Manual 14C Update

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• Manual 14C: Generation and Transmission Interconnection Facility Construction

• Proposed changes
  – Language clarifications
  – Tie Line section added
  – Technical standards for Order 1000 projects
  – Project energization process checklist (covered under separate agenda item)
Tie Line - Background and Recent History

• PJM has encountered deficiencies in the existing process for cutting in Tie Lines
  – Compliance Risk: Inaccurate external Tie Line modeling
    • PJM RTO ACE error and inadvertent after the Tie was placed into service
    • PJM over generation and Eastern Interconnection Time Error Corrections for fast clock were made until the Tie was added to the PJM model
    • Non-compliant with NERC Standard BAL-005 R12
  – Operational Risk
    • PJM delayed the energization of a critical new external transmission line due to the unavailability of required metering to support the interconnection
    • Not having reviewed the Interconnection Agreement with sufficient notice prior to the energization date led to significant concerns about operational control and outage coordination
Background and Recent History

• Mainesburg Substation – Tapping Homer City Watercure 345kV line
  – Tie line agreement was submitted weeks prior to schedule IS date
  – Required months to reach agreement on metering with NYSEG and resolve IA language
  – Project delayed 6 months

• Bosserman Substation - New 138kV substation tapping tie lines with NIPSCO
  – Project impacted multiple 138kV tie lines
  – Required over 4 months to clarify one line and resolve just the metering arrangement
  – Project IS delayed to accommodate additional metering installation work

• Farragut-Marion 345 kV line – modified an existing tie line
  – Tie line changes were not flagged in model change process until late in project
  – No wires agreement was submitted prior to energization
  – Multiple model issues due to inadequate time to address specific project modeling needs
After reevaluating the process, PJM identified opportunities for improvement and created an updated methodology. This will result in more accurate modeling and efficient cut-in of future Tie Lines.

- An internal focus group was created to holistically review and evaluate the Tie Line cut-in process
- Reviewed case studies and implemented recommendations resulting from an Apparent Cause Analysis
• Workflow Management
  – PJM will utilize a software tool to automate and communicate each step throughout the cut-in process.

• Increased communication
  – Continuation of the Tie Line focus group to analyze progress and any additional areas for improvement.
  – Monthly check-in meetings to review upcoming cut-ins
• Communication
  – Upon cut in, PJM hosts a conference call with all parties involved to confirm the accuracy of all data.

• Interconnection Agreement Submission
  – PJM has developed a web page (Tie Lines) for members to submit draft Interconnection Agreements

• Manual Updates – detailed on the next slide

• Timing of Interconnection Agreement submission
  – Timeline developed to better align with the current requirements for Network Model updates
Technical information is required within the draft Interconnection Agreement (Wires-to-Wires) submitted by the TO to PJM at least 8 months prior to energization of a new/modified Tie Line. This information and lead time is required to ensure that the PJM operations model is updated and that all required operational/revenue meters are installed prior to expected energization.

- Interconnection One Line Diagram (Sample included on the next slide) showing:
  - Topology of new interconnected facilities identifying new/modified Tie Line
  - Clearly established point(s) of interconnection/ownership boundaries
  - Clearly identified location and type of metering (operational/revenue-grade) installations
- Description of Point(s) of Interconnection identifying facility ownership & demarcation points
- Agreed upon primary meter location for new/modified Tie Line
- Expected date(s) for new/modified Tie Line energization
Sample Tie Line Interconnection One-Line Diagram

New Tap Station A
Transmission Owner-X
(PJM BA)

138 kV

Internal Line A-B
(PJM)

TO-X Owned Line Segment (miles)
(PJM BA)

TO-Y Owned Line Segment (miles),
(External BA)

Station B
Transmission Owner-X
(PJM BA)

Station C
Transmission Owner-Y
(External BA)

Operational Meter Location

Revenue Meter Location
Technical Standards for Order 1000 Projects

• Applicable sections of DEA that address technical standards

4.0 Construction of Project by Designated Entity.

Designated Entity shall design, engineer, procure, install and construct the Project, including any modifications thereto, in accordance with: (i) the terms of this Agreement, including but not limited to the Scope of Work in Schedule B and the Development Schedule in Schedule C; (ii) applicable reliability principles, guidelines, and standards of the Applicable Regional Reliability Council and NERC; (iii) the Operating Agreement; (iv) the PJM Manuals; and (v) Good Utility Practice.

4.2 Applicable Technical Requirements and Standards.

For the purposes of this Agreement, applicable technical requirements and standards of the Transmission Owner(s) to whose facilities the Project will interconnect shall apply to the design, engineering, procurement, construction and installation of the Project to the extent that the provisions thereof relate to the interconnection of the Project to the Transmission Owner(s) facilities.
Applicable section of ICA that address technical standards

4.0 Designated Entity and Transmission Owner Responsibilities.

The Designated Entity and Transmission Owner shall coordinate with each other as set forth in this Article 4 to facilitate the interconnection of the Project to the Transmission Owner’s transmission facilities in a reliable, safe, and timely manner to enable the Project to meet its Required Project In-Service Date.
• Proposed text
  – 6.1.3.2 Design Standards

As described in section 4.0 of the DEA, the Designated Entity shall design, engineer, procure, install and construct, and maintain the project in accordance with applicable reliability principles, guidelines and standards, the Operating Agreement, and Good Utility Practice. To the extent that the work relates to the interconnection of the project to Transmission Owner facilities, the applicable technical requirements and standards of the Transmission Owner to which the project interconnects with will apply.

An example of when the Transmission Owner standards are applicable would be where a new Designated Entity substation cuts into an existing transmission line. The Designated Entity’s design standards would be applicable to the design of its facilities except where necessary for coordination with the interconnected facilities, such as protection of the interconnecting transmission lines. The Designated Entity must coordinate with the neighboring transmission owner(s) to develop the protection design following the interconnecting transmission owner’s applicable standards, or other mutually agreed to solution.
As discussed in Section 4 of this manual and as specified by the PJM Tariff Attachment P, Appendix 2, PJM Transmission Owners are required to provide to PJM the Transmission Owner Applicable Technical Requirements and Standards along with a List of Approved Contractors. PJM makes this information available publically on PJM’s website for use by Interconnection Customers and others. If a Designated Entity is not currently a PJM TO where such information is already posted, the Designated Entity should submit its applicable standards and list of vendors and contractors to PJM for review and posting within 18 months of execution of the DEA.