Transmission Service Request Study Criteria

Version 3.2
Effective Date: September 11, 2017

Revision History

Date	Version	Description
August 01, 2012	1.0	Original Document
May 15, 2013	2.0	Increment version to 2.0; Update contingency file usage; Change minimum impact from 1MVA to 2MVA; Revised PRD and CCO section to allow for usage in system intact conditions; Removed EKPC from CRSG references
June15, 2015	3.0	Revisions to align with modified Planning Guidelines document
November 18, 2015	3.1	Revisions to flowgate analysis and Reliability Margins
September 11, 2017	3.2	Revisions were made to align with modified Planning Guidelines document, TPL-001-4, flowgate analysis and Reliability Margins. Additional revisions were made to enhance the clarity for the reader.

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1. Application

This *Transmission Service Request Study Criteria Document* (this “Document”) is applicable to all firm monthly and yearly Transmission Service Requests (“TSRs”) under the Louisville Gas & Electric Company and Kentucky Utilities Company’s (collectively “LG&E/KU”) Open Access Transmission Tariff (“OATT”). This Document will be posted on the LG&E/KU Open Access Same-Time Information System (“OASIS”) and will be utilized by the Independent Transmission Organization (“ITO”) for all TSR Feasibility Analysis Service Study (“FAS”), System Impact Study (“SIS”), and Facilities Study (“FS”). LG&E/KU’s OATTwill supersede this Document if inconsistency, errors, or omissions are identified.

2. Short-Term Monthly Firm TSR Evaluation

TSRs for short-term firm (less than one year) transmission service must comply with the terms of the OATT and the posted LG&E/KU OATT Business Practices (“BP”).

Short-term firm TSRs that end within the posted Available Transfer Capability (“ATC”) horizon, are evaluated based on LG&E/KU’s posted ATC/AFC/ASTFC values. An SIS is not required for a short-term firm TSR approval except where one of the following is true:

- The requested service ends beyond the posted ATC horizon
- The requested service is related to a new Designated Network Resource (“DNR”).
- The requested service is for a new delivery point on the transmission system.
- The Point of Receipt (“POR”) / Point of Delivery (“POD”) or Source/Sink specified in the request does not accurately represent the requested service in the model used for ATC calculation.

If a short-term firm TSR fails its ATC/AFC/ASTFC evaluation, then the TSR status may be set to:

- Refused (denied and no further study will be performed)
- Partial Service (counteroffer if available)

For short-term firm TSRs that end beyond the posted ATC horizon, the customer will be offered an SIS Agreement.

3. Long-term Firm TSR Evaluation

TSRs for long-term firm (one year or more) transmission service must comply with the terms of the OATT and the posted LG&E/KU OATT BP.

For long-term firm TSRs that end within the posted ATC horizon, the ITO will approve the requests if the OASIS ATC/AFC/ASTFC evaluations show no limitations to providing the service. In this case, no SISis required for the TSR approval except where one of the following is true:

- The requested service is related to a new DNR.
- The requested service is for a new delivery point on the transmission system.
- The POR/POD or Source/Sink specified in the request does not accurately represent the requested service in the model used for the ATC/AFC/ASTFC evaluation.

If the long-term firm TSR has failed the ATC/AFC/ASTFC evaluation, or ends beyond the posted ATC horizon, then the customer will be offered an SIS.

4. Study Queue Processing

TSRs in the LG&E/KU study queue will be processed in the order queued on OASIS. The ITO may concurrently perform SIS and/or FS for several TSRs (this is not a cluster study), after higher queued studies have been issued a study agreement. The ITO will perform a study for each of the TSRs independently and determine any required Network Upgrades for the requested service individually. The SIS will include all higher queued TSRs even if Network Upgrades for any of these higher queued TSRs are not known or available at commencement of the study.

5. TSR SIS

The following study procedure will be used to perform all SISs for TSRs in accordance with the LG&E/KU OATT.

5.1. Methodology

Pre-TSR power flow models will be created, which include all higher queued TSRs, but exclude the TSR being evaluated. Post-TSR models will be created by adding the TSR being evaluated to each pre-TSR model. System intact analysis and contingency analysis will be performed on both the pre-TSR and the post-TSR models; the incremental impact will be determined by comparing flows and voltages with and without the transmission service. A flowgate analysis utilizing non-LG&E/KU flowgates will also be performed on both the pre-TSR and the post-TSR models and the incremental impact of the requested transmission service will be determined by comparing flows from each model.

In addition, ATC/AFC/ASTFC evaluation will be performed if the TSR starts within the posted ATC horizon and the TSR is not a NITS load TSR.

5.2. Study Scope

A study scope will be developed outlining the following major items and will be sent for review to the Ad Hoc Study Group. The ITO will make a reasonable effort to incorporate comments and changes from the Ad Hoc Study Group if the proposed changes would not impact the 60-day study completion deadline. The study scope will include:

- A description of the TSR being studied.
- Identification of the starting point models which will be used for the study.
- Information regarding the modeling of the study TSR.
- A preliminary list of TSRs or facilities which will be added to or removed from the starting point models.
- Descriptions of the contingencies and monitored facilities

The ITO may change the study scope during the course of the study as needed and will not be required to provide an updated study scope to the Ad Hoc Study Group due to time constraints.

5.3. Ad Hoc Study Group

- An Ad Hoc Study Group will be formed for all long-term firm transmission service requests in compliance with Congestion Management Process ("CMP") between Tennessee Valley Authority ("TVA") and PJM and PJM and Midwest Independent System Operator ("MISO").
- Participation in the Ad Hoc Study Group will be by invitation to all first tier Transmission Providers ("TP") and/or Transmission Owners ("TO") of LG&E/KU, currently comprised of MISO, PJM, TVA, TVA (as the Reliability Coordinator), BREC, OMU, DUKE, VECTREN, AEP, OVEC, EKPC, and EEI/DOE; these participants may be amended from time-to-time. TSPs and/or TOs that indicate their interest in participating in the Ad Hoc Study Group by the date specified in the invitation and have executed the *Confidentiality Agreement For Treatment of Critical Energy Infrastructure Information and Confidential Transmission Planning Information* (OATT Attachment K, Appendix 1) will be allowed to

participate in the Ad Hoc Study Group. The ITO will distribute the study scope and models to the Ad Hoc Study Group members.

- The Ad Hoc Study Group will be responsible for reviewing and commenting on the draft study scope, preliminary pre-TSR and post-TSR models, and draft study report within 5 business days from the ITO's notification of posting the documents on OASIS.
- The ITO will take all comments concerning the study method or study conclusions into consideration; however, the ITO will have final decision authority over whether or not to accommodate any particular comment. All comments that were not accommodated will be identified in the final study report.
- An Ad Hoc Group will not be required for the following:
  a. Monthly TSRs.
  b. Network service requests less than 1 year in length and that both source and sink are within the LG&E/KU Balancing Area (BA).
  c. Studies performed under the fast-track process
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5.4. Computer Programs

The steady state analysis will be performed using Siemens' PSS/E® and/or MUST®. In addition, other programs may be used to assist the engineer with processing and evaluating the system contingencies and special generation dispatch scenarios.

5.5. Pre-TSR Model

Pre-TSR models for various seasons will be created from a recent NERC Multi-Regional Modeling Working Group ("MMWG") and internal LG&E/KU base model series to perform the study. These models are used by LG&E/KU for the annual Planning Assessment. A set of at least 6 pre-TSR models without the TSR will be developed, including a summer peak, winter peak and off-peak models coincident with the start date of the TSR, and a summer peak, winter peak and off-peak models (when one becomes available in a model series from an approved TEP) coincident with the stop date or a date determined by the Ad Hoc Study Group. In addition, summer peak, winter peak and off-peak models as appropriate for evaluating renewal rights if needed (typically long-term 10+ year model in lieu of stop-date model). To the extent practical, models available from recent TSR studies or from LG&E/KU's planning study will be utilized. The anticipated transmission configuration will be based upon the latest approved LG&E/KU Transmission Expansion Plan ("TEP"). The generation dispatch for all models will be based on the generation capacities provided by the Network Customers in their annual 10 year forecast of loads and resources.

The models will be adjusted to include appropriate changes applied to the most recent LG&E/KU TEP and take into consideration any changes resulting from the Ad Hoc Study Group. Certain confirmed status TSRs and higher queued study TSRs will be added to the pre-TSR model to the extent the TSRs are not already included as follows:

- Point-to-Point ("PTP") TSRs under LG&E/KU tariff that are in the same general direction of the TSRs to be studied will be added. To determine whether TSRs are in the same direction, a flowgate that is impacted by the TSR to be studied will be used as a proxy for determining whether to add a TSR to the pre-TSR model. The TSR will be added if it has a distribution factor greater than the cut-off on the proxy flowgate.
- PTP TSRs under LG&E/KU tariff that are in the opposite direction of the TSR to be studied (counter flowing) will not be added to the pre-TSR model. Any PTP TSRs that were included in the base case model, flow in the opposite direction, and have a distribution factor greater than the cut-off on the proxy flowgate will be removed from the pre-TSR model as practical. Network TSRs will be added to the model if not already modeled. A reasonable merit order dispatch will be used if designated resources exceed the designated load.
- Typically, transactions added or removed will be based on economic merit order dispatch in the LG&E/KU BA. Outside the LG&E/KU BA, generation in external BAs will be scaled based on available dispatchable generation if the merit order file is not available. Net area interchange will be adjusted to account for new transactions that are added to or removed from the model.
- No monthly firm service will be included in the pre-TSR model for a long-term TSR study.

5.6. Post-TSR Model

Post-TSR models will be created by adding the modeling of the TSR to each pre-TSR model.

Network TSRs submitted to serve load in the LG&E/KU BA, where no increase in load level is requested, will be studied by increasing resources identified in the Network Integration Transmission Service ("NITS") application and decrementing the Network Customer's other resources based on the economic merit order or specific dispatch requested by customer. For a Network TSR for a new or an increased load, the new load MWs identified in the NITS application submitted by the customer will be increased to simulate the sink.

For a DNR request, a new transaction will be modeled by increasing the DNRs identified in the DNR application submitted by the customer and adjusting generators in the Load Serving Entity ("LSE") by merit order. An exception to this methodology will occur when the source is a non-dispatchable resource such as wind and solar. Non-dispatchable resources will be dispatched to the Automatic Generation Control ("AGC") units if the TSR sink is in the LG&E/KU BA.

For PTP TSRs sourcing or sinking inside the LG&E/KU BA, the generators specified in the TSR will be adjusted as given by the definition of the source/sink points on the LG&E/KU OASIS.

For TSRs sourcing or sinking outside the LG&E/KU BA, the generator defined on the LG&E/KU OASIS for that source or sink typically will be scaled in the post-TSR model such that the source or sink can accommodate the required increase or decrease equal to the MW amount of the TSR.

5.7. Contingency Criteria

The simulations performed as part of the SIS should consider the:

- P1 and P3 planning events using the performance requirements of NERC TPL-001-4 Table 1 and the LG&E/KU *Transmission System Planning Guidelines*.
- P2 and P4 EHV (300 kV and above) contingencies in which interruption of firm transmission service and non-consequential load loss are not permitted per TPL-001-4; these will be evaluated using the performance requirements of TPL-001-4 and the LG&E/KU *Transmission System Planning Guidelines*. The same contingencies will be analyzed for the pre-TSR models and the post-TSR models, to the extent practical.
- Additional contingencies, consistent with this criterion or the criterion of the requesting party, may be performed at the request of the Ad Hoc Study Group.
- As described in the *Transmission System Planning Guidelines*, several generation replacement scenarios are evaluated.

Typically, the ITO will use the contingency file from LG&E/KU that was used in the last approved TEP study. The ITO will update this contingency file based on current system configuration and expected future network changes working with LG&E/KU. The ITO will also remove contingencies from the file which are outside of the contingency criteria discussed in this section. This contingency file includes both predefined LG&E/KU contingencies as well as selected first tier BA contingencies. The ITO will add additional first tier BA contingencies if requested by Ad Hoc Study Group based on the contingency criteria discussed in this section.

5.8. Model Solution Method

After applying the contingency, the models will be solved with the following options enabled to establish system conditions after the contingency:

- Transformer tap adjustment
- Area interchange (tie lines and loads)
- Phase shifter adjustment
- Switched shunt adjustment
- DC taps adjustment

Network Loads which are removed from service due to the fault clearing action will be reconnected using load restoration and switching procedures if applicable.

5.9. Monitored Elements

All LG&E/KU, OMU, and EKPC, facilities will be monitored at 69 kV and above for thermal and voltage impacts. Additionally, first tier TO facilities will be monitored at 100 kV and above for thermal and voltage impacts.

5.10. Reliability Margins for LG&E/KU Flowgates

The LG&E/KU flowgate impact of Capacity Benefit Margin ("CBM") requests will be included in the 18 month ATC calculation horizon. Requests for CBM set-aside that go beyond the 18 month ATC calculation horizon will be accounted for in the SIS process by developing additional generation scenarios that mimic the requesting entities original request which must include the assumed sources of the CBM.

The LG&E/KU flowgate impact of Transmission Reliability Margin ("TRM") will be included in the 18 month ATC calculation horizon. TRM outside of the 18 month ATC calculation horizon will be accounted for in the SIS process by the generation replacement scenarios that include both internal and Contingency Reserve Sharing Group ("CRSG") partner sources for the replacement generation. These generation replacement scenarios will be run against 100% of the applicable facility ratings. Mitigation for any identified impacts in excess of 100% loading will be required.

5.11. Performance Criteria

The performance criteria are provided in the latest versions of NERC TPL-001 through TPL-003, applicable SERC standards, and the LG&E/KU *Transmission System Planning Guidelines*.

The objective of the steady-state contingency analysis is to identify overloaded facilities at 100 kV and above for non-LG&E/KU facilities and at 69 kV and above for LG&E/KU facilities on which the TSR has a significant impact. For non-LG&E/KU facilities, an impact will be considered significant in accordance with the respective TO's written and posted criteria when such criteria is provided to the ITO.

The new TSR thermal impact will be calculated as follows, where DF implies Distribution Factor:

$$D\mathrm{F}\,\% = 100 \times \frac{\text{MVA flow (with TSR)} - \text{MVA flow (w/o TSR)}}{\text{TSR MW}}$$

A thermal loading impact is considered to have a significant impact when both of the following are true:

- 5% or more of the new TSR is found to detrimentally impact an overloaded facility under system intact conditions or if 3% or more of the new TSR is found to detrimentally impact an overloaded facility under contingency conditions.
- If the total impact on a facility due to the TSR(s) under study is more than or equal to 2 MVA,

Multiple TSRs with the same source/sink and from the same customer and queued within the last 6 months will be aggregated and the sum of the aggregate impact will be used for the 2 MVA impact criteria check.

A voltage impact will be considered significant if the bus voltage is found to be outside of acceptable levels and detrimentally impacted by the TSR. For LG&E/KU facilities, a voltage impact will be considered to be significant if the voltage impact is 0.5% or more and the bus voltage is found to be outside of acceptable voltage guidelines as defined in the LG&E/KU *Transmission System Planning Guidelines*. For non-LG&E/KU facilities, an impact will be considered significant in accordance with the owning party's written criteria when such criteria is provided to the ITO.

A flowgate impact will be considered significant if all of the following conditions are met:

- The flowgate is loaded above its applicable normal or emergency rating in the post-TSR model.
- The Power Transfer Distribution Factor ("PTDF") is greater than 5% or the outage Transfer Distribution Factor ("OTDF") is greater than 3%.
- The increase in loading on the branch is greater than 1 MW.

Non-LG&E/KU owned flowgates normally monitored by the ITO will be monitored in the study using the list of flowgates posted on the LG&E/KU OASIS. A flowgate analysis will be performed considering the ATC components as provided by the flowgate owner. For the flowgate analysis, the DF will be calculated as follows:

$$\mathrm{DF} = 100 \times \frac{\text{MW flow (with TSR)} - \text{MW flow (w/o TSR)}}{\text{TSR MW}}$$

The steady-state contingency analysis and flowgate analysis will follow the on-the-path/off-the-path methodology used in the CMP between TVA & PJM, and PJM & MISO to determine transmission constraints and affected flowgates. The study will ignore third party potential constraints if the customer is required to make a request on that third party's OASIS to complete the transmission path for the requested service. In this case, the third party TP will be performing a study and addressing the constraints on its system prior to their approval.

The flowgate analysis will identify all LG&E/KU non- owned reciprocally coordinated flowgates that have overload and have significant impacts due to the new TSR.

If a Network Customer is designating a new DNR and concurrently undesignating an existing DNR, the study will determine if the new DNR has a greater impact on constrained facilities compared to the original DNR. If the new DNR has lower impacts on constrained facilities, the ITO is to approve the TSR for the new DNR.

5.12. Partial service

SIS will identify partial service, if available, in accordance with the LG&E/KU OATT.

5.13. ATC/AFC / ASTFC Evaluation

Typically, initial OASIS evaluation results will be used for the ATC/AFC/ASTFC check if the subject TSR starts within the OASIS ATC posting horizon. No ATC/AFC/ASTFC check will be performed beyond the OASIS ATC posting horizon. Since posted ATC includes the monthly firm TSRs, bumping of monthly TSRs will be performed in accordance with the LG&E/KU OATT and Business Practices.

5.14. Non- LG&E/KU Constraints

If a non-LG&E/KU constraint is identified in the study, then the TO of the impacted facility will be notified by the ITO. The customer must work with the TO of the impacted facility to mitigate the new TSR's impacts.

5.15. Mitigation Plan

To the extent the study determines that there are constraints to providing the requested service, the study will evaluate system additions and/or modifications to address the LG&E/KU constraints. Mitigation is required to address P0, P1, P3, and select P2 and P4 violations found in the study to provide transmission service. Transmission customer must mitigate all significant impacts that are identified in the system impact study. No special protection system will be considered as part of the mitigation plan. For PTP TSRs, customers will have the choice of whether to request the study of a Planning Redispatch Option ("PRD"), a Conditional Curtailment Option ("CCO") (i.e. Conditional Firm Service) or both. The ITO will study and offer a mix of PRD and CCO for a single service request. If a PRD or a CCO is not applicable, Network Upgrades will be required to address all P0, P1, P3, and select P2 and P4 violations. If constraints are outside the LG&E/KU system, the ITO will make a reasonable effort in assisting the customer to obtain a mitigation plan from the third party TO. However, the customer is responsible for addressing non-LG&E/KU constraints and developing a mitigation plan by working with the third party TO

5.16. Customer's Choice Regarding PRD and/or a CCO

The service agreement will specify the relevant congested transmission facilities and whether LG&E/KU will provide a PRD, a mix of PRD and a CCO, or a CCO in order to provide the PTP transmission service. For the CCO, customers must choose among and the service agreement must specify either (1) specific system condition(s) during which conditional curtailment may occur or (2) an annual number of conditional curtailment hours during which conditional curtailment may occur. Any service agreement that incorporates a PRD or a CCO is a non-conforming agreement and must be filed with Federal Energy Regulatory Commission ("FERC"). In addition, any amendments to the service agreement that results from reassessments must be filed with FERC.

5.17. PRD Study Criteria

A long-term firm PTP TSR requested for a year or more will be provided an option to study planning redispatch to mitigate LG&E/KU facility constraints identified in the SIS. PRD will not be offered for non-LG&E/KU facility constraints. However, the ITO will undertake reasonable efforts to assist the transmission customer in making arrangements to address third-party constraints, including without limitation, providing any information or data required by another electric system pursuant to Good Utility Practice.

The SIS will include PRD analysis if the transmission customer requests the PRD Option at the time of signing the SIS agreement. Planning redispatch analysis will determine for each LG&E/KU

constraint identified whether PRD can be offered as a solution to the constraint, and determine the amount of generation redispatch required to mitigate the impacts on that constraint due to the TSR(s) being studied. The study will also determine a non-binding planning level hourly cost estimate and the required amount of generation redispatch to achieve loading on the constraint below 100%.

The PRD will be offered as a “bridge” until the facilities improvements are completed. The PRD may continue subject to reassessment every 2 years if no facilities improvements are agreed upon between the customer and LG&E/KU. Reassessments will be at the cost of the customer taking the PRD service. No new study agreement will be needed between the customer and the ITO for the biennial reassessments.

If the transmission customer chooses the PRD, LG&E/KU will have the right to implement planning redispatch during the operating hour and/or in advance of the operating hour for conditions identified by the study.

The ITO will perform a PRD study using the following criteria:

1. Only LG&E/KU constraints will be considered in the PRD study.
2. The PRD study will be consistent with the criteria and assumptions used in long-term reliability planning and operation for LG&E/KU.
3. PRD will be offered under a system intact condition (NERC Category “P0”) for a short-term constraint or as a “bridge” until the facilities improvements are completed.
4. PRD will be offered for NERC Category “P1” and “P3” constraints with limitations identified herein.
5. PRD will not be offered when an interconnection reliability operating limit (“IROL”) violation results from a TSR request.
6. For each applicable constraint identified in the SIS, shift factors for available generator pairs within the LG&E/KU BA that could potentially provide relief will be provided. The shift factor will be calculated from the same power flow model that is used in the SIS.
7. For each applicable LG&E/KU constraint identified in the SIS, a non-binding planning redispatch cost estimate ($/Hr) will be calculated. Cost estimates will be based on LG&E/KU’s current year generation cost data including incremental generation cost and start–up cost. If a constraint is identified for the summer season months, then the average generation cost for the summer season will be used for estimating the planning re-dispatch costs. Similarly, average generation cost for the winter season months will

be used for winter peak constraints. A list of incrementing LG&E/KU generation resources and decrementing LG&E/KU generation resources will be established using the available generator shift factors. Least cost redispatch generator combinations will be identified as practical by sorting the list based on the redispatch costs. Unless the customer and LG&E/KU negotiate a fixed rate contract, the charge for planning redispatch will be based on FERC's "higher of" pricing. The after-the-fact monthly billing to the customer will be the higher of the monthly generation-related actual costs of planning redispatch or the embedded costs of transmission for the month defined by the monthly firm PTP transmission rate under LG&E/KU's OATT as posted on the LG&E/KU OASIS.

8. There is no obligation for LG&E/KU to offer PRD if it either (i) degrades or impairs the reliability of service to native load customers, Network Customers or other transmission customers taking firm PTP service, or (ii) interferes with the LG&E/KU's ability to meet prior firm contractual commitments to others. PRD is not required to be provided from resources that are expected to provide reliability redispatch in response to constraints. Further, if resources with restricted run times are required to meet the reliable service needs of native load, including contingency reserves or reliability redispatch needs, these resources are not available to be offered for PRD service.

   The lists of available generating units for planning redispatch will be further refined to those resources available using the following criteria:

   a. Available generation for the planning redispatch from a unit will be calculated considering generation level in the SIS model, start-up times, ramp rates and generator maximum and minimum limits used for reliability operations of the generator.
   b. The incrementing generators considered for planning redispatch will be dispatchable generators.
   c. The decrementing generators considered for planning redispatch will be dispatchable generators located primarily in the LG&E/KU BA. However, if the study request is associated with the delivery of a wind generator and the wind generator is equipped with remotely controlled output curtailment capability, then that specific wind generator may be included as a decrementing generator.
   d. For a constraint caused by a generator contingency, incremental generation for planning redispatch should not be from that outaged unit or from a replacement of

generation required to offset unit outage in the study model. In addition, replacement of generation required to offset unit outage should not be considered as decrementing generation for the PRD solution.

e. Must run generators will not be allowed to decrement below must run levels.

f. Generator capacity held back for regulating reserves and/or contingency reserves will not be made available for planning redispatch unless alternate capacity remains available to provide this service.

g. The ITO will study any available redispatch, including redispatch that might provide some but not all of the service request. The ITO will offer "available" planning redispatch when only partial service can be accommodated and will describe customer options for the remaining portion of the service request, including CCOs discussed below.

9. When planning redispatch is offered, it must be demonstrated that it is possible to ultimately return the facility to within its acceptable (emergency limit below 100%) operating limit.
10. For all constraints for which planning redispatch has been identified as a solution, the proposed planning redispatch will be demonstrated in the study power flow model not to result in creating a new constraint or increasing flows on another constraint under the contingency or contingencies for which the original constraint was identified.
11. If more than one constraint is to be resolved with planning redispatch, a planning redispatch solution, if available, will be determined for each constraint.
12. To address the reliability concerns and to minimize the operational complexity, the planning redispatch solution that resolves a single constraint will not exceed 3 generating stations, which includes both incrementing and decrementing units in the planning redispatch solution. Additionally, each generation incrementing-decrementing pair must provide at least 1 MW of relief. Operating procedures will be developed by LG&E/KU prior to the execution of the service agreement. LG&E/KU may submit an operating guide to the Reliability Coordinator (RC) and/or Transmission Operator for review and comment. Stipulations regarding conditions and/or terms for PRD and the operating guide will be included in a FERC filing as a non-conforming service agreement.
13. The average of the monthly redispatch costs, along with the high and low redispatch cost, for each internal congested transmission facility, will be posted on OASIS as soon

as practical after the end of each month, but no later than when LG&E/KU sends invoices to the customer for redispatch related services.

14. If the customer desires to use a resource other than an LG&E/KU generation resource to be a part of the planning redispatch, it will be the customer's responsibility to provide the ITO with evidence that the customer has obtained commitment from that generator owner to participate in planning redispatch for the customer.
15. If the customer is capable and elects to self-provide planning redispatch, it will be the customer's responsibility to provide the ITO with the information necessary to complete the LG&E/KU planning redispatch study.
16. If a generation resource, designated to provide the planning redispatch, is out of service, LG&E/KU will make a good faith effort to utilize an alternative generation resource that is available at the time under the criteria listed above. However, it will be the customer's responsibility, to arrange for a replacement resource, which can provide the customer's redispatch. If no alternative generation is available, the customer's service will be curtailed at TLR Level 3 (prior to LG&E/KU performing reliability redispatch) during the periods when generation would otherwise have been redispatched. To the extent that LG&E/KU can provide partial redispatch service under such circumstances, it will do so and curtail only the portion that cannot be allocated replacement generation.

5.18. Biennial Reassessment Study

PRDs will be reassessed every 2 years if the long-term firm PTP customer chooses not to pay for upgrades. For a TSR approved under PRD service without a bridge, a biennial reassessment study will be performed by the ITO no less than 90 days prior to the end of the biennial period. In the event that the ITO is able to extend the reassessment period, such waiver or extension of the right to reassess the option will be provided consistently for all similarly situated service for the particular study period affected, e.g., such as other PRDs for the same constraint.

If the result of the study shows that the system conditions worsen, the customer may choose to either continue with the service under the new conditions or to discontinue the service in accordance with the LG&E/KU OATT. Written notice of the choice to discontinue the reservation must be received by the ITO at least 30 calendar days in advance from the customer, but no later than 60 calendar days following the notice provided to the customer that conditions changed. If the customer does not provide notice to discontinue within 60 calendar days, then the customer must continue the service until the service agreement's stated term expires, or until the next biennial study results. If the reassessment study demonstrates no change or improved system conditions, then customer may not terminate the service agreement and will be bound to continue the service until the next biennial reassessment study, or until the service agreement terminates, whichever comes first.

5.18.1. Conditional Curtailment Option (CCO) Study Criteria

A long-term firm PTP TSR requested for a year or more will be provided an option to study CCOs to mitigate LG&E/KU facility constraints identified in the SIS. CCO will not be offered for non-LG&E/KU facility constraints.

A CCO allows the customer to elect to have its long-term transmission service interrupted under certain defined circumstances. This requires defining the limited conditions or hours under which firm service can be curtailed to allow firm service to be provided in all other conditions and hours, including when redispatch is performed for continuation of service. The ITO will offer both CCO and PRD. The customer, at its costs, may also elect to have the ITO study CCO either as a sole option or in conjunction with the study of PRDs. CCO will be limited by linking it to specified transmission upgrades or to a biennial assessment of the conditions defined for the CCO.

The ITO will study both a system condition option and an annual conditional hour(s) option if the customer requests studies for CCO. The system condition option will identify specific system conditions during which conditional curtailment may occur. The annual conditional hour(s) option will provide an annual cap for the number of conditional curtailment hours during which conditional curtailment may occur. After completion of the study, the customer may choose service under either (1) a system condition option or (2) an annual conditional hour(s) option.

The CCO will be offered as an interim mitigation until the facilities improvements are completed. The CCO may continue, subject to reassessment every 2 years, if no facilities improvements are agreed upon between the customer and LG&E/KU. Reassessments will be at the cost of the customer taking the CCO service. No new SIS agreement will be needed between customer and the ITO for the biennial reassessments.

There is no obligation for the ITO to offer a CCO if it either (i) degrades or impairs the reliability of service to native load customers, Network Customers or other transmission customers taking firm PTP service, or (ii) interferes with the LG&E/KU’s ability to meet prior firm contractual commitments to others.

During the conditional hours, real-time curtailment will be on the same basis as a non-firm/secondary network curtailment priority. During non-conditional hours, real-time curtailment will be on the same basis as all other firm transmission uses. A TSR under a CCO will be under non-conditional terms either (1) when the number of hours in the service agreement runs out, cases in which the customer selected the annual conditional hours option, or (2) when there is a need for a curtailment due to a system condition not specified, cases in which the customer selected the system conditions option, or (3) an approved short-term firm TSR is used to upgrade the conditional firm service to firm service status based on ATC availability on a short-term basis.

If the transmission customer chooses the system conditions option, LG&E/KU will have the right to curtail service during the operating hour and/or in advance of the operating hour for conditions identified by the study. If the transmission customer chooses the annual conditional hours option, LG&E/KU will have the right to curtail service during the operating hour and/or in advance of the operating hour for any conditions up to the maximum annual curtailment hours in the service agreement.

The ITO will track conditional curtailments based on each of the realized system conditions. Additionally, the ITO will track the number of hours curtailed and the number of hours remaining for the year, or other period defined in the service agreement, if applicable. A full or partial curtailment lasting for 1 hour or a full or partial curtailment lasting less than 1 hour will be counted as 1 hour of use of conditional curtailment rights. If an unexpected event occurs when the conditional firm customer is curtailed pursuant to a firm curtailment priority, then the curtailment will not count against the annual hours. In determining whether the annual conditional curtailments are met, the ITO will count curtailments made by the RC when the service is conditional, i.e., tagged with the secondary network curtailment priority, regardless of whether the curtailment occurred during an unexpected event.

The ITO will perform a CCO study using the following criteria:

1. Only LG&E/KU constraints will be considered in the CCO study.
2. CCO will be offered under a system intact condition (NERC Category “P0”) for a short-term constraint or as an interim mitigation until the facilities improvements are completed.
3. CCO will be offered for NERC Category “P1” and “P3” constraints with limitations identified herein.
4. CCO will not be offered for an IROL violation.
5. LG&E/KU concurs with footnote 596 in FERC Order No. 890 where the Commission cited concern that multiple CCO reservations across the same path may constitute a

reliability risk due to system operator's inability to track, tag and manage curtailment in a timely and responsive manner while performing other reliability duties. Under the system conditions option, for each constraint identified in the SIS, a list of conditions that will result in curtailment of the TSR will be developed as follows:

a. In real time the constraint and contingency identified in the study is projected to either load above 100% of its emergency rating or violate first contingency voltage criteria for the applicable bus voltage following contingencies identified in the study.
b. In real time either a transmission or generation facility included in a NERC Category P3 event identified in the SIS is out of service and the loss of the remaining element in the NERC TPL-001-4 P3 event is projected to either load the constraint identified in the study above 100% of its emergency rating or violate second contingency voltage criteria for the applicable bus voltage.

6. The annual curtailment hours for each constraint will be calculated based on the system load level for which the most limiting NERC Category "P1" or "P3" contingency identified in the SIS is expected to result in loading a constraint above 100% of its emergency rating or violate first contingency voltage criteria for the applicable bus voltage (voltage constraints). The annual number of hours associated with the system load level will be adjusted by subtracting a margin (for uncertainty) from the load level consistent with the LG&E/KU TRMID. The annual curtailment cap for the transmission service request will be the maximum of the annual curtailment hours calculated for each constraint.
7. The annual conditional hours option will not be offered if a constraint identified in the study is not sensitive to system load fluctuations.

Operating procedures will be developed prior to the execution of the service agreement. LG&E/KU may submit an operating guide to the RC for review and comment. Stipulations regarding conditions and/or terms for a CCO and the associated operating guide will be included in a FERC filing as a non-conforming service agreement.

5.18.2. Biennial Reassessment Study

CCO will be reassessed every 2 years if the long-term firm PTP customer chooses not to pay for upgrades. For a TSR approved under a CCO without an interim mitigation, a biennial reassessment study will be performed by the ITO no less than 90 days prior to the end of the biennial period. In the event that the ITO is able to extend the reassessment period, such a waiver or extension of the right to reassess the option will be provided consistently for all similarly situated service for the particular study period affected, e.g., such as another CCO for the same constraint.

If the result of the study shows that, the system conditions worsen or the number of conditional hour's changes, the customer may choose either to continue with the service under the new conditions or to discontinue the service in accordance with LG&E/KU OATT. Written notice of the choice to discontinue the reservation must be received by the ITO at least 30 calendar days in advance from customer, but no later than 60 calendar days following the notice provided to the customer that conditions changed. If the customer does not provide notice to discontinue within 60 calendar days, then the customer must continue the service until the service agreement's stated term expires, or until the next biennial study results. If the reassessment study demonstrates no change or improved system conditions or conditional hours, then customer may not terminate the service agreement and will be bound to continue the service until the next Biennial Reassessment Study or until the service agreement terminates, whichever comes first.

5.18.3. Upgrade of a CCO to Firm Service

The ITO will assign firm status to a TSR with a CCO as short-term firm service becomes available. LG&E/KU will implement this requirement by following the North American Energy Standards Board ("NAESB") Business Practice once the required Business Practice is developed by the NAESB and it is implemented in the OATI OASIS and webTrans.

5.19. SIS Report

The SIS report must identify:

1. The system constraints, identified by transmission facility or flowgate, requiring mitigation prior to granting the TSR.
2. Additional Direct Assignment Facilities or Network Upgrades required to provide the requested service and preliminary planning level cost estimates if readily available.
3. PRD, if requested by the customer, including an estimate of the incremental costs of redispatch and the relevant congested transmission facilities for which redispatch will be provided.
4. Generation resources located within the LG&E/KU BA, including LG&E/KU's own resources that can relieve the congested transmission facility at issue if the PRD Option is requested by the customer.

5. To the extent that the ITO is aware of resources outside of the LG&E/KU BA that can relieve the constraint, the ITO will inform the customer of these resources if the PRD Option is requested by the customer.
6. For PRD, if requested by the customer, the impact of each identified resource in LG&E/KU CA on the congested facilities, e.g., the generator shift factor
7. For CCO, if requested by the customer, including the number of conditional curtailment hours and the specific system conditions during which conditional curtailment may occur.

6. Procedures for Transmission Service Requests 20 MW or Less

All studies for long-term firm TSRs of 20 MW or less will be evaluated under the Fast Track TSR Study Procedure except Network TSRs greater than 10 MW at 100 kV or below Delivery Point However, no SIS will be required if the requested TSR capacity is less than or equal to 1 MW. An FS is only needed for a 1 MW request if it is a new Delivery Point and a cost estimate for Direct Assignment Facilities are required for providing the requested service.

6.1. Fast Track TSR Study Procedure

The Fast Track TSR study will follow the procedure outlined in the SIS study procedure with following exceptions:

- The study may typically use a maximum of two summer and two winter peak models that coincide with the start-date and end date of the TSR
- Study will only consider the following contingencies.
  - P0
  - P1; consider only breaker to breaker contingency except where sink is related to a load serving request and have potential impact to an existing local switching procedure or operating guide
  - Selected outage of one generator plus one transmission circuit from P3
- No flowgate analysis will be performed. However, initial OASIS evaluation results will be used for the ATC/AFC/ASTFC check if the subject TSR starts within the OASIS ATC posting horizon and the TSR is not a NITS load TSR.
- No PRD or CCO analysis will be performed.

For a Network TSR, the ITO will request LG&E/KU to start an evaluation concurrently with the SIS to determine cost and construction schedule for any Direct Assignment Facilities if applicable.

The ITO will include Direct Assignment Facilities cost and schedule into the system impact study report. No further facilities study will be required if there are no network constraints found in the system impact study.

7. TSR Feasibility Analysis Service

The “FAS” study for a TSR will follow the procedure outlined in the SIS procedure provided in this Document with the following exceptions:

- No Ad Hoc Study Group will be formed.
- No study plan will be developed.
- The study will require only 2 models including a summer peak load and a winter peak load model coincident with the start-date of the TSR.
- The study will use models from the most recent TSR study which best aligns with the start-date of the TSR. No effort will be made to update the model with higher queued TSRs that are not already in the model.
- No partial service evaluation will be performed.
- No flowgate analysis will be performed.
- No PRD or CCO analysis will be performed.
- A mitigation plan will be identified only for LG&E/KU transmission system.

8. Facilities Study

8.1. Scope

An FS will consider only the LG&E/KU constraints identified in the SIS. Typically, an FS will not require additional power flow analysis if the final mitigation plan is consistent with the SIS and no significant changes are applied to the SIS assumptions. The FS may include stability and short-circuit analysis if significant Network Upgrades are required. The FS will also include cost estimates of any required Direct Assignment Facilities.

8.2. Computer Programs

If additional power flow, stability and short-circuit analysis are required, power flow analysis will be performed using Siemens PSS/E® and/or MUST®, stability analysis will be performed using PSS/E® and short-circuit analysis will be performed using ASPEN®.

8.3. Model Development

The power flow models developed for the SIS will be used for the FS.

8.4. Contingency Criteria

The simulations performed as part of the facilities study will be consistent with the simulations performed for the SIS.

8.5. Monitored Elements and Flowgates

The monitored elements in the facilities study will be consistent with those monitored in the SIS.

8.6. Performance Criteria

The performance criteria for the facilities study will be the same as the performance criteria used for the SIS.

8.7. Physical and Electrical Design Criteria

The physical and electrical design will conform to LG&E/KU's engineering design practices, design standards, equipment specifications, and safety rules.

8.8. Facilities Costing Criteria

LG&E/KU will use good faith efforts to develop cost estimates using the same methods used to develop cost estimates for facilities required to serve retail load.