PJM Regional Transmission Expansion Planning (RTEP) Process

Nebiat Tesfa, Transmission Planning
IPSAC May 16, 2022
PJM Planning Links

- Services and Requests – [http://www.pjm.com/planning/services-requests.aspx](http://www.pjm.com/planning/services-requests.aspx)
# PJM’s 2-year Reliability

## Cycle 1
- **Yr -1**
  - Develop assumptions
  - Reliability criteria analysis for years 6 - 11
  - Identify and evaluate solution options
  - Review with TEAC and approval by the PJM Board

- **Yr 0**
  - Develop assumptions and build Year 8 base case
  - Perform criteria analysis for years 8 - 15
  - Perform reliability and market efficiency analysis for Year 8 - 15
  - Identify proposed solutions
  - Re-tool analysis for years 7 - 15 including solution options
  - Independent consultant reviews of buildability
  - Adjustments to solution options by PJM based on analysis

- **Yr +1**
  - Develop assumptions
  - Reliability criteria analysis for years 5 - 15
  - Identify and evaluate solution options
  - Review with TEAC and approval by the PJM Board

## Cycle 2
- **Year 1**
  - Develop assumptions (Year 1 and Year 5)
  - Market Efficiency Analysis (Year 1 and Year 5 accelerations and modifications)
  - Identify and evaluate solution options accelerations and modifications
  - Final review with TEAC and approval by the PJM Board

## PJM’s 2-year Market Efficiency

### Year 0
- Develop assumptions (Year 1, Year 5, Year 8, Year 11, Year 15)
- Market Efficiency Criteria Analysis (Year 1, Year 5, Year 8, Year 11, Year 15)
- Market Efficiency Analysis (Year 1, Year 5, Year 8, Year 11, Year 15)
- Identify proposed solutions
- Update significant assumptions (Year 6, Year 4, Year 7, Year 10, Year 14)
- Independent consultant reviews of buildability
- Adjustments to solution options by PJM based on analysis

### Year 1
- Develop assumptions (Year 1, Year 5)
- Market Efficiency Analysis (Year 1, Year 5 Accelerations and Modifications)
- Identify and evaluate solution options accelerations and modifications
- Final review with TEAC and approval by the PJM Board
2022 RTEP Assumptions
PJM annually presents the assumptions at the beginning of each year. See the link below for details of the presentation.

Queue Project NOT Included in 2022 Series RTEP Cases

- Queue projects with an FSA or ISA but are not included in 2022 Series RTEP cases
  - Y3-092 (MTX)
    - 1000 MW Capacity Transmission Injection Rights
    - 500 MW Firm Transmission Withdrawal Rights and 500 MW Non-Firm Transmission Withdrawal Rights
2022 RTEP Assumptions

PJM/NYISO Interface
  – B & C cables will be modeled out of service consistent with 2021 RTEP
  • Linden VFT
    – Modeled at 330 MW
  • HTP
    – Modeled at 0 MW
  • Transource 9A project
    – Not included in model
• As part of the 24-month RTEP cycle, a year 8 (2030) base case will be developed and evaluated as needed as part of the 2022 RTEP

• The year 8 case will be based on the 2027 Summer case that will be developed as part of this year’s 2022 RTEP

• Purpose: To identify and develop longer lead time transmission upgrades
Similar to the 2021 RTEP and per the PJM Operating Agreement, a proposal window will be conducted for all reliability needs that are not Immediate Need reliability upgrades or are otherwise ineligible to go through the window process.

FERC 1000 implementation will be similar to the 2021 RTEP.

- Advance notice and posting of potential violations
- Advance notice of window openings
- Window administration
Expected Timeline

June/July 2022
- Open competitive proposal window
- Post modeling assumptions changes and corrections for and begin mid-year retool of 2022 RTEP baseline analysis if required
  - Accounts for major new modeling assumption changes and corrections not previously considered.
  - Basic assumptions such as planning criteria and ratings methodology that changed after February will not be considered until the 2023 RTEP.

July/August 2022
- Close competitive proposal window
- Finalize mid-year retool

August to December 2022: Evaluate proposals
October 2022 to February 2023: Approve proposals
Stakeholder Input and Information Items

Input Requested:
- Stakeholder suggestions for and input to 2022 alternative sensitivity studies and scenario analysis

Information Items (Non-RTEP Scenarios Studied by PJM):
- PJM participating in DOE Atlantic Offshore Wind Transmission study which may provide additional information for 2023 RTEP and beyond
- PJM System Planning is working to outline a scope for looking at a low carbon future to discuss in RTEP scenario discussions later in 2022 or early 2023
Generation Deactivation Notification Update
(Between 11/1/2021 and 4/1/2022)
Retirements
<table>
<thead>
<tr>
<th>Unit(s)</th>
<th>Fuel Type</th>
<th>Transmission Zone</th>
<th>Requested Deactivation Date</th>
<th>PJM Reliability Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleasant Unit 1 &amp; 2 (1278 MW)</td>
<td>Coal</td>
<td>APS</td>
<td>6/1/2023</td>
<td>Reliability analysis underway</td>
</tr>
<tr>
<td>Sammis Unit 5, 6, 7, &amp; Diesel (1504 MW)</td>
<td>Coal</td>
<td>ATSI</td>
<td>6/1/2023</td>
<td>Reliability analysis underway</td>
</tr>
<tr>
<td>Chambers CCLP (240 MW)</td>
<td>Coal</td>
<td>ACE</td>
<td>5/31/2022</td>
<td>Reliability analysis complete. No violation identified</td>
</tr>
<tr>
<td>Logan (219 MW)</td>
<td>Biomass</td>
<td>ACE</td>
<td>5/31/2022</td>
<td>Reliability analysis complete. No violation identified</td>
</tr>
<tr>
<td>Unit(s)</td>
<td>Fuel Type</td>
<td>Transmission Zone</td>
<td>Requested Deactivation Date</td>
<td>PJM Reliability Status</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------</td>
<td>-------------------</td>
<td>------------------------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>Essex 9 (81 MW)</td>
<td>Natural Gas</td>
<td>PSEG</td>
<td>6/1/2022</td>
<td>Reliability analysis complete. No violation identified</td>
</tr>
<tr>
<td>Ottawa County Project (1.7 MW)</td>
<td>Methane</td>
<td>ATSI</td>
<td>5/31/2022</td>
<td>Reliability analysis complete. No violation identified</td>
</tr>
<tr>
<td>Martins Creek CT 1 &amp; 2 &amp; 3 (35 MW)</td>
<td>Oil</td>
<td>PPL</td>
<td>5/31/2023</td>
<td>Reliability analysis complete. No violation identified</td>
</tr>
<tr>
<td>Martins Creek CT 4 (17.3 MW)</td>
<td>Natural Gas</td>
<td>PPL</td>
<td>5/31/2023</td>
<td>Reliability analysis complete. No violation identified</td>
</tr>
</tbody>
</table>
## Deactivation Status

<table>
<thead>
<tr>
<th>Unit Name</th>
<th>Fuel Type</th>
<th>Transmission Zone</th>
<th>Actual Deactivation Date</th>
<th>PJM Reliability Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fishbach CT 1 &amp; 2 (28 MW)</td>
<td>Oil</td>
<td>PPL</td>
<td>4/1/2022</td>
<td>Reliability analysis complete; no impacts identified</td>
</tr>
<tr>
<td>Jenkins CT 1 &amp; 2 (27.6 MW)</td>
<td>Oil</td>
<td>PPL</td>
<td>4/1/2022</td>
<td>Reliability analysis complete; no impacts identified</td>
</tr>
<tr>
<td>Lock Haven CT 1 (14 MW)</td>
<td>Oil</td>
<td>PPL</td>
<td>4/1/2022</td>
<td>Reliability analysis complete; no impacts identified</td>
</tr>
<tr>
<td>West Shore CT 1 &amp; 2 (28 MW)</td>
<td>Oil</td>
<td>PPL</td>
<td>4/1/2022</td>
<td>Reliability analysis complete; no impacts identified</td>
</tr>
<tr>
<td>Williamsport-Lycoming CT 1 &amp; 2 (26.6 MW)</td>
<td>Oil</td>
<td>PPL</td>
<td>1/12/2021</td>
<td>Reliability analysis complete; no impacts identified</td>
</tr>
<tr>
<td>Avon Lake 9 &amp;10 (648 MW)</td>
<td>Coal</td>
<td>FirstEnergy</td>
<td>3/31/2022</td>
<td>Reliability analysis complete and upgrades expected to be completed in time for unit to deactivate as scheduled.</td>
</tr>
</tbody>
</table>
# Deactivation Status

<table>
<thead>
<tr>
<th>Unit(s)</th>
<th>Fuel Type</th>
<th>Transmission Zone</th>
<th>Withdrawn Deactivation Date</th>
<th>PJM Reliability Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheswick 1 (568 MW)</td>
<td>Coal</td>
<td>PPL</td>
<td>3/31/2022</td>
<td>Reliability analysis complete and upgrades expected to be completed in time for unit to deactivate as scheduled.</td>
</tr>
<tr>
<td>Orchard Hills LF (9.3 MW)</td>
<td>Methane</td>
<td>ComEd</td>
<td>3/31/2022</td>
<td>Reliability analysis complete; no impacts identified</td>
</tr>
<tr>
<td>Glendon LF (2.9 MW)</td>
<td>Methane</td>
<td>ME</td>
<td>12/15/2021</td>
<td>Reliability analysis complete; no impacts identified</td>
</tr>
</tbody>
</table>

Generation Deactivation link:  
[https://www.pjm.com/planning/services-requests/gen-deactivations](https://www.pjm.com/planning/services-requests/gen-deactivations)
PJM Market Efficiency Update

Nick Dumitriu
Principal Engineer, PJM Market Simulation
2020/21 Long-Term Window 1
Cluster No. 1 (APS) - French’s Mill to Junction 138 kV
Analysis completed: Proposal 756, terminal equipment upgrades at the French’s Mill and Junction 138 kV substations, with a projected in-service date of 4/1/22, selected as the preferred solution.

• Cluster No. 2 (PECO) - Plymouth Meeting to Whitpain 230 kV
  – Analysis completed: Proposal 704, terminal equipment upgrades at the Plymouth Meeting and Whitpain 230 kV substations, with a projected in-service date of 6/1/25, selected as the preferred solution.

• Cluster No. 3 (PPL) - Juniata to Cumberland 230 kV
  – Analysis completed: Proposal 218, reconductor the Juniata-Cumberland 230 kV line, with a projected in-service date of 12/1/23, selected as the preferred solution.

• Cluster No. 4 (DOM) - Charlottesville to Proffit 230 kV
  – Analysis completed: Proposal 651, series reactor on the Charlottesville-Proffit 230 kV line, with a projected in-service date of 6/1/23, selected as the preferred solution.
# 2020/21 Long-Term Window 1 – Proposals Approved by PJM Board

<table>
<thead>
<tr>
<th>Proposal ID#</th>
<th>Proposal Baseline #</th>
<th>Project Description</th>
<th>Project Type</th>
<th>Transmission Owner</th>
<th>In-Service Date</th>
<th>Construction Cost ($MM)</th>
<th>B/C Ratio Metric</th>
<th>B/C Ratio</th>
<th>Percent Congestion Alleviated</th>
</tr>
</thead>
<tbody>
<tr>
<td>218</td>
<td>b3698</td>
<td>Juniata-Cumberland 230kV Line Reconductort</td>
<td>Upgrade</td>
<td>PPL</td>
<td>12/1/2023</td>
<td>$9.00</td>
<td>Low voltage</td>
<td>11.28</td>
<td>100%</td>
</tr>
<tr>
<td>651</td>
<td>b3702</td>
<td>Charlottesville-Proffit 230kV Line Series Reactor</td>
<td>Upgrade</td>
<td>DOM</td>
<td>6/1/2023</td>
<td>$11.38</td>
<td>Low voltage</td>
<td>16.05</td>
<td>99.52%</td>
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<tr>
<td>704</td>
<td>b3697</td>
<td>Plymouth Meeting-Whitpain 230kV Terminal Upgrades</td>
<td>Upgrade</td>
<td>PECO</td>
<td>6/1/2025</td>
<td>$0.62</td>
<td>Low voltage</td>
<td>75.30</td>
<td>99.91%</td>
</tr>
<tr>
<td>756</td>
<td>b3701</td>
<td>French’s Mill-Junction 138kV Terminal Upgrades</td>
<td>Upgrade</td>
<td>APS</td>
<td>4/1/2022</td>
<td>$0.77</td>
<td>Low voltage</td>
<td>119.03</td>
<td>100%</td>
</tr>
</tbody>
</table>
2022/23 Market Efficiency Cycle
## 2022/23 Market Efficiency Timeline

### YEAR 0 (2022)

<table>
<thead>
<tr>
<th>Month</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>Develop assumptions – Year 1 &amp; 5</td>
</tr>
<tr>
<td>Feb</td>
<td>Market Efficiency Analysis – Year 1 &amp; 5</td>
</tr>
<tr>
<td>Mar</td>
<td>Identify and evaluate solution options</td>
</tr>
<tr>
<td>Apr</td>
<td>Final review with TEAC and approval by the PJM Board</td>
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</table>

### YEAR 1 (2023)

<table>
<thead>
<tr>
<th>Month</th>
<th>Activity</th>
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<tbody>
<tr>
<td>Jan</td>
<td>Develop assumptions – Year 1, 5, 8, 11 &amp; 15</td>
</tr>
<tr>
<td>Feb</td>
<td>Market Efficiency Criteria Analysis – Year 1, 5, 8 &amp; 15</td>
</tr>
<tr>
<td>Mar</td>
<td>Identify proposed solutions</td>
</tr>
<tr>
<td>Apr</td>
<td>Mid-cycle update of significant assumptions – Year 0, 4, 7, 10 &amp; 14</td>
</tr>
<tr>
<td>May</td>
<td>Analysis of market solutions and support of benefits of reliability solutions – Year 0, 4, 7, 10 &amp; 14</td>
</tr>
<tr>
<td>Jun</td>
<td>Independent consultant reviews constructability</td>
</tr>
<tr>
<td>Jul</td>
<td>Adjustments to solution options by PJM based on analysis</td>
</tr>
<tr>
<td>Aug</td>
<td>Final review with TEAC and approval by the PJM Board</td>
</tr>
</tbody>
</table>

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The timeline includes a 24-month cycle and a 12-month cycle. The timeline is color-coded for clarity. Indicators show accelerations and modifications.
2022 Market Efficiency Assumptions

Hitachi Energy PROMOD Database – Spring 2022.

• Powerflow consistent with the 2027 RTEP powerflow.

• Load Forecast and Demand Response based on PJM 2022 Load Forecast Report.

• Generation Expansion consistent with the machine list included in the Planning RTEP Powerflow.

• Fuel and Emissions Price forecasts provided by Hitachi Energy.

• Financial parameters Discount Rate and Carrying Charge, based on the Transmission Cost Information Center spreadsheet.