# PJM Interconnection Queue Initiative

# AEP Challenges and Improvements

**PJM Interconnection Process Workshop 2**

**December 11, 2020**

# Challenges and Improvements

1. Applications
2. Studies
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# Applications

# Applications

- **Challenges**
  - Application Support – Significant numbers of information requests being sent by ICs to TOs prior to their application submittals.
  - Application Review – Unclear, incomplete or incorrect information on points of interconnection and voltage requirements provided on applications and at kick-off calls.

- **Improvements**
  - Application Support – PJM should consider providing improved guidance to ICs through lessons learned feedback on application details and enhance information available to ICs on PJM website.
  - Application Review – Improve information available to ICs on how to navigate the process for submitting their applications, especially on clearly stating their points of interconnection, in particular.

# Applications

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 1-1 | Application Support | With the surge of new types of generation resources in the queue, there is also a surge of new ICs who are trying to gain knowledge and understanding of the PJM application process.<br><br>Because PJM application support information is not sufficiently clear to the ICs, it is leading to significant numbers of information requests being sent by ICs to TOs prior to their application submittal.<br><br>For example, PJM information fields requesting information on line impedances are being misinterpreted to be the TOs' impedances not the ICs' internal radial component impedances or voltages. | This places stress on TOs and ICs by having TOs refer ICs back to PJM for assistance with PJM interconnection process.<br><br>Also, continually deferring back to PJM gives a false impression that the TOs are unsupportive of the development of new generation.<br><br>It should be added that attempts by TOs to informally assist potential ICs in navigating the pre-application process, takes time.<br><br>These are not yet active queue projects, and therefore provide no avenue for TOs to recoup costs spent in handling these requests, even if only referring them back to PJM. | PJM should consider providing guidance to ICs through lessons learned feedback on applications or open forums for comments and to also enhance the information available to ICs on PJM website.<br><br>Potentially consider including for the benefit of the ICs reference material such as tables with TO-specific available voltages or links to TO-specific information that is available. |

# Applications

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 1-2 | Application Review | Lack of clarity on POI (point of interconnection) and voltage requirement information provided on the kick-off calls.<br><br>IC (interconnection customer) applications may contain incorrect information. | Incorrect information can lead to delays starting the process to conduct the interconnection queue studies. | Improve the information available to ICs regarding how to navigate the process to submit their application, especially around the connection points.<br><br>PJM needs to be clear in the application process that the ICs need to state the specifics of their points of interconnection, including the pole numbers, circuit numbers, or the exact location for where service will be provided or the project will be connected. |

# Studies

# Studies

- **Challenges**
  - Feasibility Studies – Model not locked down on schedule due to late queue entries.
  - Feasibility Studies – Delayed study starts by taking too long to clear closed queues.

  - Feasibility and Impact Studies – System upgrades (Baseline and Supplemental) are not consistently being included in GI study models.
  - Feasibility and Impact Studies – Some queue requests require network upgrades across multiple TOs; unclear process for managing impacts across multiple TOs.
  - Feasibility and Impact Studies – Unclear process for conducting combined studies.

  - Facility Studies – Critical information needed from developers to start studies.
  - Facility Studies – Current estimating accuracy rules require significant work.
  - Facility Studies – Lacking confirmation of POI and other customer information.
  - Facility Studies – Retooling and significant POI adjustments during studies are becoming more prevalent.

# Studies

- **Improvements**
  - Feasibility Studies – Shorten the queue window by one month; add two weeks to the kick-off meeting schedule; add two weeks to the model development schedule.
  - Feasibility Studies – Consider for every six-month queue close, a soft close of that queue to new projects by two months earlier; this will allow for large volume of queue projects to be processed and kick-offs scheduled, so adequate time is restored to perform the studies.

  - Feasibility and Impact Studies – Compare GI study cases to the appropriate RTEP base cases for model consistency and to accelerate to eliminate unneeded upgrades.
  - Feasibility and Impact Studies – Improve collaboration and coordination of regional and interregional queue processes to avoid TOs being left with unfunded liability.
  - Feasibility and Impact Studies – Improve transparency of process of determining combined studies, when that determination is made, and the resulting changes to the timeframes and deliverables, as well as ensuring consistent application of process.

# Studies

- **Improvements**
  - Facility Studies – Adjust timeline to include developer delays; explore establishing response timeline to terminate Facility Studies Agreements for lacking information.
  - Facility Studies – Relax estimating requirements and consider adding contingency dollars to cover unknowns.
  - Facility Studies – Revisit previous plans to add section to Facility Study Agreement for ICs to provide POI coordinates and updated SLD as pre-requisite to beginning studies.
  - Facility Studies – Due to significant increase in project volume, consider having TOs and ICs to align retooling criteria with PJM and set expectations to proactively identify impacts to study completion dates.

# Studies

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 2-1 | Feasibility Studies | Model not locked down on schedule due to late entries during the queue. | Results are delayed significantly, creating a crunch for PJM and the TOs. | Shorten the queue window by one month.<br><br>Add two weeks to the kick-off meeting schedule.<br><br>Add two weeks to the model development schedule.<br><br>Benefits by putting the process back on schedule.<br><br>Benefits by supporting the model comparison issue. |

# Studies

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 2-2 | Feasibility Studies | Delayed start of Feasibility Studies since it is taking PJM too long to clear the closed queues. | This is delaying and taking valuable time away from starting and performing the Feasibility Studies. | Recommend that for every six-month queue close, a soft close of that queue to new projects by two months earlier, to allow for the large volume of queue projects to be processed by PJM and kick-offs scheduled (by the time that six-month queue would have closed), so adequate time is restored to perform the engineering studies. |

# Studies

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 2-3 | Feasibility and Impact Studies | System upgrades (Baseline and Supplemental), approved through or incorporated into the RTEP, are not being included in the GI study models, consistently.<br><br>IPP Team/Planning have to be very diligent in trying to capture these upgrades.<br><br>Since TOs are not the registered Planners, this task should fall to PJM. | New network upgrades get identified that are not required. | Compare the study case to the appropriate RTEP case (by year) for model consistency.<br><br>Compare future cases for upgrades that have been approved through or incorporated into the RTEP, that may need to be accelerated to eliminate unneeded upgrades.<br><br>Benefits by providing more time needed by PJM to create the models and list of approved and incorporated upgrades.<br><br>Benefits by providing more accurate results with less effort.<br><br>Benefits through less back and forth with developer on need for network upgrades. |

# Studies

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 2-4 | Feasibility and Impact Studies | Some interconnection queue requests cause network upgrade requirements across multiple TOs.<br><br>Process by which PJM manages multiple TO impacts appears to be unclear.<br><br>This has the potential to become more challenging with the rise of offshore wind development. | Some TOs outside the primarily affected TOs are not always invited to kick-off calls, included in communications, or provided with critical documents such as signed copies of the study agreements for each study phase.<br><br>Additionally, there is a single deposit shared by TOs for execution of those studies with no coordination of efforts or project controls in place to ensure sufficient funding remains for the last TOs that submit invoices at conclusion of the project. | FERC and/or Congress may need to act to resolve artificial impediments to a collaborative and coordinated regional and interregional planning processes.<br><br>In the interim, PJM should, wherever possible, enhance coordination and inclusion of TOs, including potentially soliciting individual TO EACs and performing some minimal cost monitoring to avoid TOs being left with unfundable liability, especially during the Facility Study phase, where invoicing often occurs at the conclusion of all work. |

# Studies

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 2-5 | Feasibility and Impact Studies | Lack of clarification on the process by which combined studies are conducted.<br><br>It appears combined studies are sometimes conducted same as Feasibility Studies. | This grants no additional time for further evaluation and would suggest the quality of the study is not at the level of a System Impact Study.<br><br>This has caused problems when not enough time is provided (on more complex projects) to perform the protection analysis of the study and hasty assumptions are made in order to deliver the study on time per the PJM Tariff. | PJM should make more transparent the process of determining a combined study, when that determination is made, and the resulting changes to the timeframes and deliverables as well as demonstrate consistent application.<br><br>Facility owners must approve whether queue projects are going to be considered for combined Feasibility/System Impact Studies, and not PJM. |

# Studies

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 2-6 | Facility Studies | Critical information needed from developer to start Facility Studies.<br><br>Reporting makes it appear the TOs are delinquent in finishing the Facility Studies. | Facility Studies are delayed and TOs shown as responsible for delays. | Adjust timeline reporting to include developer delays or establish response timelines to terminate Facility Studies Agreement for lacking information.<br><br>Benefits by removing projects from delinquency report, or from the process, that cannot deliver the data necessary to begin Facility Studies.<br><br>Explore feasibility of terminating Facilities Study Agreement, since termination of one project's study agreement puts others in the queue at risk for termination as impacts and costs need to be re-evaluated. |

# Studies

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 2-7 | Facility Studies | Current accuracy of estimating rules require significant amount of work. | Facility Studies delayed until the level of effort can be completed. | Relax the requirements and add contingency dollars to cover the unknowns.<br><br>Benefits by enabling quicker delivery of Facility Studies. |

# Studies

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 2-8 | Facility Studies | Lacking confirmation of POI and other customer information.<br><br>Historically, Facility Studies are being kicked off without final POI coordinates. | Proper Facility studies cannot begin without 3 main components:<br>1. SS or POI tap coordinates<br>2. Updated Site Plan<br>3. Updated Single Line Diagram | Roughly two years ago, PJM was going to add a section to the Facility Study Agreement that the ICs would provide the POI coordinates and updated SLD as a pre-requisite to beginning Facility Studies. |

# Studies

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 2-9 | Facility Studies | Prioritization of retools/significant customer changes during Facility Study efforts. | Retooling and significant POI adjustments during the facility study activities are becoming more prevalent. | Due to the significant increase in project volume, it would be advantageous for TOs and ICs to align on retooling criteria with PJM and set expectations with the customers to proactively identify impacts to Facility Study completion dates. |

# Agreements

# Agreements

- **Challenges**
  - Interim ISA – Terms and Conditions are lacking, subjecting PJM to risk of non-payment and other risks.
  - Interim ISA – If entered into before Impact Studies are completed, the scope and costs would not yet have been defined.
  - Interim ISA – Facility Studies process has not been completed; project could lead to unnecessary commitment of resources by TOs if that project is changed or stopped.
  - ISA/WMPA – After-the-fact conformance reviews by PJM requires TOs and ICs to review agreements and sign twice.
  - Forced Interconnections – Even if TOs identify problems, developers can simply move forward and force TOs to participate by filing the agreements unexecuted; this could result in placing in-service transmission facilities that could pose risk to public safety or reliability of the system.

# Agreements

- **Improvements**
  - Interim ISA – Develop appropriate Terms and Conditions (including payment provisions) and clear scopes of work.
  - Interim ISA – If used, only allow that use at completion of Facility Studies phase.
  - Interim ISA – Significantly limit use of Interim ISA.
  - ISA/WMPA – Consider having PJM Legal perform pro forma review first and then issue the contracts for signing and conformance initialing at the same time.
  - Forced interconnections – Need opportunity in study process for TOs to object to the placement of transmission facilities in-service that pose a risk to the safety or reliability of the system; clarify the extent to which TOs are able to dispute the filings and make their case for any public safety and reliability concerns.

# Agreements

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 3-1 | Interim ISA | Terms and Conditions are lacking. | Lack of Terms and Conditions subjects PJM to risk of non-payment and other risks. | Develop appropriate Terms and Conditions (including payment provisions) and clear scopes of work. |

# Agreements

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 3-2 | Interim ISA | If entered into before Impact Studies are completed the scope and costs have not yet been defined. | Project may not be viable and could lead to unnecessary commitment of resources by transmission owner if the project is changed or stopped. | If Interim ISA is used, only allow at the completion of the Facility Studies phase. |

# Agreements

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 3-3 | Interim ISA | Facility Studies process has not been completed. | Could lead to unnecessary commitment of resources by TOs if the project is changed or stopped. | Significantly limit the use of Interim ISAs. |

# Agreements

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 3-4 | ISA/WMPA | Both the WMPA and ISA use a standardized pro forma. Anytime there is a deviation from the pro forma, PJM performs an in-depth review of changes in the agreement AFTER it has been signed by the TOs and the ICs.<br><br>PJM wants the TOs and the ICs to simply initial off on these changes, but TOs and ICs often times cannot do that without re-circulating internally and obtaining internal approvals. However, it is difficult to obtain internal approvals for deviations from the pro forma in the absence of concrete justifications and support, particularly after the pro forma has already been executed. | After-the-fact conformance reviews by PJM essentially require TOs and ICs to review agreements and sign twice. | Recommend PJM Legal do the pro forma review first and then issue the contract for signing and conformance initialing at the same time. |

# Agreements

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 3-5 | Forced Inter-connections | Even if the TOs identify problems, the developer can simply move forward and force the TOs to participate by filing the agreements unexecuted. | Placement of transmission facilities in-service in locations that may pose a risk to the safety or reliability of the system. | It would seem that there should be some opportunity in the study process for the TOs to object to the placement of transmission facilities in places that pose a risk to the safety or reliability of the system.<br><br>Clarify the extent to which TOs are able to dispute the filings and make their case for reliability and safety concerns. |

# Other

# Other

- **Challenges**
  - Generation Re-dispatch Costs – Sub-transmission connected generation re-dispatch costs that should be covered by IPP are transferred to other customers on system.
  - Deactivated Generation – Generation no longer connected to the system, or shut down for good, still included in models.
  - Generation Not in Market – Inconsistent treatment in models of generation not in the market or no longer participating in the market.

  - Generation Energy Meters vs. Load Meters – FERC ruled that PJM's self supply tariff needs to be adjusted by early 2021.
  - Generation Energy Meters vs. Load Meters – Energy meter on high side may be sufficient for energy produced, but insufficient for load needs drawn from grid to supply station auxiliary load.
  - Generation Energy Meters vs. Load Meters – TO load zones may be connecting generators to TO lines, but also settling embedded load for non-affiliated LSEs.

# Other

- **Challenges**
  - DERs Connecting to Retail Owned Distribution Equipment, but Retail Customer Takes Direct T-service Through an LSE – Retail customers taking transmission service through an LSE are bypassing the LSE (utility) and back feeding onto the transmission system for periods of time.

# Other

- **Improvements**
  - Generation Re-dispatch Costs – Add specific contingencies and MFO to studies to require generation to fund mitigation.
  - Deactivated Generation – Remove from models and update status on PJM website.
  - Generation Not in Market – Model generation that supplies load, but is not in the market.

  - Generation Energy Meters vs. Load Meters – PJM established staged approach for study and contract revisions for this effort.
  - Generation Energy Meters vs. Load Meters – Ensure Facility Study language and ISA-ICSA language reference the need to coordinate with LSE meters for load measurement purposes, keeping the energy production (generation) and the energy consumption (load) separate.
  - Generation Energy Meters vs. Load Meters – Same as above, or identify the dual use of these meters.

# Other

- **Improvements**
  - DERs Connecting to Retail Owned Distribution Equipment, but Retail Customer Takes Direct T-service Through an LSE – Wholesale distribution entity (utility) must be intermediary between any retail connection onto or at the transmission voltage level.

# Other

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 4-1 | Generation Re-dispatch Costs | Sub-transmission connected generation re-dispatch costs.<br><br>N-1-1 contingencies not studied during interconnect process.<br><br>TOs getting charged for N-1 re-dispatch costs.<br><br>Only CIR considered, not MFO, considered for mitigation. | Transferring costs that should be covered by IPP to other customers on the system. | Add the specific contingencies and MFO to the studies, requiring IPP to fund mitigation.<br><br>Even if not done this way, the TOs should not bear the cost of re-dispatch. |

# Other

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 4-2 | Deactivated Generation | Generation no longer connected to the system, or shut down for good, still included in models. | CIRs not available for new IPP queue participants.<br><br>Models that are not correct.<br><br>Inaccurate queue study results.<br><br>Inaccurate short circuit results. | Remove from models and update the status on the PJM website.<br><br>Benefits in more accurate results with available CIRs included.<br><br>Benefits through fewer system upgrades required. |

# Other

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 4-3 | Generation Not in Market | Inconsistent treatment in models of generation not in the market or no longer participating in the market.<br><br>Non-Market (load reducing) generation not modeled (Q30), while back-up (run seldom) generation modeled (P44). | Inaccurate queue study results.<br><br>Inaccurate short circuit results. | Model generation that supplies load, but is not in the market.<br><br>Benefits through accurate models with accurate results. |

# Other

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 4-4 | Generation Energy Meters vs. Load Meters | FERC ruled that PJM's self supply tariff needs to be adjusted by early 2021. | Existing generation IPPs do not have the retail tariffs or the load managing meters for the local LSE to bill.<br><br>Bills will need to be paid by the generators for additional equipment needs. | PJM established staged approach for study, contract revisions for this effort. |

# Other

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 4-5 | Generation Energy Meters vs. Load Meters | Energy meter on the high side may be sufficient for energy produced, but insufficient for load needs drawn from grid to supply station auxiliary load. | Load serving entities may have supported dual use meters, but load details needed to align to their state retail tariffs for generators require more detailed load meters for measurement. | Ensure Facility Study language and ISA-ICSA language reference the need to coordinate with LSE meters for load measurement purposes, keeping the energy production (generation) and the energy consumption (load) separate. |

# Other

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 4-6 | Generation Energy Meters vs. Load Meters | TO load zones may be connecting generators to TO lines, but also settling embedded load for non-affiliated LSEs.<br><br>This requires establishing non-affiliate service contracts for these load services to be reimbursed to the TO. | Real time load service fees are not being recognized in non-affiliate contracts.<br><br>This prevents the data from transferring to the LSE retail service provider. | Ensure Facility Study language and ISA-ICSA language reference the need to coordinate with LSE meters for load measurement purposes, keeping the energy production (generation) and the energy consumption (load) separate, or identifying the dual use of these meters. |

# Other

| No. | Area of Challenge | Description of Challenge | Impact of Challenge | Recommended Improvement |
|---|---|---|---|---|
| 4-7 | DERs connecting to Retail owned distribution equipment but Retail customer takes direct T-service through an LSE. | LSE retail tariffs may not have the necessary requirements within their tariffs and require time from state commissions.<br><br>Retail customers taking transmission services through an LSE are bypassing the LSE (utility) and back feeding onto the transmission system for periods of time.<br><br>No transparency into cybersecurity software or other distribution aggregations if the retail customers own their own distribution network. | Back feed extends beyond 5 minute interval, as listed in documentation, and the TO or TOP (PJM) cannot control. | Wholesale distribution entity (utility) must be intermediary between any retail connection onto or at the transmission voltage level. |

# Questions ???

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