PJM's two-year transition plan

PJM's Planning Committee has approved the reforms and transition plan. The package is expected to work its way up through other supervisory committees like Markets & Planning and Members committees. PJM is expected to submit the proposed reforms package and tariff changes to FERC sometime in May 2022.

There is also opportunity for intervenors to respond to PJM's FERC filing. FERC will then make a determination on PJM's interconnection reforms package and tariff changes. Based on the current work plan, PJM expects the effective date of the transition to be the last quarter of this year or the first quarter of 2023. Some of the key provisions for transitioning existing queued projects under consideration are summarized below.

### No change for queued projects up to AD2 cluster

- These projects are expected to be assessed under the existing serial interconnection study process. Most of these projects are expected to execute ISAs shortly and proceed to construction phase.

### PJM is proposing three processing schemes for existing queued projects

- Fast Lane, Transition Cycle #1, and Transition Cycle #2.
- From mid-2025, PJM expects to process new queued projects.

### Fast Lane process for all AE1 to AG1 cluster projects with network upgrades cost exposure of less than \$5 million and no applicable affected study

- Network upgrade impacts include the project meeting any cost allocation thresholds for shared network upgrades or a project being the first to cause the need for a network upgrade. Direct interconnection facilities/upgrades are not considered in the \$5 million threshold.
- Projects that have approved baselines and/or supplemental projects that obviate the need

for a network upgrade will not be counted as a network upgrade impact but as contingent facilities. For example, consider a project with eligible upgrade cost of \$10 million. Out of \$10 million, \$6 million worth of upgrades are contingent upgrades (these issues may have assigned baseline upgrades, supplemental upgrades, etc.). Hence, the actual cost allocated to project would be \$4 million and it will be eligible for Fast Lane study.

- If the retooled/sag studies identifies that a project has assigned network upgrade of more than \$5 million, it will be removed from the Fast Lane and shifted to Transition Cycle #1.
- Projects that enter the Fast Lane will have their facilities study completed and their ISA/ICSA tendered under the existing cost allocation rules.

### Transition Cycle #1 for AE1 to AG1 cluster projects with cost allocation eligibility for a shared network upgrade greater than \$5 million

- This cycle is expected to begin in Q1 2024 and be completed by Q2 2025.
- PJM to provide retooled results and the new case will be provided in advance of IC Decision #1. Transition Cycle #1 will start within one year of the transition date, while the Fast Lane projects are ongoing. Phase #3 of Transition Cycle #1 will not begin until all Fast Lane projects are completed.
- All projects entering the transition process will have to pay upfront fee of \$4000/MW as readiness deposits (i.e., by Q4 2022).

### Transition Cycle #2 for AG2 to AH1 cluster projects with cost allocation eligibility for a shared network upgrade greater than \$5 million

- This cycle is expected to begin in Q3 2024 and be completed by Q3 2026.
- Rules applied will be consistent with the new process, including readiness requirements such as deposits and site control.

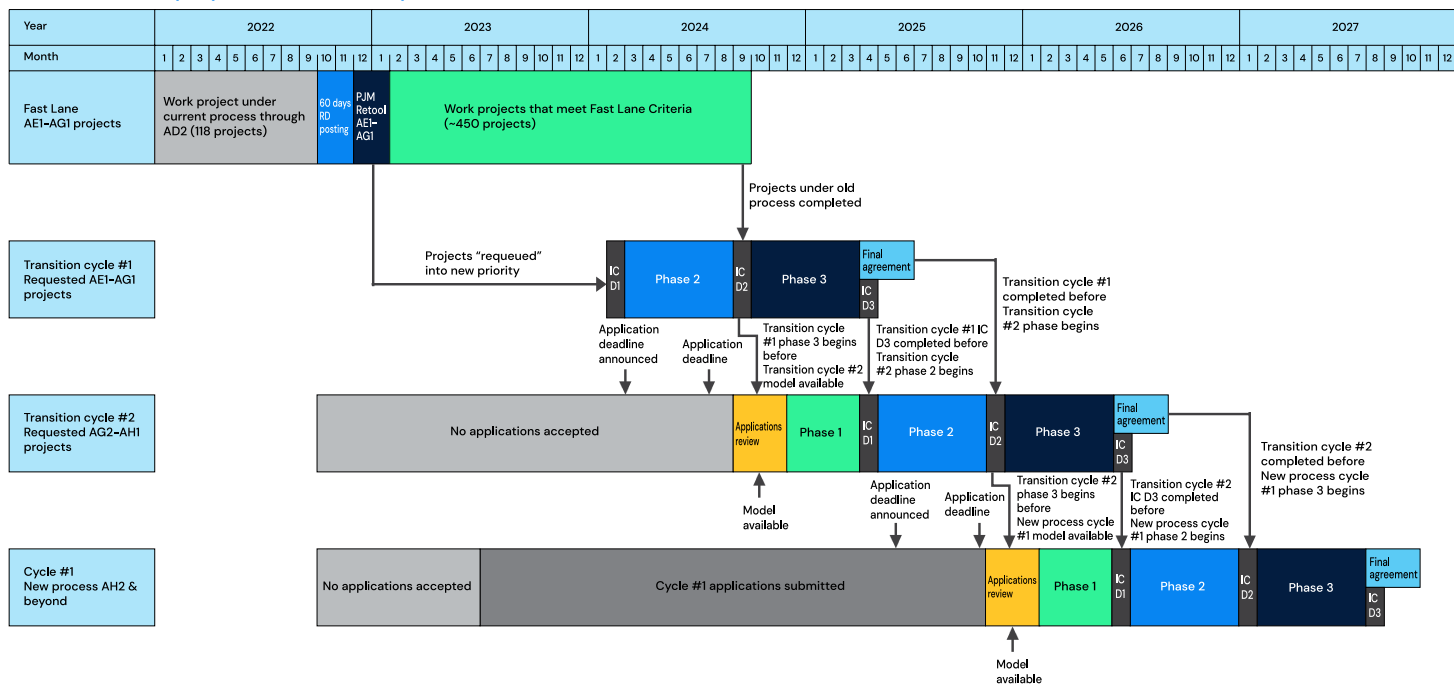
- Any increase in queue MW (i.e., MFO) will not be permitted for this cycle.
- Developers may choose between the primary and secondary POIs identified during the scoping meeting prior to the start of application review.
- Projects will be permitted to submit revised technical data and configuration.
- All projects entering the transition process will have to pay upfront fee of \$4000/MW

as readiness deposits during the application phase (i.e., Q4 2024).

**New Cycle #1 for all projects in AH2 cluster and beyond**

- The cycle is expected to begin in Q4 2025 and complete by Q4 2027.
- This will be the first cycle that will be based on PJM's new interconnection study process.

Exhibit 3. PJM's proposed transition option



Note: The transition plan is subject to confirmation by FERC.

Exhibit 4. Expected queue execution dates based on PJM transition option

Cluster	Queue process	Expected PJM study start date	Expected ISA execution date
AD2 and prior clusters	Current sequential process	-	9/2022
AE1 to AG1*	Fast Lane	2/2023	9/2024
Requeued AE1 to AG1	Transition Cycle #1	2/2024	6/2025
AG2 and AH1	Transition Cycle #2	12/2024	8/2026
AH2 and beyond	New Process Cycle #1	1/2026	10/2027

\*Projects within AE1-AG1 that have network upgrades or cost allocation less than or equal to \$5 million only will be eligible for Fast Lane. Remaining AE1-AG1 projects will be re-queued into a single transition cycle.





### What to expect during the transition?

Project developers will need to closely follow the transition plan and be prepared to respond to any changes to their allocated costs. The same applies for investors of early-stage renewable projects and platform in the PJM market. To demonstrate uncertainties related to Upgrades Cost and Timing that project developers and investors may face during this period, ICF has provided an example of two queued projects in AF2 and AG1 clusters in the AEP zone (Exhibit 4).

Both projects are eligible for Fast Lane as their assigned network upgrade cost is less than \$5 million subject to positive sag study results. However, if the sag study results are not favorable, both projects will be removed from Fast Lane and shifted

to Transition Cycle #1, which includes all projects from AE1–AG1 clusters. PJM expects to complete the screening for Fast Lane projects by the end of this year. Projects, such as the ones in this case study that fail to qualify for the Fast Lane, will be required to post readiness deposit by Q4 2022.

Project A gets allocated a higher cost as a result of the transition cluster versus the cost under status quo. With a bigger pool of units in the transition cluster, ICF observed additional overloads where Project A contributions met PJM’s cost allocation criteria. As a result, under the transition cluster, Project A’s share of the allocated cost increases from \$8 million to \$14 million. However, Project B’s share reduces since a greater number of projects are sharing the costs in the bigger cluster group.

Exhibit 5. Tale of two queue positions

	Current/Status Quo			Transition Cycle #1	
	Cluster	Study	Estimated cost allocation *(\$ million)	Eligible for Fast Lane	Estimated cost allocation *(\$ million)
Project A / 50 MW	AF2	SIS	1.6–8.0	Yes, based on the lower range of the costs in the current SIS	14.0
Project B/ 150 MW	AG1	SIS	1.6–41.5		18.9

\*Lower end of the range assumes favorable sag-studies

## Timing risk

Project developer and investors should also factor in revised ISA/CSA dates and construction of direct or contingent network upgrades for negotiating start dates of any off-takes. Miscalculations could lead to penalties. For the projects in the case study, the most optimistic commercial operation date is March 2024 assuming they can execute an ISA/CSA before the transition date (i.e., before Q4 2022). However, in PJM's proposed transition plan—even under the Fast Lane process—these projects may achieve commercial operations by March 2026 and December 2026 under Transition Cycle #1. This assumes an 18-month construction period post execution of the ISA/CSA.

Exhibit 6. Expected commercial-in-service dates

Queue process	Expected PJM study start date	Expected ISA/CSA execution date	Expected commercial in-service date*
Current sequential process		9/2022	3/2024
Fast Lane	2/2023	9/2024	3/2026
Transition Cycle #1	2/2024	6/2025	12/2026

\* Assumes 18 month construction period post ISA/CSA



## About the authors



### Shankar Chandramowli

Senior Manager, Energy and Power Markets

[Shankar.Chandramowli@icf.com](mailto:Shankar.Chandramowli@icf.com)

Shankar Chandramowli joined ICF in 2015 and is a senior manager in the Energy Advisory practice. He has over 10 years of experience in energy market consulting, with deep expertise in energy policy research, transmission due diligence assessments, economic analysis of energy systems, and public stakeholder engagement. He has supported due diligence assessment of over 45 GW of renewable assets in the last two years across major markets in the U.S.



### Himali Parmar

Vice President, Energy Advisory Services,  
Interconnection and Transmission

[Himali.Parmar@icf.com](mailto:Himali.Parmar@icf.com)

Himali Parmar joined ICF in 2002 and is a vice president in the Energy Advisory practice. Himali assists clients with greenfield renewable siting and interconnection, production cost modeling, and forecasting transmission congestion and losses and their effect on locational power prices and asset valuation. She also supports clients as an expert witness on interconnection and transmission issues.

## About the authors



### Amit Agrawal

Senior Power Consultant

[Amit.Agrawal@icf.com](mailto:Amit.Agrawal@icf.com)

Amit Agrawal is a commercial energy market expert specializing in quantitative and production cost modeling, interconnection assessments, power load flow studies, congestion and curtailment analysis, and nodal price forecasting. He is a senior consultant in the Energy Advisory practice. He focuses on PJM, Southeast, and ERCOT markets.



### Mansi Agrawal

Energy Markets Consultant – Transmission

[Mansi.Agrawal@icf.com](mailto:Mansi.Agrawal@icf.com)

Mansi Agrawal is a power markets consultant with a focus on PJM and MISO markets. She specializes in generator interconnection assessments, power/load flow studies, greenfield siting strategy, and congestion and curtailment analysis.



## Shankar Chandramowli

Shankar.Chandramowli@icf.com

+1.703.2510874


## Himali Parmar

Himali.Parmar@icf.com

+1.703.934.3497

---

[icf.com/energy](https://icf.com/energy)

 [twitter.com/ICF](https://twitter.com/ICF)

 [linkedin.com/company/icf-international](https://linkedin.com/company/icf-international)

 [facebook.com/ThisIsICF](https://facebook.com/ThisIsICF)

 [#thisisicf](https://instagram.com/#thisisicf)

---

### About ICF

ICF (NASDAQ:ICFI) is a global consulting services company approximately 8,000 full-time and part-time employees, but we are not your typical consultants. At ICF, business analysts and policy specialists work together with digital strategists, data scientists and creatives. We combine unmatched industry expertise with cutting-edge engagement capabilities to help organizations solve their most complex challenges. Since 1969, public and private sector clients have worked with ICF to navigate change and shape the future. Learn more at [icf.com](https://icf.com).