PJM/NYISO Wheel Replacement Protocol Update

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## PJM/NYISO Wheel Replacement Protocol Project Overview

<table>
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<th><strong>Why was the project started?</strong></th>
<th>ConEd notified involved parties of intention to terminate non-conforming wheeling service on April 28, 2016. PJM and NYISO are working jointly to develop a replacement protocol to address the operational, planning, and market impacts.</th>
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<td><strong>What is the wheeling service that is currently in place?</strong></td>
<td>The non-conforming wheeling service has historically been implemented by NYISO and PJM by modeling a fixed 1000 MW flowing from NYISO to PJM over the JK (Ramapo-Waldwick) interface and from PJM to NYISO over the ABC (Hudson-Farragut and Linden-Goethals) interface</td>
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| **When does the replacement protocol have to be in place?** | • Current non-conforming wheeling service will end on April 30, 2017.  
• New protocol must be in place for use on May 1, 2017 |
| **What is the impact to Market Participants?** | • Primary impact to PSE&G and ConEd as facility owners  
• No changes to OASIS/Bidding Energy Transaction processes |
• 61% of AC interchange and 80% of RECO load applied to the 5018 desired flow calculation

• 1,000 MW non-conforming wheel service
  – Imported to PJM from NY on the J & K
  – Exported to NY from PJM on the A, B, & C
• Example Assumptions:
  – Net AC Interchange schedule: 1,000 MW to NYISO
  – RECO load: 300 MW
• 5018 = 850 MW
  – 61% of AC Interchange + 80% RECO load
• JK = 1,000 MW to PSE&G (PJM)
• ABC = 1,000 MW to ConEd (NYISO)
Guidelines for New Protocol

- Supports reliable operation of the transmission system
- Effectively manages congestion across the region
- Provides for open access and utilization of the facilities to serve the public interest and provide benefit to consumers
- Does not hinder use of the facilities to respond to emergencies in real-time
- Preserves competitive market behaviors
- Minimize impacts to PJM and NYISO load
Guidelines for New Protocol

- Can be facilitated with the Phase Angle Regulator (PAR) technology at the ABC, JK, and 5018 interfaces (current equipment for May 1, 2017 implementation)
- Can be implemented in both PJM and NYISO market models

Note: The guidelines above will be evaluated with equal consideration.
Proposed Solution

• Considering a combination of two concepts:
  – Apply a Operational Base Flow in PJM Operations as a starting point
  – Do not apply a base flow in planning
  – Apply an Interchange percentage distribution:
    • 5018: 32%
    • JK: 15%
    • ABC: 21%
  – RECO Load: no change from current process
    • 80% applied to the 5018 Target Flow
    • 20% considered to flow over Western ties
Protocol Comparison – PJM Planning

Current Planning Protocol

Proposed Future Planning Protocol

- Ramapo
- Waldwick
- HTD HVDC – O66
- Farragut
- Goethals
- Hudson
- Hopatcong
- Linden
- Linden VFT
- Hudson
- 49th Street
- 1000 MW

To Rockland (RECO)

- +15% AC

- +21% AC
Definitions

- **Operational Base Flow**: Baseline value used as part of the JK/ABC target flow calculations in PJM Operations. The OBF accounts for “loop flow” across the JK/ABC interfaces.
  - Loop flow determined using EMS & PSS/e study applications
- **Interchange Percentage**: percentage of net scheduled interchange applied to each interface (5018, JK, and ABC)
- **Interface Target Flow**: target flow PJM and NYISO System Operators will meet during real-time operations
- **Operational base flow will not be used in PJM Planning**

Note: OBF value in PJM Operations will be evaluated annually by PJM and NYISO. OBF will be reduced as system upgrades allow.
Interchange/OBF Target Flow Example – 1,000 MW to NYISO

• Assumptions:
  – Net AC interchange to NYISO = 1,000 MW
  – RECO load = 300 MW
  – RECO load treatment:
    • 80% applied to 5018
    • 20% flows over western PJM/NYISO ties
  – Operational Base Flow: 0 MW
  – Applied Interface percentages:
    • 5018 – 32% of AC interchange
    • JK – 15% of AC interchange
    • ABC – 21% of AC interchange
  – Western Ties: 32% of net AC Interchange
**Interchange Target Flow Example in PJM Planning**

**1,000 MW to NYISO**

- **5018 = 560 MW to NYISO**
  - 32% of AC Interchange + 80% RECO load
- **JK = 150 MW to NYISO**
  - 15% of AC interchange
- **ABC = 210 MW to NYISO**
  - 21% of AC interchange
- **Western Ties = 380 MW to NYISO**
  - 32% of AC Interchange + 20% RECO load
Interchange Target/OBF Flow Example - \textit{1,000 MW to PJM}

- Assumptions:
  - Net AC interchange \textit{to PJM} = \textit{1,000 MW}
  - RECO load = 300 MW
  - RECO load treatment:
    - 80% applied to 5018
    - 20% flows over western PJM/NYISO ties
  - Operational Base Flow: 0 MW
  - Applied Interface percentages:
    - 5018 – 32% of AC interchange
    - JK – 15% of AC interchange
    - ABC – 21% of AC interchange
  - Western Ties: 32% of net AC Interchange
Interchange/OBF Target Flow Example - **1,000 MW to PJM**

- **5018 = 80 MW to PJM**
  - 32% of AC Interchange + 80% RECO load
- **JK = 150 MW to PJM**
- **ABC = 210 MW to PJM**
- **Western Ties = 260 MW to PJM**
  - 32% of AC Interchange + 20% RECO load
• PJM and NYISO collaborated on version 2 of the Whitepaper
• Updated Version will be posted on the NYISO and PJM Websites
• Provides a high level overview of the wheel replacement effort
• October 4th OC meeting – Operational based topics
• October 5th MIC meeting – Market based topics
• October 6th PC meeting – Planning topics
• JOA changes will be reviewed during November/December Stakeholder meetings
Questions?