FTR Market Analysis for Financial Risk Mitigation

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The purpose of this presentation is to share the results of analysis and potential recommendations on how to mitigate risk in the FTR market through:

- Concept of a rolling monthly auction
- Impact analysis of aligning FTR biddable points with day-ahead and real-time physical energy transactions
- FTR Software existing capabilities and potential enhancements
PJM FTR group performed multiple analyses utilizing study cases derived from:
- 18/21 long-term auction
- 18/19 annual auction
- 2018 JUN BOPP auction

Key takeaways:
- Replacing Annual, BOPP, and Long-term auction with monthly auctions will maximize “mark-to-auction” capabilities and modeling capabilities
- Analysis shows alignment of biddable points aligns FTR and DA constraints which mitigates risk through converging auction prices to their expected value over time
Rolling Monthly Auctions

• Promotes enrichment of forward pricing information
  – Better liquidity, price discovery, more granular modeling

• Maximizes “mark-to-auction” credit policy utilization
  – Quicker / more accurate valuation of existing FTR portfolios and corresponding collateral coverage

• Can be implemented with minimum impact to existing ARR annual process
  – Valuation of ARRs would need to change due to the elimination of an annual auction
GreenHat was able to amass an extremely large portfolio which mainly consisted of low-collateral FTRs and FTRs that did not align with actual physical delivery paths.
Alignment of FTR with day-ahead and real-time physical constraints

Improved FTR auction case performance

Increased value and prevailing flow across physical delivery paths

Anticipated increased competition along physical delivery paths
### Study Case:
**Valid sources:** Hubs, Interfaces, Zones, Gen Aggregates, Gens  
**Valid sinks:** Hubs, Interfaces, Zones, Load Aggregates

<table>
<thead>
<tr>
<th>Number of Unique Binding Constraints</th>
<th>Base Case</th>
<th>Study Case</th>
<th>DA 18/19 Planning Period (more than 50 hours, worst case)</th>
<th>Constraints Removed from Base Case/New Study Constraints that did not bind in DA</th>
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</thead>
<tbody>
<tr>
<td>Round 1</td>
<td>479</td>
<td>180</td>
<td>275</td>
<td>254</td>
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<tr>
<td>Round 2</td>
<td>588</td>
<td>224</td>
<td>275</td>
<td>283</td>
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<tr>
<td>Round 3</td>
<td>629</td>
<td>225</td>
<td>275</td>
<td>303</td>
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<td>Round 4</td>
<td>575</td>
<td>207</td>
<td>275</td>
<td>272</td>
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**Study Case:**

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<tr>
<td>YR1</td>
<td>880</td>
<td>400</td>
<td>275</td>
<td>487</td>
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<tr>
<td>YR2</td>
<td>818</td>
<td>354</td>
<td>275</td>
<td>500</td>
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<td>YR3</td>
<td>685</td>
<td>245</td>
<td>275</td>
<td>427</td>
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<tr>
<td>JUN</td>
<td>460</td>
<td>174</td>
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<tr>
<td>JUL</td>
<td>396</td>
<td>194</td>
<td>275</td>
<td>160</td>
</tr>
<tr>
<td>AUG</td>
<td>389</td>
<td>194</td>
<td>275</td>
<td>148</td>
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</table>
Increased FTR Auction Case Performance

**Study Case 1:** Bids not on below paths removed
Valid sources: Hubs, Interfaces, Zones, Gen Aggregates, Gens
Valid sinks: Hubs, Interfaces, Zones, Load Aggregates

**Study Case 2:** Bids “backfilled” with above valid paths, i.e. same bid count and MW count from base case

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<th></th>
<th>Base Case</th>
<th>Study Case 1</th>
<th>Study Case 2</th>
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</thead>
<tbody>
<tr>
<td><strong>FTR 18/21 Long-Term Round 3 Case Solve Time</strong></td>
<td>22:17:28</td>
<td>05:24:40</td>
<td>09:56:51</td>
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<tr>
<td><strong>FTR 18/19 Annual Round 1 Case Solve Time</strong></td>
<td>02:54:42</td>
<td>01:49:59</td>
<td>02:38:36</td>
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</tbody>
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Isolates impacts of added constraints caused by nodal paths
Prevailing Flow Impacts

Nodal bids do not appear to provide meaningful counter flow along physical delivery paths

18/19 Annual Auction Round 1
Cleared MW by Path Type

Prevailing Flow along physical supply paths increase with reduced bid set

Source
Sink
Case time reduces by 30% on average in the Annual Auction, 5% in the Monthly Auction

Net Auction Revenue collected is reduced by $6.5M on average in the Annual Auction

No increased risk of a default is apparent by eliminating FTR Options

Expanded Option Paths and Bids will severely increase case execution time
Current Technology Capabilities

• Maximum cases that can be run simultaneously is **12**
  – All must be single powerflow model, e.g. no overlapping periods

• Average case solve time for a simple period is 3 hours

• Average case solve time for an overlapping period is between 6-12 hours

• Long Term cases average solve time is roughly 7-20 hours
Discussion: Member Concerns with Proposed Concepts

Elimination of Annual Auction concerns

Reduced bid set: Inability to price specific branches in the FTR market may lead to inefficient pricing