Large Generator Interconnection Study Criteria

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Revision History

Date	Description
August 01, 2012	Original Document
January 24, 2013	Clarification of steady state modeling for a ERIS generation without long-term firm transmission service
February 28, 2013	Update and clarification of maximization of generators
May 15, 2013	Increment version to 2.0; Clarification on maximization of generators; Update contingency file usage; Change minimum impact from 1MW to 2MVA; Update stability performance criteria; Removed EKPC from CRSG references

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Large Generator Interconnection Study Criteria

1. Application

This Large Generator Interconnection (GI) Study Criteria is applicable to all Large GI requests under Louisville Gas and Electric/Kentucky Utilities Services Company (LG&E/KU)'s Open Access Transmission Tariff (OATT). This GI Study Criteria document will be posted on the LG&E/KU Open Access Same Time Information System (OASIS) and will be utilized by the ITO for all Generator Interconnection System Impact Studies (ISIS), Interconnection Feasibility Studies (IFES), and Interconnection Facilities Studies (IFS). LG&E/KU's OATT, including attachments thereto e.g., Large Generator Interconnect Procedures (LGIP), Attachment C, and Planning Guidelines, will supersede this GI Study Criteria if inconsistency, errors, or any omissions are found in this criteria document.

2. Study Queue Processing

The Interconnection requests in the LG&E/KU GI study queue will be processed in the queue order as posted on the OASIS in accordance with LG&E/KU's LGIP.

However, the ITO may initiate ISISs or IFESs or IFSs for several GIs concurrently (not a cluster study) in GI queue order to accelerate the GI queue processing. The ITO will start a new study only after all higher queued GI requests' studies are already started or in progress. The ITO will perform a study for each of the GI requests independently and determine their required network upgrades for the interconnection service individually. The ISISs will include all higher queued GI projects even if network upgrades for any of these higher queued GIs are not known or available at the commencement of the study.

In addition, if a customer is requesting Interim Interconnection service, the ITO will perform a sensitivity analysis out of the queue order to determine Interim Interconnection requirements. The Interim Interconnection Customer must agree to assume all risks and liability associated with the changes in the Interconnection Agreement including, but not limited to, a change in the output limit and additional costs for Network Upgrades; the Generator Operational output limit will be reviewed and updated as required at least seasonally or any time there is a change in higher queued generation interconnection status or network upgrade requirements/responsibility or a change in study assumptions. The Interim Interconnection Customer will be responsible for facility upgrade costs, including any accelerated construction cost, even if that network upgrade is a requirement of a higher queued project and if that network upgrade is required for the Interim Interconnection. In this case, the Interim Interconnection Customer will be reimbursed for the cost of this upgrade, except for the costs which resulted from the accelerated construction, once the higher queued project pays for the network upgrade.

GIs which are requested to be included in a cluster study by an eligible customer will be given a queue date of the end date of the "queue cluster window" and studied in accordance with the LG&E/KU LGIP.

3. Generator Interconnection System Impact Study Procedures

The ISIS will determine the impacts of the proposed new generator on the transmission system performance, including steady-state, short-circuit and stability impacts. The scope of the ISIS is limited to identifying injection constraints, which likely would limit the ability of the generator to interconnect. The ISIS will not address the deliverability issues from a proposed GI. Therefore, mitigating the injection constraints identified in the ISIS does not grant the customer any right for firm delivery from a new generator. A separate Transmission Service Request (TSR)/deliverability study will be performed for the new generator in accordance with LG&E/KU's TSR Study Criteria once the customer submits a TSR on LG&E/KU's OASIS for long-term firm Transmission Service. It should be noted that the study schedule and the modeling utilized for the ISIS will be based on the GI study queue and the modeling utilized for the TSR SIS will based on the TSR study queue.

The following study procedure will be used to perform all ISISs for GI requests under the LG&E/KU OATT.

3.1 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 and the customer. To the extent practical, 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 study completion deadline. The study scope will include:

- A description of the GI request under study.
- Identification of the starting point models which will be used for the study.
- Information regarding the modeling of the study GI request.
- A preliminary list of higher queued GI requests or facilities which will be added to or removed from the models.

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 customer due to time constraints.

3.2 Ad Hoc Study Group

An Ad Hoc Study Group process will be set-up as follows:

- An Ad Hoc Study Group will be formed for all GI requests in compliance with the 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 and/or Transmission Owners (TO's) to LG&E/KU, i.e. MISO, PJM, TVA, TVA(RC), BREC, OMU, DUKE, VECTREN, AEP, OVEC, EKPC, and EEI/DOE. Transmission Providers and/or TOs that indicate their interest in participating in the Ad Hoc Study Group by the date specified in the invitation and have a Critical Energy Infrastructure Information Non-Disclosure Agreement (CEII NDA) with LG&E/KU will be allowed to participate in the Ad Hoc Study Group. The ITO will distribute to the Ad Hoc members the study scope and models.
- The Ad Hoc Study Group will be responsible for reviewing and commenting on the draft study scope within 5 business days.
- The Ad Hoc Study Group will be responsible for reviewing preliminary pre-project and post-project models and providing comments within 5 business days.
- The Ad Hoc Study Group will be responsible for reviewing draft reports and providing comments within 5 business days. 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. The ITO may finalize the study report and identify the non-accommodated comments at any time the ITO deems appropriate and subsequently issue the report to the customer in order to complete the study within the established study schedule. The ITO may share a copy of the near-final report or study results with the customer (subject to Standards of Conduct considerations) prior to the Ad Hoc Study Group's review if the ITO requires feedback from the customer in order to complete the study within the established study schedule.

3.3 Steady State Analysis

3.3.1 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.

3.3.2 Pre-Project Model

Appropriate pre-project models for various seasons will be created from the most recent North American Electric Reliability Corporation (NERC) Multi-Regional Modeling Working Group

(MMWG) and internal LG&E/KU Base Case Series to perform the study. A set of at least 4 pre-project models without the new GI will be developed, including a summer peak and a winter peak model coincident with the start-date of the proposed generator and a summer peak and a winter peak out year models as appropriate. In addition, a near-term summer off-peak load model and/or a winter off-peak load model appropriate for evaluating off-peak issues will be developed if requested by the Ad Hoc Study Group. To the extent practical, models available from recent GI studies or from the LG&E/KU planning study will be utilized. The anticipated transmission configuration will be based upon the latest approved LG&E/KU Transmission Expansion Plan (TEP).

The models will be adjusted to include appropriate changes applied to the latest approved LG&E/KU TEP model. The models will be adjusted to include appropriate changes from the Ad Hoc Study Group.

Wind generators within LG&E/KU control area, but outside an approximately 50 mile radius of the Point of Interconnection (POI) of the studied request, will be modeled at 20% of their nameplate capacity in the peak models and 100% of their nameplate capacity in the off-peak models. Scheduled outages of any facility at 100 kV and above during the study period will be included in the pre-project models, as appropriate. Generators interconnected to the Transmission System pursuant to Interim Interconnection Service will not be added to the model, except to the extent those units' permanent output will be considered in the studies of lower-queued customers in the normal course.

Confirmed status TSR's will be added to the models to the extent the TSR's are not already included. All higher queued GI requests in the LG&E/KU GI queue will be added to the models with their network upgrades. Higher queued GI requests in non-LG&E/KU GI queues will be added if requested by the Ad Hoc Study Group. Typically, higher queued GI requests will be added based on economic merit order dispatch in the LG&E/KU Balancing Area (BA). Outside the LG&E/KU BA, generation in respective BA's will be scaled based on the available dispatchable generation if the merit order file is not available. Net area interchange will be adjusted to account for new transactions which are added to or removed from the model. The output level of the higher queued projects included in the pre-project models will be adjusted to their transmission rights output levels if there is a power flow convergence problem due to the addition of higher queued projects. In addition, in the pre-project model, generators that are close electrical proximity to POI of the studied request and/or typically within an approximately 50 mile radius of the POI, may be maximized based on good engineering judgment of the ITO

with consultation of the Ad Hoc Study Group. No monthly firm service will be included in the pre-project model.

3.3.3 Post-Project Model

Post-project models will be created by adding the new generator and its associated interconnection facilities to the pre-project models. For Network Resource Interconnection Study (NRIS) requests, the generation to be decremented will typically be based on economic merit order of the new resource compared to other resources, respecting must-run limitations. An exception to the use of an economic merit order to sink the project generation would be when the project generation was a non-dispatchable resource such as wind. Non-dispatchable resources will typically be dispatched against on-line generating units which operate on Automatic Generation Control. For Energy Resource Interconnection Study (ERIS) requests, the generation to be decremented will typically be based on scaling the generation of control areas or local balancing authority areas to the north, south, east and west of the LG&E/KU control area each by 25% of the requested interconnection.

3.3.4 Steady State Contingency Criteria

The simulations performed as part of the ISIS should consider the contingencies in Category A, Category B, and selected Category C3 of the latest versions of the NERC TPL-001 through TPL-003, and LG&E/KU Transmission System Planning Guidelines. The same contingencies will be analyzed for the pre-project and post-project models, to the extent practical.

For Category A, the system is intact (no contingencies). Generators off-line for economic reasons will not be considered a contingency.

For Category B, the contingencies will include single-element outages at buses with a nominal voltage of 69 kV and above in the LG&E/KU BA and the first tier BA's of LG&E/KU near the interconnection point selected contingencies as provided by the Ad Hoc Study Group. Single contingencies will also include multi-element single contingencies initiated by a fault with normal clearing such as multi-terminal lines in the LG&E/KU BA and in the first tier control areas to the extent the Ad Hoc Study Group requests such contingencies and provides the necessary information.

For Category C, only the following Performance Level 2 contingencies as identified in the LG&E/KU Transmission System Planning Guideline will be considered: :

- An outage of one generator followed by another generator.
- An outage of one generator followed by one transmission circuit.

- An outage of one generator followed by one transmission transformer.

ITO will simulate selected category C3 listed above as requested by the Ad Hoc Study Group. For an outage of one transmission circuit or transformer with one generator, the replacement generation required to offset the unit outage will be from the most restrictive of the following: internal sources, MISO, and/or TVA and /or PJM

In an ERIS study, an outage of 1 transmission circuit or transformer with 1 generator outage, the replacement generation required to offset the unit outage will be simulated from the most restrictive of internal sources or TVA (CRSG partner) if LG&E/KU has an energy contract and transmission service for the replacement energy from the respective direction.

In an ERIS study, outage of 2 generators, the replacement generation required to offset the second unit outage will be simulated from TVA (CRSG partner). The replacement generation for the first unit outage will be assumed from internal resources.

Typically, 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 BAs contingencies. The ITO will add additional first tier BAs contingencies if requested by Ad Hoc Study Group based on the contingency criteria discussed in this section.

3.3.5 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.

3.3.6 Monitored Elements

All LG&E/KU, OMU, and EKPC, facilities will be monitored at 69 kV and above for thermal and voltage impacts. Also, if requested by the Ad Hoc Study Group, additional first tier control area facilities will be monitored at 100 kV and above for thermal and voltage impacts.

3.3.7 Reliability Margins

Capacity Benefit Margin (CBM) and Transmission Reliability Margin (TRM) are accounted for in the flowgate definitions in accordance with LG&E/KU's posted CBMID and TRMID. System elements will be monitored using 100% of the applicable normal or emergency rating adjusted for any CBM and TRM margins.

3.3.8 Performance Criteria

The performance criteria are provided in the latest versions of the 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 new GI request has a significant impact. For non-LG&E/KU facilities, an impact will be considered significant in accordance with the TO's written and posted criteria.

For steady state analysis, a thermal loading impact will be considered significant if 5% or more of the new GI request is found to detrimentally impact an overloaded facility under system intact conditions or if 3% or more of the new GI request is found to detrimentally impact an overloaded facility under contingency conditions. For AC contingency analysis, the new GI project impact will be calculated as follows, where DF implies Distribution Factor:

$$\text{DF}\,\% = 100 \times \frac{\text{MVA flow (with GI Request)} - \text{MVA flow (w/o GI Request)}}{\text{GI Request MW}}$$

If the total impact on a facility due to the GI request under study is less than or equal to 2 MVA, the impacted facility will be noted in the study report as not being significantly impacted. Multiple GI requests with same POI and from a same customer and queued within the last 6 months will be will be aggregated and the sum of the aggregate impact will be used for the one MVA impact criteria check.

All LG&E/KU bus voltages will be monitored in accordance with the LG&E/KU Transmission System Planning Guidelines. All non-LG&E/KU bus voltages will be monitored in accordance with the TO's written and posted criteria. For LG&E/KU facilities, a voltage impact will be considered to be significant if the voltage changes by 0.5% or more and is outside acceptable

voltage guidelines. For non-LG&E/KU facilities, an impact will be considered significant in accordance with the TO's written criteria.

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

- The branch is loaded above its applicable normal or emergency rating adjusted for reliability margin in the post-project 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.

Flowgates normally monitored by LG&E/KU will be monitored in the study using the list of flowgates posted on the LG&E/KU OASIS. The posted flowgates include LG&E/KU flowgates as well as reciprocally coordinated flowgates. For NRIS requests, a flowgate analysis will be performed considering the reliability margins. A flowgate analysis will not be performed for ERIS requests.

For the flowgate analysis, the DF will be calculated as follows:

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

The flowgate analysis will identify all LG&E/KU flowgates as well as reciprocal flowgates which are loaded beyond acceptable levels and have significant impacts due to the new GI request.

3.3.9 Injection Related Constraints

The ISIS will identify "injection-related constraints." The Interconnection Customer will be required to mitigate the injection-related constraints in order to interconnect with the LG&E/KU system.

For a NRIS request, a constraint will be considered an injection-related constraint if it is identified as a significant impact in accordance with impacted facility and voltage criteria (Section 3.3.8)

For an ERIS request, a constraint will be considered an injection-related constraint if any of the conditions identified below is met:

- A significant impact, as defined in Section 3.3.8 is due to an impact for which the DF of the new GI request is larger than or equal to a 10%.

- A facility caused to be overloaded by the new generator is local to the POI (based on engineering judgment typically within a three bus radius). In this case, the Performance Criteria given in Section 3.3.8 will be used to determine significant injection related constraints.
- Section 3.3.8 will be used to assess voltage criteria violations.
- Respective TO criteria will be used for the non-LG&E/KU constraints.

3.3.10 Sensitivity Studies

A Steady State sensitivity may be performed removing modeling of an existing generator (prior to the effective date of FERC Order No. 2003[1]) and/or higher queued ERIS generator without an associated long term firm TSR. Associated planned network upgrades also will be removed along with these generators without a long term firm TSR. The steady state injection constraints on the LG&E/KU Transmission System that are not found in the sensitivity study will be removed from the final injection constraint list. New constraints that are found in the sensitivity study will be added to the final injection constraint list. The ITO will document both an initial injection constraint and a final injection constraint list in the study report.

3.4 Short-Circuit Analysis

3.4.1 Computer Programs

Short-circuit analysis will be performed using ASPEN®.

3.4.2 Methodology

A pre-project model will be developed without the interconnection request to represent system conditions with all generators in the area with higher interconnection queue priority. A post-project model will be created with the interconnection request by adding the new generation interconnection to the pre-project model.

Short Circuit analysis will include three-phase faults and single line-to-ground faults at various substations near the POI on the pre-project model and the post-project model to determine the available fault current with and without the new generator.

3.4.3 Short-Circuit Study Criteria

Three-phase faults and single line-to-ground faults will be simulated at various substations in the pre-project and post-project models to determine the impact on available fault current of the

[1] FERC Order No. 2003 "Standardization of Generator Interconnection Agreements and Procedures" FINAL RULE was issued July 24, 2003.

new generator. The available fault current will be calculated for buses within a 5 bus radius of the POI. The available fault current will be compared to the breaker short-circuit interrupting capabilities. The available fault current will be calculated recognizing the short-circuit current which a particular breaker will need to interrupt.

If the post-project available fault current of any breaker is shown to exceed 100% and the impact of the new generator is greater than or equal to 5% of the breakers interrupting capability, the post-project available fault current will be compared to the pre-project available fault current. If the new request caused the available fault current at the breaker to increase by at least 5% of the breaker's interrupting capability and the pre-project available fault current for the breaker was less than 100% of the breakers interrupting capability, the replacement of this breaker will be considered an injection-related constraint and the customer will be responsible for its replacement.

3.5 Stability Analysis

3.5.1 Computer Programs

A stability analysis to be performed using Siemens PSS/E®.

3.5.2 Methodology

A pre-project model will be developed without the interconnection request to represent system conditions with all generators in the area with higher interconnection queue priority. A post-project model will be created with the interconnection request by adding the new GI to the pre-project model.

Stability simulations will be performed for various three-phase faults with normal clearing and single line-to-ground faults with delayed clearing to evaluate the stability of the project and the impact of the project on the stability of the transmission system. The disturbances will be evaluated under both system intact and prior outage conditions near the POI. The stability performance of the post-project model will be compared to the stability performance of the pre-project model.

3.5.3 Model Development

3.5.4 Pre-project Model

Pre-project models will be developed without the interconnection request. To the extent practical, models available from the previous LG&E/KU GI stability study will be utilized. The models should reflect summer peak conditions. The model will be adjusted to include appropriate model changes provided by the Ad Hoc Study Group. Earlier queued generation

interconnection projects in a state of active or complete from adjoining Transmission Providers' interconnection queues deemed by the Ad Hoc Study Group to be electrically "near" the interconnection request location will be added. This typically includes requests no more than one tier from the LG&E/KU control area.

Generation in the geographic area of the GI request will be increased to maximum or appropriate TP approved output levels. The geographic area typically includes generators within an approximate 50 mile radius based on good engineering judgment of the ITO with consultation of the Ad Hoc Study Group.

3.5.5 Post-project Model

The new generation will be added to the model and dispatched either in the direction of the prevailing flows or to neighboring control areas to the north, south, east, and west of the LG&E/KU control area by 25% of the requested interconnection as determined by the Ad Hoc Study Group.

3.5.6 Stability Disturbance Criteria

The stability simulations performed as part of the study should consider the disturbances in Category B through Category C of Table 1 of the latest versions of the NERC TPL-001 through TPL-004 in accordance with LG&E/KU's Transmission System Planning Guidelines. Category A through C disturbances will include three-phase faults with normal clearing and Single Line-to-Ground (SLG) faults with and without delayed clearing as a result of breaker or relay failure. In addition at least 1 Category D disturbance will be simulated in order to evaluate risks and consequences. Examples of Category D disturbances include three-phase faults with delayed clearing, the loss of an entire substation, and a simultaneous three phase fault at a point where two transmission lines cross each other.

The ITO will simulate three-phase faults with normal clearing and single line to ground faults with delayed clearing (typically 20 cycle) for selected worst disturbances near the POI (1 or 2 bus radius) under system intact and selected prior outage conditions near the POI as requested by Ad Hoc Study Group. In addition, the ITO will simulate other regional disturbances which are identified by the Ad Hoc Study Group.

3.5.7 Stability Performance Criteria

The performance criteria are provided in the latest versions of the NERC TPL-001 through TPL-004, applicable SERC standards and LG&E/KU's Transmission System Planning Guidelines.

Stability performance will be evaluated based on these standards including the following:

- For Category B contingencies,
  - The BES voltage at all monitored generator interconnection points must recover to 0.9 p.u. voltage within 1.0 seconds after the fault is cleared.
  - all other BES buses must recover to greater than 0.75 p.u. voltage following clearing the fault, and shall not be less than 0.8 p.u. for more than 40 cycles

- NERC Categories C and D contingencies are less probable and may involve loss of some load or generation in the LGE/KU model area
- All machine rotor angle oscillations must be positively damped.
- If the swing is large, a 5% decrement between swing cycles is required for a single dominant mode of oscillation.
- Generator(s) with a total capacity of less than LG&E/KU Reserve Sharing Group's operating reserves will be allowed to trip for Category C and D disturbances if:
  - Other solutions (such as IPO breakers, 2 cycle breakers, etc.) have been evaluated
  - The Impedance swings are located between the highside of the GSU and the generator(s)
  - The generators that trip are located or connected at the substation where the contingency occurs and
  - No system problems result from this tripping
- Wind generators will be studied for compliance with the Low Voltage Ride Through Criterion (LVRT) for the Wind Energy interconnection in accordance with FERC Order 661. The LVRT criterion tests the ability of the wind generator to maintain operation and interconnection with the system during events which cause extremely low voltage transients.

3.6 Non- LG&E/KU Constraints

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

3.7 Mitigation Plan

To the extent the study determines that there are injection 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 any injection constraints found in the study in order to provide interconnection service. No special protection system will be considered as part of the mitigation plan. 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 TOs.

3.8 System Impact Study Report

The System Impact Study Report must identify:

1. The transmission facility and flowgate injection constraints to providing the interconnection service and dictating the need for a facilities study.
2. Preliminary list of Direct Assignment Facilities or Network Upgrades required to provide the interconnection service.
3. Planning level non-binding cost estimate for network upgrades, and Direct Assignment Facilities.

4. Interim Interconnection System Impact Study (Interim ISIS)

The Interim Interconnection System Impact Study (Interim ISIS) will follow the same methodology and utilize the same criteria as given in Section 3 of this GI Criteria document for the steady-state, stability and short circuit analyses, with the following exceptions:

The Interim ISIS will evaluate the adequacy of the transmission system in its current configuration, or in its anticipated configuration on the effective date of the Interim Interconnection Service requested, to accommodate the Interim Interconnection Service at the megawatt level specified in the Interim Interconnection Request, which must be the same megawatt level as the megawatt level specified in the original Interconnection Request.

The Interim ISIS will use a summer peak, a winter peak and, if deemed appropriate, a summer off-peak model coincident with the start-date of the proposed generator and anticipated network configuration on the effective date of the Interim Interconnection Service requested in the steady-state analysis. Summer peak and off-peak models coincident with the start-date of the proposed generator and anticipated network configuration on the effective date of the Interim Interconnection Service requested will be used in the stability analysis. This study will determine maximum generation output without any network upgrade for the requested interim interconnection.

5. Feasibility Study

The IFES will follow the same methodology and utilize the same criteria as given in Section 3 of this GI Criteria document with the following exceptions:

- With the exception of LG&E/KU participation in comments and model review, no Ad Hoc Study Group will be formed.
- No study scope will be developed.
- A limited number of pre-project models (summer and winter peak cases) will be used for performing the feasibility study.
- No effort will be made to update the model with higher queued GI requests from Non-LG&E/KU GI queues.
- No stability analysis will be performed.
- A mitigation plan will be identified only for the LG&E/KU transmission system and a planning level cost estimate will be provided.

6. Facilities Study

The ITO will oversee the IFS performed by LG&E/KU. IFSs will consider only the LG&E/KU constraints identified in the ISIS by the ITO. Typically an IFS will not require additional power flow analysis if the final mitigation plan is consistent with the ISIS identified mitigation plan and no significant changes to the ISIS assumptions are identified. The ITO will perform additional power flow and stability analysis if there are significant changes to the ISIS assumptions or constraints in the IFS. IFSs will include steady state, stability and short-circuit analyses if significant network upgrades are required.

6.1 Computer Programs

If additional power flow, stability and short-circuit analysis are required, steady-state 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®.

6.2 Model Development

The pre-project and post-project models developed for the ISIS will be used for the IFS.

6.3 Contingency Criteria

The simulations performed as part of the IFS will be consistent with the simulations performed for the ISIS.

6.4 Monitored Elements and Flowgates

The monitored elements in the IFS will be consistent with those monitored in the ISIS.

6.5 Performance Criteria

The performance criteria for the IFS will be the same as the performance criteria used for the ISIS.

6.6 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.

6.7 Facilities Cost 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.

6.8 Facility Study Report

The IFS report will specify and provide an estimate for the equipment, engineering, procurement and construction work required to implement the conclusions of the ISIS / IFS.