Transmission Expansion Advisory Committee

May 9, 2013
Issues Tracking
• Open Issues
  – None

• New Issues
EIPC Update
EIPC – The Beginning

• Formed - April 8, 2009
  – Interconnection-wide modeling and analysis
  – Consistency with regional planning processes
• June 2009 DOE FOA
• Phase I – end of 2011
  – Rollup of regional plans
  – Macroeconomic analysis 90 scenario/sensitivity
  – 3 Scenarios selected
• Phase II – end of 2012
  – Analysis and conceptual transmission for 3 Scenarios
• DOE grant funded gas/electric coordination study
EIPC Transition

- Work heavily driven by DOE and Stakeholders
  - EIPC Coordination Committee (grant work)
  - Stakeholder Steering Committee (SSC)
  - EISPC (1/3 of SSC)
  - Formal SSC structure and decision/voting process
  - EIPC Technical Committee
  - Result was not consistent with regional planning

- Beginning 2013 EIPC developed
  - A new scope of non-grant work
  - More grant funded work - gas/electric infrastructure
EIPC - Two Year *Non-Grant* Work Plan

- **Year one power flow**
  - Model rollups and evaluation year one
  - Procedures from phase one grant work
  - Incorporate any agreed procedure changes
  - Identify issues and solutions
  - Review in regional planning processes

- **Year two scenario analyses**
  - Stakeholder input through regional planning processes
  - Techniques and models under consideration
  - Modeling techniques under discussion
Non-Grant Stakeholder Process

- Separate from Grant activities
- Regional Processes are the foundation
- Regional input will be coordinated by the EIPC TC through a Stakeholder Coordination Subcommittee (SCS) of Planning Coordinators
- PJM will present EIPC non-grant information to TEAC, OPSI and ISAC for review and input
- EIPC will separately outreach to EISPC
  - The EISPC will be the main conduit for PJM states to interact with the non-grant activities.
- Formal process roll-out over next several months
2013 RTEP Analytical Approach
2018 RTEP Power Flow Model
  - Analysis underway

Analytical Progress
  - Baseline contingency analysis
    - Generator deliverability & common mode outage testing

Next Steps
  - Load deliverability, N-1-1
• Neighboring external systems contingencies
  – Coordination with neighboring entities
  – Major update for 2013 RTEP
  – Inclusion in RTEP
Neighboring systems contingencies
- NERC category B & C
- Over 8,000 NERC category B contingencies and 5,000 NERC category C contingencies from all neighboring Planning Coordinators added
### 2018 CETO Values for use in 2013 RTEP

- Area loads based on 2013 PJM Load Forecast Report
- Cleared DR & EE
- Other Assumptions

<table>
<thead>
<tr>
<th>AREA</th>
<th>2018 CETO (MW)</th>
<th>Change From 2017 CETO (MW)</th>
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<td>AE</td>
<td>1120</td>
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<tr>
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<td>PJM West</td>
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Northern NJ Short Circuit
• **PSEG Short Circuit Issue**
  - 2012 RTEP identified several busses in PSEG zone where the fault currents exceed 80 kA
  - A number of alternatives evaluated including rebuilding stations to 90 kA standard, installing current limiting reactors, splitting the system
  - Original recommendation from October 2012 TEAC: Construct HVDC back to Back facility at Hudson
Corridor overview
PSEG Transmission Zone Short Circuit

• PJM is evaluating alternative solutions
  – Double circuit 345 kV Solution
    • Isolate Hudson 230 kV from the 138 kV at Marion and 345 kV at Farragut
    • Convert the 138 kV buses and transmission facilities on the path from Linden to Bergen to double circuit 345 kV
  – Other solutions considered
    • Double circuit 230 kV Solution
      – Isolate Hudson 230 kV from the 138 kV at Marion and 345 kV at Farragut
      – Convert the 138 kV buses and transmission facilities on the path from Linden to Bergen to double circuit 230 kV
    • Other configurations
  – Hudson #2 generation location assumption
    • Existing Hudson 230 kV or converted Marion 230 kV or 345 kV station?
• Double circuit 345 kV Solution
• Existing baseline projects included in the scope
PSEG Transmission Zone Short Circuit

• Assumptions
  – Hudson 230 kV bus tie status
  – Hudson #2 generation location
    • Hudson 230 kV or Marion 345 kV
  – Queued Generation
    • T41, T42, T107
    • X2-050 (660 MW at Essex 230 kV), Y2-083 (198 MW at Essex 138 kV), Y2-105 (50 MW at Eagle Point 230 kV)
## Solution Alternatives – Short Circuit Performance

<table>
<thead>
<tr>
<th>Location</th>
<th>Breaker Capacity</th>
<th>No Solution</th>
<th>HVDC Solution</th>
<th>Double Circuit 345 kV Solution</th>
<th>Double Circuit 345 kV (w/ Hudson #2 at Marion 345 kV) Solution</th>
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<tr>
<td>Essex 230kV</td>
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<td>Hudson 1-6 230kV</td>
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<td>Marion 1 138kV</td>
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<td>Marion 3 138kV</td>
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<td>NJT Meadow 230kV</td>
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<td>80.0</td>
<td>71.4</td>
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PSEG Transmission Zone Short Circuit

• Next Steps
  – Cost impact
  – Additional load flow analysis
  – Coordination with NYISO
Artificial Island RTEP Proposal Window
Announcement  
(Presented at 3/7/2013 TEAC)  
• Announce window and potential timeline  
• Request CEII/NDA submittals from anticipated participants  
• Request Designated Entity Pre-Qualification

PSS/E v32 Case Development  
(Initial case complete, pending benchmarking)  
• Initial PSS/E v32 case created  
• Benchmarking in Progress  
• Develop and benchmark critical system condition cases

Open Window  
(Anticipated 4/29/2013  
60 Day Duration)  
• Open the “Artificial Island” RTEP Proposal Window  
• Complete problem statement available  
• Analytical files available

Coordinate with Window Participants and Receive Solution Proposals  
• Coordination VIA www.pjm.com  
• Data, Information  
• Questions & Answers

Close Proposal Window  
(Estimated 6/28/2013)  
• Dependant on timing of window opening

PJM Evaluates Solution Proposals
Artificial Island Proposal Window Status

• Window opened on 4/29/2013
  – Anticipated close on 6/28/2013

• Scope and Requirements Document Posted

• Analytical Study files posted

• Updates
Artificial Island Proposal Window Next Steps

• Continue to respond to stakeholder questions

• Evaluate solution alternatives
High Voltage in PJM Operations Analysis Update
• Determined potential reactor locations
  – from historical PI data and high voltage alarm data

• Modeled and simulated reactors in several operational cases to determine the potential magnitude that is necessary to control high voltage

• Also simulated high voltage conditions and reactors in a planning case to determine system needs beyond the operational cases
High Voltage Locations in PJM Operations Cases

- 5 snapshot cases from PJM Operations evaluated
Preliminary Solutions and Locations
### Proposed Preliminary Solutions

<table>
<thead>
<tr>
<th>Upgrade ID</th>
<th>Description</th>
<th>TO</th>
<th>In Service Date</th>
<th>Cost Estimate (SM)</th>
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<tr>
<td>b2227</td>
<td>50 MVAR shunt reactor at Mickleton 230 kV and relocate Mickleton #1 230 69 kV transformer</td>
<td>AEC</td>
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<td>Install a 300 MVAR reactor at Dequoin 345 kV</td>
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<td>b2230</td>
<td>Replace existing 150 MVAR reactor at Amos – N. Proctorville Hanging Rock 765 kV with 300 MVAR reactor</td>
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<td>b2231</td>
<td>Install 765 kV reactor breaker at Dunmore 765 kV substation</td>
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<td>b2232</td>
<td>Install 765 kV reactor breaker at Marysville 765 kV substation</td>
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<td>Change transformer tap settings for the Saker 765/345 kV transformer</td>
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High Voltage in PJM Operations

• Next Steps
  – Finalize Transmission Owner Review
  – Propose final solutions
  – PJM Board Approval
Deactivation Analysis Update
Deactivation Update

• Deactivation Withdrawal Notice by NRG
  – Deactivation notice withdrawn for Avon Lake Units 7&9 (732 MWs)
  – Deactivation notice withdrawn for New Castle Units 3, 4, 5 and Diesels (330 MWs)
• Retool in progress due to updated notifications
• RMR Update
The Croydon – Burlington 230 kV line is overloaded for various contingencies. Additional reinforcement of the line is needed as loading on the line has increased due to the various generator deactivations.

**Original Solution:** Reconductor the PECO portion of the Burlington - Croydon circuit and replace aerial wire at Croydon (b1197).

- Cost Estimate: $1.0 M
- Required IS Date: 6/1/2014.

**Revised Solution:** Reconductor the PECO portion of the Burlington - Croydon circuit, replace some towers, and replace aerial wire at Croydon (b1197).

- Cost Estimate: $4.4 M
- Required IS Date: 6/1/2014.
Next Steps
Questions?

Email: RTEP@pjm.com
• 5/9/2013 – Original version presented to PJM TEAC