LG&E/KU ITO Stakeholder Meeting

October 13, 2014

Prepared by:
Independent Transmission Organization

MAPPCOR®

Introduction & Overview

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Introductions

Overview of Meeting

- Review of ITO Assessment of 2014 TEP
- Stakeholder Q & A
- Load and Resource Forecast Data Request

2014 TEP Assessment

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Introduction

- According to Attachment P of the LG&E/KU OATT, the ITO will perform an independent assessment of the LG&E/KU transmission system.
- As part of this assessment, the ITO will independently evaluate whether:
  - the Transmission Owner's Annual Plan complies with the Planning Guidelines; and
  - whether there are upgrade projects in the Annual Plan that are not necessary to meet the Planning Guidelines.

Naming

- LG&E/KU made change to its TEP naming convention that is effective with this 2014 TEP. This TEP and all future TEPs will be named according to the first year in the study period.
- 2014 TEP previously referred to has the 2013 TEP

ITO 2014 TEP Assessment Process

- LG&E/KU's 2014 Transmission Expansion Plan
- Review Power Flow Models
- LG&E/KU Transmission System Planning Guidelines
- Review of LG&E/KU Technical Studies
- RC Review of Models and TEP
- 2014 TEP and Assessment report posted on CEII Study Reports FTP site
- Stakeholder Review

ITO 2014 TEP Assessment – Project Overview

Projects in 2012 TEP (01/01/2013 – 12/31/2022	102
Projects in-Service (–)	20
Projects Delayed Beyond the Planning Horizon (–)	33
Projects Added (+)	14
Projects Under Construction (+)	18
Projects in 2014 TEP (01/01/2014 – 12/31/2023)	**81**

ITO 2014 TEP Assessment – Years Modeled

Steady-State Power Flows
2015 Summer Peak
2015/16 Winter Peak
2018 Summer Peak
2018/19 Winter Peak
2023 Summer Peak
2023/24 Winter Peak

Stability Power Flows
2014 Summer Peak
2018 Summer Peak
2018 Light Load

ITO 2014 TEP Assessment – Summary

- The ITO approves the 2014 TEP while providing recommendations for LG&E/KU to provide specific clarifications, additional documentation, and changes.

Recommendations for 2014 TEP

1. Provide documentation of "customer agreed to level of service" with respect to the use of a switching procedure which does not restore specific customer load, to the ITO as requested in Section 3.4. **LG&E/KU Response**: LG&E/KU is currently evaluating the necessity of this switching procedure. This recommendation will be addressed as part of the 2015 TEP.

2. Modify the scope of the Non-Affiliate DNR sensitivity study to include dispatch scenarios which include replacement generation from non-affiliate internal DNR resources at appropriate levels as requested in Section 3.6.4. **LG&E/KU Response** : This type of study was new to LG&E/KU for the 2014 TEP and the scope was not clear. This recommendation is currently under review with the ITO and will be considered for future TEPs.

Recommendations for 2014 TEP

3. Perform stability sensitivity studies as requested in Section 3.3. **LG&E/KU Response**: This has not historically been an annual study for LG&E/KU and was not required by the applicable Planning Guidelines for the 2014 TEP. The study was completed in 2011 and 2012. Another study will be completed as part of the 2015 TEP and as required by the Planning Guidelines and appropriate reliability standards. **ITO Comment**: LG&E/KU should update the 2014 TEP report with the 2011 and 2012 studies which included these sensitivities and explain how these sensitivities were included. **LG&E/KU Comment**: LG&E/KU is using the most up to date dynamic data. LG&E/KU and the ITO will develop better communication practices to ensure that the ITO has the most up to date dynamic data for Transmission Service Request (TSR) and Generation Interconnection (GI) studies.

Recommendations for 2014 TEP

4. Investigate the Category B disturbances that violated LG&E/KU's stability criteria and determine if a project is needed. **LG&E/KU Comment:** The fault that resulted in 161 kV voltage violations was not cleared properly. The 161 kV bus would be cleared as well. LG&E/KU does not monitor 69 kV voltages as part of its stability analysis. This is clarified in the newest version of the Planning Guidelines. The ITO did not indicate that this was an issue in the 2012 TEP so it was not known that the ITO was misinterpreting the intent of the Planning Guidelines. The TPL standards only apply to the BES. **ITO Comment:** The ITO agrees that this is clarified in the newest version of the LG&E/KU Planning Guidelines. However the newest version of the Planning Guidelines is not applicable to the 2014 TEP. However, these were subsequently removed after LG&E/KU provided revised results and input files. The revised LG&E/KU results did not show any 161 kV Category B criteria violations. The ITO agrees with LG&E/KU's revised results.

Recommendations for 2014 TEP

5. Obtain generation trip settings from the customer as required to perform simulations to assure that criteria violations will not result after loss of generation with rotor angle values which were shown to differ from the reference angle by more than 180º. Perform these simulations for all disturbances which were found to result in one or more rotor angles which differed from the reference angle by more than 180º. Perform risk assessment simulations for Category D disturbances as requested in Section 3.6.2. **LG&E/KU Response** : Category D1-D3 disturbances do not have to pass and cascading can result for this low probably disturbance. The study recommended by the ITO in Section 3.6.2 was already performed and results were provided to the ITO prior to the August 12, 2014. Instability no longer exists when the generator trip settings were used. This report should be revised to include the most recent studies performed and submitted to the ITO prior to August 12, 2014. **ITO Comment**: The ITO agrees that Category D1-D3 disturbances do not have to pass and cascading can result for these low probability disturbances. However, disturbances should be simulated with evaluation of subsequent generation tripping, if applicable. If a generator angle is greater than 180º, it could indicate generation tripping.

Recommendations for Future TEP's

1. Continue communication between LG&E/KU and the ITO during future TEP development. **LG&E/KU Response**: LG&E/KU agrees with this recommendation.

2. Continue to review Planning Guidelines to ensure the criteria are clear and consistent with current practices and OATT requirements. **LG&E/KU Response :** LG&E/KU agrees with this recommendation.

3. Clarify the methodology for reporting the capability of Transmission Customers' Network Resources in the tariff or planning guidelines. In particular whether such reporting should indicate the current actual capability of a Network Resource, which could be different from the original capability of the resource when it was initially designated. This clarification will assist the ITO to: (i) monitor any practice that would result in the withholding of excess transmission capacity that cannot be physically dispatched by the customer and (ii) accurately assess the modeling of each DNR in the TEP. **LG&E/KU Response :** LG&E/KU is currently working jointly with the ITO to address this recommendation.

Recommendations for Future TEP's

4. Document model changes introduced between the Base Case Series (BCS) and TEP models not associated with TEP Projects. **LG&E/KU Response** : LG&E/KU has revised its model documentation processes to address this recommendation. This should be verified as LG&E/KU and the ITO work through the 2015 TEP.

5. Ensure Switching Procedures used during the development of the TEP are included in the final documentation. Also, document differences between the contingency file provided during the BCS Model and input file review and the final contingency file used during development of the TEP. **LG&E/KU Response** : LG&E/KU agrees with this recommendation.

6. Coordinate interim mitigation plans and planning level operating guides for projects needed prior to their Expected In-Service Date with the RC. **LG&E/KU Response** : LG&E/KU agrees that the RC should review planning level operating guides for BES Facilities that are developed for the Operating Horizon. However, the RC does not have oversight of the 69 kV system, and does not require review of operating guides for 69 kV Facilities.

Recommendations for Future TEP's

7. Verify that sensitivity studies were performed on models which account for retiming of TEP projects due to load forecast changes to ensure impacts of all planned facilities are taken into account. **LG&E/KU Response :** LG&E/KU agrees with this recommendation.

8. Resolve dynamic data differences discussed in Section 3.3 prior to performing the 2015 TEP. **LG&E/KU Response :** LG&E/KU agrees with this recommendation.

9. Review the stability analysis python program and input files used to run the simulations to ensure that they are performed as intended. Some specific areas of concern are bus number errors which prohibit the simulation of the intended disturbances, simulations which terminate prematurely, and simulations which result in islanded buses. Input files need to correspond to result files for a model and between models being reviewed for a TEP being reviewed. **LG&E/KU Response :**
   - Bus number errors were corrected and confirmed with the ITO.
   - The termination of simulations prematurely is a software issue. LG&E/KU is working with the vendor to find a solution.
   - LG&E/KU will review the simulations that result in islanded buses and determine if there is a better approach to reporting the results.

Reliability Coordinator Review

Overall, no deficiencies were found from the Reliability Coordinator perspective.

For future Expansion Planning analysis:

- LG&E/KU may want to re-evaluate their definition of cascading in Attachment 13 page 4 and verify that it conforms with industry definitions of cascading.

- LG&E/KU may want to include breaker duty analysis since the new TPL requires looking at overstressed breakers.

Remaining Action Items

- Address Stakeholder Questions and Comments
- Questions may be emailed to: support@transervinternational.net
- Finalize 2014 TEP Assessment Report
- ITO Approval of LG&E/KU 2014 TEP
- If modifications are required, a final TEP and Assessment Report will be Posted on CEII Study Reports FTP site
- 2014 TEP models are available upon request LG&E/KU (NDA required).

QUESTIONS?

Load & Resource Data Request

- For development of 2016 TEP Models
- Notice sent out on September 4, 2014
- Additional information required by TO
  - 90/10 peak load forecast (extreme temps)
  - Low load forecast
  - Matching resource forecasts
  - Firm PTP customers provide information regarding their usage that will exceed five years
- Responses required by October 31, 2014
- Questions?

Fall Stakeholder Meeting

November 20, 2014
9:00 a.m. – 2:00 p.m. (EST)

Galt House
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THANK YOU

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