Generator Interconnection Queue Improvements

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Director Resource Utilization, MISO
Planning Advisory Committee (PAC)
August 30, 2023
Purpose:
Introduce the updated package of queue reforms needed to improve the rules governing entry and exit from the Generator Interconnection Queue

Key Takeaways:

• Issue: Additional Tariff changes are needed to better manage the number of new requests in upcoming queue cycles

• Based on extensive stakeholder feedback, MISO is making some adjustments on the original package proposed at the July PAC

• Charles River Associates updated their independent review of the existing MISO rules and recommend changes

• Queue reform proposal continues to includes increases in milestone payments, improved site control, changes to withdrawal provisions including automatic penalty, and an automatic cap on queue size
Queue reforms are needed to reduce the volume of future cycles to enable faster and more certain study results earlier.

- Current Tariff rules still incentivize speculative projects:
  - Small financial commitment
  - Ineffective withdrawal rules allow withdrawn requests to get most of their money back, with interest, due to lack of penalties
- The queue has seen an exponential increase in the number of requests.
  - The 2022 cycle was 171GW. MISO summer peak load is approximately 123GW.
- The queue has significantly more generation submitted than will be built.
  - Over 70% of queue submittals don't get built.
- The more projects in studies, the longer it takes to complete; the more projects that withdraw, the less certain phase 1 and 2 study results are.
- Without reform, the next cycle will continue this trend and exacerbate queue delays.
- To ensure uniform application of needed rule changes, MISO has extended the 2023 Queue Cycle submission deadline until Tariff improvements are made.
Stakeholder engagement has resulted in a well defined proposal that should allow for quicker consensus

- MISO had dozens of individual meetings with stakeholders from multiple sectors to gain insight into their position on queue reform
  - Significant support in MISO’s direction on the reforms
  - Great feedback on what would and would not work
  - Some feedback on enhancements that should be made in the future
- MISO has engaged Charles River Associates to provide an independent review of current queue rules for entry and exit
  - Their initial assessment and recommendations are posted as supplemental material
  - CRA provides additional analysis of the MISO queue and industry comparisons
  - Support MISO position to increase milestones, penalty free withdraw provisions, creation of a penalty schedule upon withdrawal, and physical limitations on the size of the queue
Queue reform package adjusts multiple entry/exit rules that work in concert with each other to reduce the size of the queue.

**Proposed Queue Reform package adjusts the following items:**

- Increase M2, M3, and M4 milestone payments
- Improve site control requirements for the Point of Interconnection (POI)
- Introduce an escalating automatic penalty upon withdrawal; requires an adjustment to meaning of harm
- Adjust penalty free withdrawal provisions to simplify calculation and reduce availability
- Set limitation on the number of MWs that will be allowed in future cycles
  - Limitation on the number of MWs any one developer can submit into a future cycle
Milestone Payment and POI Site Control Adjustments

• Initial Milestone payment (M2) to be increased from $4,000/MW to $12,000/MW with a corresponding change to M3 and M4
  • M3 = The greater of (20% of Network Upgrades – M2) or $1,000/MW
  • M4 = The greater of (30% of Network Upgrades – M2) or $1,000/MW

• Increase Point of Interconnection (POI) site control requirements
  • 50% site control from generator site to POI upon application, or $80,000/mile for the entire line mileage to POI
  • 50% site control from generator site to POI and 50% of IC switchyard, if necessary, prior to Phase 2
  • 100% site control from generator to POI, including IC switchyard if necessary, prior to GIA Negotiations or within 180 days of Execution with an approved exception
Adjustment to harm calculation to include an automatic penalty upon withdrawal

- An Interconnection request in the queue impacts all requests in the same queue cycle by contributing MWs to the system (increasing congestion not just on constraints that meet the screening criteria) and increases the time to complete the queue cycle by requiring engineering staff to determine upgrades necessary to interconnect the facility and any potential Network Upgrades
  - This harm is not captured in the existing harm calculations.
  - Additional uncertainty and work occasioned by withdrawal also not captured.
- Automatic penalty upon withdrawal is necessary to capture this harm, and to incentivize only those projects to enter the queue that have sufficient confidence in commercial viability that they are willing to risk this penalty
- Penalty will be used to offset interconnection costs of projects that sign a GIA
  - Penalty will be a percentage of M2 and increase in later phases of the queue
Automatic penalty schedule and changes to penalty free withdrawal provisions

- **Automatic withdrawal penalty schedule:**
  - 10% of M2 before DPP Start (would be removed if cap is not part of final solution)
  - 25% of M2 at DP1
  - 50% of M2 at DP2
  - 75% of M2 during Phase 3,
  - 100% of M2 during GIA negotiations and beyond

- **Penalty free withdrawal should only apply to the greatest outliers in cost (top 10-25% of all projects in a cycle); all other projects should be subject to a harm calculation to determine potential increase in Network Upgrades on other projects**
  - Penalty free withdrawal provisions should continue to exist, but need to be simplified and limited
  - Will only apply between Phase 1 and Phase 2, and again between Phase 2 and Phase 3
  - Combined NU + AS cost increased by 50% from P1 and P2
  - Combined NU + AS cost increased by 40% from P2 and P3

  **Still determining percent increase allowable between the two phases.**
Limiting queue size by MW to allow more realistic studies

- A backstop is needed to ensure the size of the queue does not exceed a certain percentage of the MISO load to allow dispatch of existing resources with new interconnection requests
  - Adjustments to milestone payments, POI site control, and harm calculations may not be enough to limit the amount of new requests studied in a cycle
  - Limit on MW size of requests is proposed as a function of the peak load in each study region
  - Proposed percentage will be based on the factors below is 60% (average MISO peak is 121GW, meaning a cap of 73 GW/cycle)
    - The limit will be based on but not limited to the following factors: the ability to develop a reasonable dispatch based on the existing system and Generation Facilities in that queue cycle, the regional and subregional peak load in the study model, and anticipated level of project withdrawals.
    - Annual peak number (by GI region) to be posted on MISO public website.
  - Projects submitted after the cap is met will be used to replace projects in the cycle that are withdrawn during validation process (e.g. site control review), all others will be in next cycle
  - A safety valve will be necessary to allow projects with a PPA in the cycle if above the cap
Limiting the number of applications per developer facilitates fairness

- Limiting the size of each cycle could result in one developer having a significant portion of requests and, thus, a potential advantage over other developers
  - In previous cycles the highest volume any one developer had was between 10 and 15%
  - Propose limiting the amount of any one developer to 10% of the MW size cap (e.g., a 73GW cap results in a 7300 MW cap per developer)
  - Developers will need to attest that their project is not owned by anyone else in the queue, and there is no agreement to sell the project to a different developer until after Phase 2
    - All projects for a single developer will be withdrawn as a penalty if found to be violation of their individual cap
  - Projects will be accepted on a first come first serve basis (with or without a limit per developer)
  - If volume of projects submitted is below cap, then developers can exceed individual cap on pro rata basis
- MISO is not pursuing developer cap at this time, but one may be necessary later if future cycles are dominated by only a few developers
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 31</td>
<td>Introduced the need for reform at the Planning Advisory Committee (PAC)</td>
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<tr>
<td>May-July</td>
<td>MISO engaged Charles River Associates for an independent review of reforms, engaged dozens of individual stakeholders and publicly via stakeholder meetings.</td>
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<tr>
<td>June 21</td>
<td>MISO stopped accepting new applications and notified Interconnection Customers that applications will be accepted again upon anticipated FERC action on queue reforms</td>
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<tr>
<td>July 19</td>
<td>Present an initial proposal and seek feedback at the PAC</td>
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<tr>
<td>Aug 30</td>
<td>Present updated proposal and first draft tariff changes at PAC, seek feedback</td>
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<tr>
<td>October 11</td>
<td>Present final proposal and tariff changes at PAC</td>
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<td>End of October</td>
<td>Projected FERC filing targeting acceptance by the end of the year</td>
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<td>After Acceptance</td>
<td>2023 Queue Cycle submission deadline</td>
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Request for Feedback

• MISO requests feedback on the Queue Reform Proposal by September 12, 2023
• Feedback requests and responses are managed through the Feedback Tool on the MISO website: https://www.misoenergy.org/stakeholder-engagement/stakeholder-feedback/
Review of Charles River Associates Analysis and Recommendations

- Charles River Associates has updated their independent analysis and recommendations
- Their updated presentation is posted along with the PAC meeting materials
- Representatives from Charles River Associates to provide a synopsis of their deck and answer stakeholder questions
Questions?

Contact Information: Andy Witmeier awitmeier@misoenergy.org
<table>
<thead>
<tr>
<th>Update</th>
<th>GIP Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase M2, M3, M4 milestone payments</td>
<td>3.3.1 (Initiating an Interconnection Request), 7.9.1 (PGIA) - For M2</td>
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<tr>
<td></td>
<td>7.3.1.4.1 (Definitive Planning Phase II Milestone (M3) Calculation)</td>
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<tr>
<td></td>
<td>7.3.2.4.1 (Definitive Planning Phase III Milestone (M4) Calculation)</td>
</tr>
<tr>
<td>Increased Site Control at POI</td>
<td>7.2.1 (Requirements for Demonstrating Site Control)</td>
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<td></td>
<td>7.2.1.2 (Cash in lieu of Site Control)</td>
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<td></td>
<td>7.2.2.1 (Timing Requirements - Continued Site Control)</td>
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<tr>
<td></td>
<td>7.2.2.2 (Demonstrating Site Control for ICIF and NU) 7.3.2.4</td>
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<tr>
<td>Introduce Escalating automatic penalty upon withdrawal</td>
<td>7.8, 7.6.2.1</td>
</tr>
<tr>
<td>Adjust penalty free withdrawal provisions</td>
<td>7.6.2.4 (Withdrawal and Refund due to Increase in Network Upgrade costs)</td>
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<td></td>
<td>7.8? (Use of Definitive Planning Phase Entry at Risk Milestone Payments or Payments of Withdrawn Projects)</td>
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<tr>
<td>Cap on MW per cycle</td>
<td>New 4.1.1</td>
</tr>
<tr>
<td>Cap on MW per developer</td>
<td>None</td>
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Potential Benefits to Additional Queue Reforms

- Fewer requests in a queue cycle will lead to faster results.
- Fewer requests will result in study assumptions that will more resemble an actual future dispatch.
- A reduction in withdrawals will lead to less changes in the network upgrades between studies thereby increasing upfront certainty for customers.
- Adjustments to refunds and removal of penalty free withdrawal will result in a transfer of funds from projects that dropout to projects that sign a generator interconnection agreement, reducing the overall costs of projects that will be built.
- Extending the 2023 Queue Cycle submission deadline until tariff changes are made will allow MISO/TO engineers to focus on existing projects in the queue.
- If tariff changes are made expeditiously, the 2023 Queue Cycle could begin later this year.
Potential Roadblocks to Queue Reforms

- Increasing requirements to enter and exit the queue can be perceived as an impediment to generation development.
- If milestone payments are too high, it could impact the ability of smaller developers from getting funding and pursuing viable projects.
- If milestone payments are too low, like today, it allows for a flood of requests that will not get built due to the lack of demand.
- Removing penalty free withdrawal could result in developers losing investment dollars on projects they thought were viable.
- Extending the 2023 Queue Cycle submission deadline could allow projects that are not ready for submission during the normal September deadline to be ready when reforms are approved, potentially shifting some projects forward.
Historical Charts, Data, and RTO Comparisons
# Current Site Control Comparison

<table>
<thead>
<tr>
<th>Site Control For Generating Facility Tie Line</th>
<th>SPP</th>
<th>PJM</th>
<th>MISO</th>
</tr>
</thead>
</table>
| Upon submission, reasonable evidence of Site Control for at least fifty percent (50%) of the mileage of the Generating Facility's high voltage tie line to the Point of Interconnection, or in lieu of Site Control for the Generating Facility's high voltage tie line, additional financial security in the amount of $80,000 per entire line mileage right-of-way. | Application Review Phase - 100% site control for generating site.  
Prior to Phase 1: Decision Pt 1 - 100% Site Control for Gen Facility; 50% site control for gen-tie to the POI & 50% IC switchyard (if necessary)  
Decision Pt 3 (end of Phase 3): 100% site control within 6 months of agreement execution for generation site, IC switchyard, IC facilities to POI. | Prior to conclusion of the Interconnection Customer’s GIA execution period, 50% Site Control for all Interconnection Customer's Interconnection Facilities |

<p>| Site Control Acreage Requirements | Wind – 30 acres per MW; Solar – 6 acres per MW; Storage/Battery – 1 acre per MW or manufacturer specifications; Conventional Generation – 40 acres (fixed) or manufacturer specifications | Site plan submitted with the Attachment N application must show the arrangement of the proposed facilities for the amount of MW Requested | Wind-50 acres per MW; Solar-5 acres per MW; Storage/Battery-0.1 acres per MW; Conventional-10 acres for the proposed facility; Hybrid-Summation of the various fuel types represented in the Hybrid facility based on each fuel type's acres per MW show above |</p>
<table>
<thead>
<tr>
<th></th>
<th>SPP</th>
<th>PJM</th>
<th>MISO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Site Control Definition</strong></td>
<td>Ownership of, a leasehold interest in, or a right to develop a site of sufficient size for the purpose of constructing the Generating Facility; (2) an option to purchase or acquire a leasehold site of sufficient size for such purpose.....</td>
<td>Demonstrating Project Developer’s interest in, control over, and right to utilize the Site for the purpose of constructing a Generating Facility, Merchant Transmission Facilities, Interconnection Facilities...</td>
<td>(1) ownership of a site; (2) a leasehold interest in a site; (3) an option to purchase or acquire a leasehold interest in a site......</td>
</tr>
<tr>
<td></td>
<td>Three year minimum</td>
<td></td>
<td></td>
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<tr>
<td><strong>Site Control Documentation</strong></td>
<td>Geographic Information System (GIS) site plan map, associated data files and documentation that shows sufficient acreage requirements are met and boundaries of the Interconnection Customer's land lease / ownership for the citing of the Generating Facility, Collector Substation, the Interconnection Facilities (if applicable) and Point of Interconnection.</td>
<td>(1) Deed; (2) lease; (3) option to lease or purchase; or (4) as deemed acceptable by the Transmission Provider, any other contractual or legal right to possess, occupy and control the Site</td>
<td>A Geographic Information System (GIS) site plan map, data files, and documentation that shows the following information: (a) sufficient land to meet the acreage requirements set forth in the Generator Interconnection Business Practices Manual.....</td>
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<tr>
<td></td>
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<td>GIS Site Plan map and data files acceptable to PJM demonstrating the arrangement of resource-specific facilities for the MW</td>
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<tr>
<td></td>
<td>SPP</td>
<td>PJM</td>
<td>MISO</td>
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<tr>
<td><strong>D1 Non-Refundable Fee</strong></td>
<td>N/A</td>
<td>10% of study deposit nonrefundable</td>
<td>$5,000</td>
</tr>
<tr>
<td><strong>D2 Study Deposit</strong></td>
<td>&lt;2 MW $25,000 deposit; 2 ≥ MW ≥ 20 $35,000; 20 ≥ MW ≥ 75 $50,000; ≥ 75 MW $90,000</td>
<td>&quot;Study Deposit Amounts: 0-20MW: $75k &gt;20-50MW: $200k &gt;50-100MW: $250k &gt;100-250MW: $300k &gt;250-750MW: $350k &gt;750MW: $400k&quot;</td>
<td>&lt; 6 MW $50,000; 20 ≥ MW ≥ 75 $120,000; 50 ≥ MW ≥ 100 $180,000; 100 ≥ MW ≥ 200 $270,000; &gt;200 MW $320,000; &gt;500 MW $350k; &gt;1000 MW $400k</td>
</tr>
<tr>
<td><strong>One-Line Diagram</strong></td>
<td>Must be PE-certified</td>
<td>PE-certified</td>
<td>Reviewed by DPP Engineer</td>
</tr>
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</table>
Historical Queue Volume and Current State

MISO Active Queue by Study Area

- **West**
  - Size: 37.3 GW
  - Projects: 215

- **East (ATC/UP)**
  - Size: 12.8 GW
  - Projects: 94

- **East (ITC)**
  - Size: 24.5 GW
  - Projects: 149

- **Central**
  - Size: 78.5 GW
  - Projects: 474

- **South**
  - Size: 87.5 GW
  - Projects: 480

Total Queue:

- 240.7 GW
- 1412 Projects

Fuel Type Legend:

- Other
- Gas
- Wind
- Solar
- Hybrid
- Storage

MISO Queue: Historical Trend

Requested Generation

By Fuel Type (GW) by Queue Date Year

- 2000: 8
- 2001: 8
- 2002: 16
- 2003: 10
- 2004: 11
- 2005: 21
- 2006: 23
- 2007: 47
- 2008: 23
- 2009: 15
- 2010: 12
- 2011: 7
- 2012: 13
- 2013: 28
- 2014: 27
- 2015: 30
- 2016: 31
- 2017: 40
- 2018: 44
- 2019: 52
- 2020: 171
- 2021: 77
Historical Queue Completion/Dropouts Since 2017 and Generators with a GIA but are not online

Signed GIAs not online and reasons for delays

- Interconnection Customer Contractor Issues: 6%
- Transmission Owner Contractor Issues: 3%
- Transmission Owner Supply Chain Issues: 7%
- Other: 10%
- Regulatory Issues: 38%
- Economic/Financial Issues: 0%
- Lack of PPA: 0%

Total COD Delayed Capacity Response to Survey: 10 GW

- Generating Equipment Chain Issues: 36%
Historical Queue Completion/Dropouts Since 2017
Historical Completion Time for Each DPP Cycle

Average Completion Time for Finished Study Cycles ~ 778 Days

<table>
<thead>
<tr>
<th>Cycle</th>
<th>GW Size</th>
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<tbody>
<tr>
<td>2016 Feb</td>
<td>8</td>
</tr>
<tr>
<td>2016 Aug</td>
<td>13</td>
</tr>
<tr>
<td>2017 Feb</td>
<td>8</td>
</tr>
<tr>
<td>2017 Aug</td>
<td>31</td>
</tr>
<tr>
<td>2018</td>
<td>40</td>
</tr>
<tr>
<td>2019</td>
<td>44</td>
</tr>
<tr>
<td>2020</td>
<td>52</td>
</tr>
<tr>
<td>2021</td>
<td>76</td>
</tr>
<tr>
<td>2022</td>
<td>171</td>
</tr>
</tbody>
</table>
Historical Transmission Upgrade Costs for Previously Completed DPP Phases
Indicative Customer Submissions for 2022 Cycle

- All Requests: 171 GW (100%)
  - Top 25 Companies: 106 GW (62%)
  - Top 15 Companies: 83 GW (49%)
  - Top 5 Companies: 47 GW (28%)
- All other: 124 GW (72%)
- Top 5 Companies: 47 GW (28%)

All Requests: 171 GW (100%)