LG&E AND KU SERVICES COMPANY

LG&E Power System
2010 Analysis of System Losses

August 2012

Prepared by:

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August 16, 2012

Mr. Robert M. Conroy
Director of Rates
LG&E and KU Services Company
220 West Main Street
Louisville, KY 40202

RE: 2010 LOSS ANALYSIS – LG&E

Dear Mr. Conroy:

Transmitted herewith are the results of the 2010 Analysis of System Losses for LG&E and KU Services Company's Louisville Gas & Electric (LG&E) power system. Our analysis develops cumulative expansion factors (loss factors) for both demand (peak/kW) and energy (average/kWh) losses by discrete voltage levels applicable to metered sales data. Our analysis considers only technical losses in arriving at our final recommendations. Please note that the proposed loss factors include a common or system-wide transmission factor for both LG&E and KU studies.

On behalf of MAC, we appreciate the opportunity to assist you in performing the loss analysis contained herein. The level of detailed load research and sales data by voltage level, coupled with a summary of power flow data and power system model, forms the foundation for determining reasonable and representative power losses on the LG&E system. Our review of these data and calculated loss results support the proposed loss factors as presented herein for your use in various cost of service, rate studies, and demand analyses.

Should you require any additional information, please let us know at your earliest convenience.

Sincerely,

Paul M. Normand
Principal

Enclosure
PMN/rjp

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1.0 EXECUTIVE SUMMARY

This report presents LG&E 2010 Analysis of System Losses for the power systems as performed by Management Applications Consulting, Inc. (MAC). The study developed separate demand (kW) and energy (kWh) loss factors for each voltage level of service in the power system for LG&E. The cumulative loss factor results by voltage level, as presented herein, can be used to adjust metered kW and kWh sales data for losses in performing cost of service studies, determining voltage discounts, and other analyses which may require a loss adjustment.

The procedures used in the overall loss study were similar to prior studies and emphasized the use of "in house" resources where possible. To this end, extensive use was made of the Company's peak hour power flow data and transformer plant investments in the model. In addition, measured and estimated load data provided a means of calculating reasonable estimates of losses by using a "top-down" and "bottom-up" procedure. In the "top-down" approach, losses from the high voltage system, through and including distribution substations, were calculated along with power flow data, conductor and transformer loss estimates, and metered poles.

At this point in the analysis, system loads and losses at the input into the distribution substation system are known with reasonable accuracy. However, it is the remaining loads and losses on the distribution substations, primary system, secondary circuits, and services which are generally difficult to estimate. Estimated and actual Company load data provided the starting point for performing a “bottom-up” approach for calculating the remaining distribution losses. Basically, this “bottom-up” approach develops line loadings by first determining loads and losses at each level beginning at a customer’s meter service entrance and then going through secondary lines, line transformers, primary lines, and finally distribution substation. These distribution system loads and associated losses are then compared to the initial calculated input into Distribution Substation loadings for reasonableness prior to finalizing the loss factors. An overview of the loss study is shown on Figure 1 on page 4.

Appendix A of this report presents the Transmission loss analysis which was calculated separately and the results incorporated into the final loss factors as shown on Table 1 on the next page.

Table 1 (columns (a) and (b)) also provides the final results from Appendix B for the 2010 calendar year. Exhibits 8 and 9 of Appendix B present a more detailed analysis of the final calculated summary results of losses by segments and delivery voltage of the power system. The following Table 1 cumulative loss expansion factors are applicable only to metered sales at the point of receipt for adjustment to the power system’s input level.

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TABLE 1
Loss Factors at Sales (Meter) Level, Calendar Year 2010

Voltage Level of Service	Total LG&E	Delivery System (Excludes Transmission)	Recalculated Total LG&E With Appendix A Transmission Losses	
	(a)	(b)	(c)	(d) = 1/(c)
Demand (kW)				
Transmission[1]	1.01549	1.00000	1.02805	0.97272
Primary Substation	1.02152	1.00594	1.03415	0.96698
Primary	1.04295	1.02704	1.05585	0.94710
Secondary	1.06325	1.04703	1.07640	0.92902
Energy (kWh)				
Transmission[1]	1.01033	1.00000	1.02271	0.97779
Primary Substation	1.01619	1.00581	1.02865	0.97215
Primary	1.02998	1.01946	1.04261	0.95913
Secondary	1.05325	1.04160	1.06525	0.93875

Losses – Net System Input[2] 4.37% MWh
5.56% MW
Losses – Net System Output[3] 4.57% MWh
5.89% MW

Notes: *Column (a)* *Results derived from Appendix A for Transmission and Appendix B for all remaining factors.*

Column (b) *Column (a) loss factors excluding all Transmission-related losses.*

Column (c) *Column (b) delivery-only loss factors with incorporating the composite LGEE system-wide Transmission loss factors from Appendix A, Schedule 1, lines 5 and 10.*

Column (d) *All loss factors presented in columns (a), (b), and (c) are expansion factors applicable to metered sales as a multiplier. Column (d) is simply the inverse of column (c) and results in a loss factor that is used to divide metered sales to derive sales requirement at input.*

The loss factors presented in the Delivery Only column of Table 1 are the Total LG&E loss factors divided by the transmission loss factor from column (a) in order to remove these losses from each service level loss factor. For example, the secondary distribution demand loss factor of 1.04703 includes the recovery of all remaining non-transmission losses from the distribution substation, primary lines, line transformers, secondary conductors and services.

[1] Reflects results for 500 kV, 345 kV, 161 kV, 138 kV and 69 kV from Appendix A.
[2] Net system input equals firm sales plus losses, Company use less non-requirement sales and related losses. See Appendix A, Exhibit 1, for their calculations.
[3] Net system output uses losses divided by output or sales data as a reference.

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The net system input shown in Table 1 represents the MWh losses of 4.37% for the total LG&E load using calculated losses divided by the associated input energy to the system. The 5.56% represents the MW losses also using system input as a reference. The net system output reference shown in Table 1 represents MWh losses of 4.57% and MW losses of 5.89%. These results use the appropriate total losses for each but are divided by system output or sales. These calculations are all based on the data and results shown on Exhibits 1, 7 and 9 of the study.

Due to the very nature of losses being primarily a function of equipment loadings, the loss factor derivations for any voltage level must consider both the load at that level plus the loads from lower voltages and their associated losses. As a result, cumulative losses on losses equates to additional load at higher levels along with future changes (+ or –) in loads throughout the power system. It is therefore important to recognize that losses are multiplicative in nature (future) and not additive (test year only) for all future years to ensure total recovery based on prospective fixed loss factors for each service voltage.

The derivation of the cumulative loss factors (Appendix B) shown in Table 1 (columns (a) and (b)) have been detailed for all electrical facilities in Exhibit 9, page 1 for demand and page 2 for energy. Beginning on line 1 of page 1 (demand) under the secondary column, metered sales are adjusted for service losses on lines 3 and 4. This new total load (with losses) becomes the load amount for the next higher facilities of secondary conductors and their loss calculations. This process is repeated for all the installed facilities until the secondary sales are at the input level (line 45). The final loss factor for all delivery voltages using this same process is shown on line 46 and Table 1 for demand. This procedure is repeated in Exhibit 9, page 2, for the energy loss factors.

The loss factor calculation is simply the input required (line 45) divided by the metered sales (line 2).

An overview of the loss study is shown on Figure 1 on the next page. Figure 2 simply illustrates the major components that must be considered in a loss analysis.

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Figure 1

MANAGEMENT APPLICATIONS CONSULTING, INC.
ELECTRIC LOSS MODEL OVERVIEW

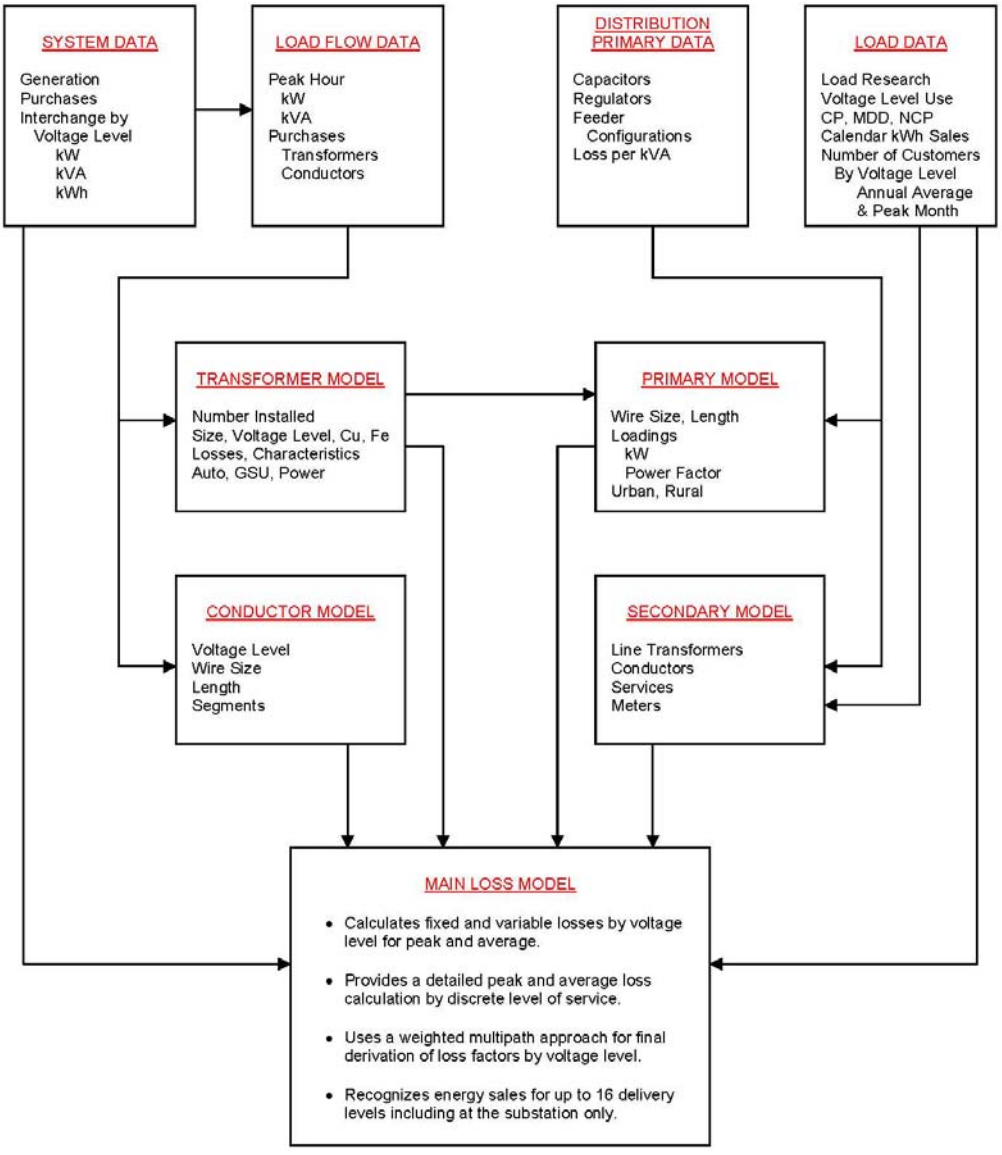

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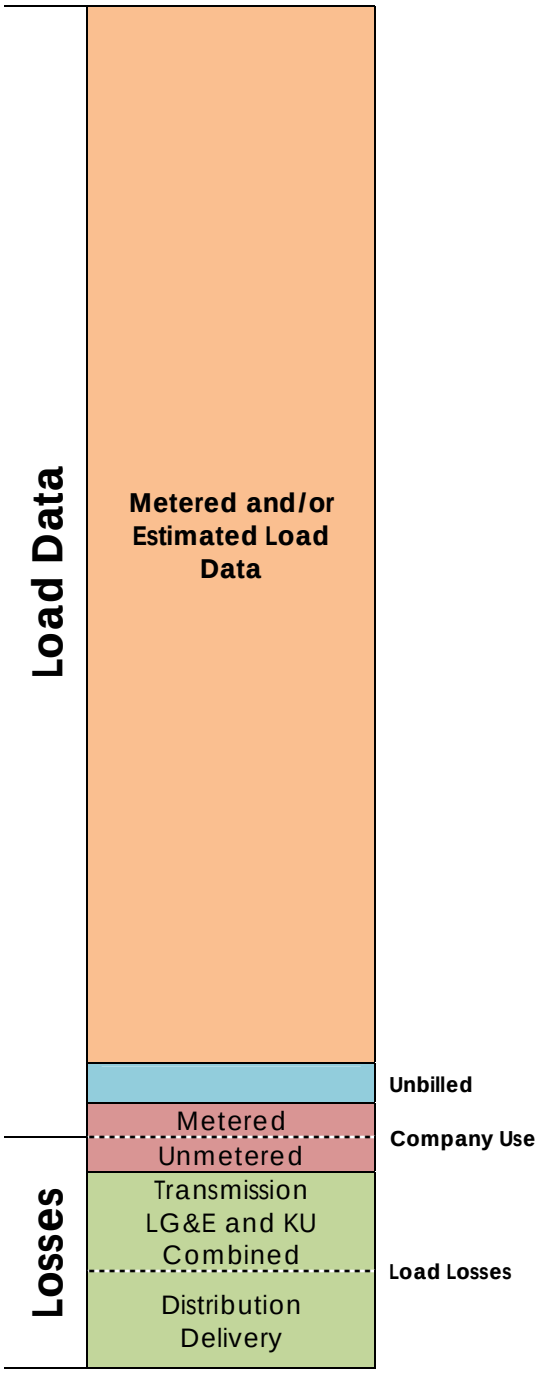
Figure 2
LG&E and KU Services Company – LG&E
Jurisdiction Energy and Loss Components



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2.0 INTRODUCTION

This report of the 2010 Analysis of System Losses for the LG&E power system provides a summary of results, conceptual background or methodology, description of the analyses, and input information related to the study.

2.1 Conduct of Study

Typically, between five to ten percent of the total kWh requirements of an electric utility is lost or unaccounted for in the delivery of power to customers. Investments must be made in facilities which support the total load which includes losses or unaccounted for load. Revenue requirements associated with load losses are an important concern to utilities and regulators in that customers must equitably share in all of these cost responsibilities. Loss expansion factors are the mechanism by which customers' metered demand and energy data are mathematically adjusted to the generation or input level (point of reference) when performing cost and revenue calculations.

An acceptable accounting of losses can be determined for any given time period using available engineering, system, and customer data along with empirical relationships. This loss analysis for the delivery of demand and energy utilizes such an approach. A microcomputer loss model[4] is utilized as the vehicle to organize the available data, develop the relationships, calculate the losses, and provide an efficient and timely avenue for future updates and sensitivity analyses. Our procedures and calculations are similar with prior loss studies, and they rely on numerous databases that include customer statistics and power system investments.

Company personnel performed most of the data gathering and data processing efforts and checked for reasonableness. MAC provided assistance as necessary to construct databases, transfer files, perform calculations, and check the reasonableness of results. A review of the preliminary results provided for additions to the database and modifications to certain initial assumptions based on available data. Efforts in determining the data required to perform the loss analysis centered on information which was available from existing studies or reports within the Company. From an overall perspective, our efforts concentrated on five major areas:

1. System information concerning peak demand and annual energy requirements by voltage level,
2. High voltage power system power flow data and associated loss calculations,
3. Distribution system primary and secondary loss calculations,
4. Derivation of fixed and variable losses by voltage level, and
5. Development of final cumulative expansion factors at each voltage for peak demand (kW) and annual energy (kWh) requirements at the point of delivery (meter).

[4]Copyright by Management Applications Consulting, Inc.

2.2 Electric Power Losses

Losses in power systems consist of primarily technical losses with a much smaller level of non-technical losses.

Technical Losses

Electrical losses result from the transmission of energy over various electrical equipment. The largest component of these losses is power dissipation as a result of varying loading conditions and are oftentimes called load losses which are proportional to the square of the current (I^2R). These losses can be as high as 75% of all technical losses. The remaining losses are called no-load and represent essentially fixed (constant) energy losses throughout the year. These no-load losses represent energy required by a power system to energize various electrical equipment regardless of their loading levels. The major portion of no-load losses consists of core or magnetizing energy related to installed transformers throughout the power system.

Non-Technical Losses

These are unaccounted for energy losses that are related to energy theft, metering, non-payment by customers, and accounting errors. Losses related to these areas are generally very small and can be extremely difficult and subjective to quantify. Our efforts generally do not develop any meaningful level as appropriate because we assume that improving technology and utility practices have minimized these amounts.

2.3 Description of Model

The loss model is a customized applications model, constructed using the Excel software program. Documentation consists primarily of the model equations at each cell location. A significant advantage of such a model is that the actual formulas and their corresponding computed values at each cell of the model are immediately available to the analyst.

A brief description of the three (3) major categories of effort for the preparation of each loss model is as follows:

- Main sheet which contains calculations for all primary and secondary losses, summaries of all conductor and transformer calculations from other sheets discussed below, output reports and supporting results.

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- Transformer sheet which contains data input and loss calculations for each distribution substation. Separate iron and copper losses are calculated for each transformer by identified type.

Appendix A presents a separate hourly loss study result which derived the loss factors for the combined LGEE system-wide Transmission only (69 kV through 500 kV) of the LG&E and KU power system. These Transmission results are then incorporated on Table 1 of the Executive summary to derive the final LG&E 2010 loss factors by voltage level of energy delivery.

Appendix B presents a detailed loss study result which derives the loss factors for the Company's system-wide power system. Appendix B, Exhibits 8 and 9, presents the final detailed summary results of the demand and energy losses for each major portion of the total LG&E power system.

3.0 METHODOLOGY

3.1 Background

The objective of a Loss Study is to provide a reasonable set of energy (average) and demand (peak) loss expansion factors which account for system losses associated with the transmission and delivery of power to each voltage level over a designated period of time. The focus of this study is to identify the difference between total energy inputs and the associated sales with the difference being equitably allocated to all delivery levels. Several key elements are important in establishing the methodology for calculating and reporting the Company's losses. These elements are:

- Selection of voltage level of services,
- Recognition of losses associated with conductors, transformations, and other electrical equipment/components within voltage levels,
- Identification of customers and loads at various voltage levels of service,
- Review of generation or net power supply input at each level for the test period studied, and
- Analysis of kW and kWh sales by voltage levels within the test period.

The three major areas of data gathering and calculations in the loss analysis were as follows:

1. System Information (monthly and annual)
    - MWH generation and MWH sales.
    - Coincident peak estimates and net power supply input from all sources and voltage levels.
    - Customer load data estimates from available load research information, adjusted MWH sales, and number of customers in the customer groupings and voltage levels identified in the model.
    - System default values, such as power factor, loading factors, and load factors by voltage level.

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2. High Voltage System (Appendix A)

   - Conductor information was summarized from a database by the Company which reflects the transmission system by voltage level. Extensive use was made of the Company's power flow data with the losses calculated and incorporated into the final loss calculations.

   - Transformer information was developed in a database to model transformation at each voltage level. Substation power, step-up, and auto transformers were individually identified along with any operating data related to loads and losses.

   - Power flow data and calculations for each hour (8760) formed the basis for the peak and annual load losses in the high voltage (500 kV through 69 kV) loss calculations.

3. Distribution System (Appendix B)

   - Distribution Substations – Data was developed for modeling each substation as to its size and loading. The Company provided loss characteristics for each transformer. Loss calculations were performed from this data to determine no load losses separately for each transformer. The annual load losses were calculated using an average load level for each transformer which replaced the prior Hoebel formula method.

   - Primary lines – Line loading and loss characteristics for several representative primary circuits were obtained from the Company. These loss results developed kW loss per MW of load and a composite average percentage was calculated to derive the primary loss estimate.

   - Line transformers – Losses in line transformers were based on each customer service group's size, as well as the number of customers per transformer. Accounting and load data provided the foundation with which to model the transformer loadings and to calculate load and no load losses.

   - Secondary network – Typical secondary networks were estimated for conductor sizes, lengths, loadings, and customer penetration for residential and small general service customers.

   - Services – Typical services were estimated for each secondary service class of customers identified in the study with respect to type, length, and loading.

The loss analysis was thus performed by constructing the model in segments and subsequently calculating the composite until the constraints of peak demand and energy were met:

- Information as to the physical characteristics and loading of each transformer and conductor segment was modeled.

- Conductors, transformers, and distribution were grouped by voltage level, and unadjusted losses were calculated.

- The loss factors calculated at each voltage level were determined by "compounding" the per-unit losses. Equivalent sales at the supply point were obtained by dividing sales at a specific level by the compounded loss factor to determine losses by voltage level.

- The resulting demand and energy loss expansion factors were then used to adjust all sales to the generation or input level in order to estimate the difference.

- Reconciliation of kW and kWh sales by voltage level using the reported system kW and kWh was accomplished by adjusting the initial loss factor estimates until the mismatch or difference was eliminated (Appendix B, Exhibits 6 and 7).

3.2 Calculations and Analysis

This section provides a discussion of the input data, assumptions, and calculations performed in the loss analysis. Specific appendices have been included in order to provide documentation of the input data utilized in the model.

3.2.1 Bulk and Transmission Lines (500 kV – 69 kV)

The transmission line losses were calculated based on a modeling of unique voltage levels identified by the Company's power flow data and configuration for the entire integrated Power System (Appendix A). Specific information as to length of line, type of conductor, voltage level, and hourly loading were utilized as data input in the power flow analyses.

Actual MW and MVA line loadings were based on LG&E's hourly loading conditions. Calculations of line losses were performed and summarized by fixed and variable components for both Transmission and GSU facilities for reporting purposes as shown in Appendix A of this report.

3.2.2 Bulk and Transmission Transformers

The transmission transformer loss analysis required several steps in order to properly consider the characteristics associated with various transformer types; such as, step-up, auto transformers, distribution substations, and line transformers. In addition, further efforts were required to identify both iron and copper losses within each of these transformer types in order to obtain reasonable peak (kW) and average annual energy (kWh) losses. While iron losses were considered essentially constant for each hour, recognition had to be made for the varying degree of copper losses due to hourly equipment loadings.

The remaining miscellaneous losses considered in the loss study consisted of several areas which do not lend themselves to any reasonable level of modeling for estimating their respective losses and were therefore lumped together into a single loss factor of 0.10%. The typical range of values for these losses is from 0.10% to 0.25%, and we have assumed the lower value to be conservative at this time. The losses associated with this loss factor include bus bars, unmetered station use, and grounding transformers.

3.2.3 Distribution System

The load data at the substation and customer level, coupled with primary and secondary network information, was sufficient to model the distribution system in adequate detail to calculate losses.

Distribution Substations

The Distribution Substation loss derivation required several steps to recognize the loss characteristics relating to iron or fixed losses versus the copper or load varying (I^2R) losses. The fixed component was based on Company loss characteristics from manufacturer's test results. The annual variable loss calculations considered a different approach by using an average hourly loading level and used this to the peak hour losses as a ratio $(average/peak)^2$ times 8760 hours with an average adjustment factor and peak hour losses.

Primary Lines

Primary line loadings take into consideration the available distribution load along with the actual customer loads including losses. Primary line loss estimates were prepared by the Company for use in this loss study. These estimates considered loads per substation, voltage levels, loadings, total circuit miles, wire size, and single- to three-phase investment estimates. All of these factors were considered in calculating the actual demand (kW) and energy (kWh) for the primary system.

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Line Transformers

Losses in line transformers were determined based on typical transformer sizes for each secondary customer service group and an estimated or calculated number of customers per transformer. Accounting records and estimates of load data provided the necessary database with which to model the loadings. These calculations also made it possible to determine separate copper and iron losses for distribution line transformers, based on a table of representative losses for various transformer sizes.

Secondary Line Circuits

A calculation of secondary line circuit losses was performed for loads served through these secondary line investments. Estimates of typical conductor sizes, lengths, loadings and customer class penetrations were made to obtain total circuit miles and losses for the secondary network. Customer loads which do not have secondary line requirements were also identified so that a reasonable estimate of losses and circuit miles of these investments could be made.

Service Drops and Meters

Service drops were estimated for each secondary customer reflecting conductor size, length and loadings to obtain demand losses. A separate calculation was also performed using customer maximum demands to obtain kWh losses. Meter loss estimates were also made for each customer and incorporated into the calculations of kW and kWh losses included in the Summary Results.

4.0 DISCUSSION OF RESULTS

A brief description of each Exhibit is provided in Appendices A and B:

Exhibit 1 – Summary of Company Data

This exhibit reflects system information used to determine percent losses and a detailed summary of kW and kWh losses by voltage level. The loss factors developed in Exhibit 7 are also summarized by voltage level.

Exhibit 2 – Summary of Conductor Information

A summary of MW and MWH load and no load losses for Distribution conductors by voltage levels is presented. The sum of all calculated losses by high voltage is based on input data information provided in Appendix A. Percent losses are based on equipment loadings.

Exhibit 3 – Summary of Transformer Information

This exhibit summarizes Distribution transformer losses by various types and voltage levels throughout the system. Load losses reflect the copper portion of transformer losses while iron losses reflect the no load or constant losses. MWH losses are estimated using an average load loss factor for copper and the annual load losses times the test year hours.

Exhibit 4 – Summary of Losses Diagram (2 Pages)

This loss diagram represents the inputs and output of power at system peak conditions. Page 1 details information from all points of the power system and what is provided to the distribution system for primary loads. This portion of the summary can be viewed as a "top down" summary into the distribution system.

Page 2 represents a summary of the development of primary line loads and distribution substations based on a "bottom up" approach. Basically, loadings are developed from the customer meter through the Company's physical investments based on load research and other metered information by voltage level to arrive at MW and MVA requirements during peak load conditions by voltage levels.

Exhibit 5 – Summary of Sales and Calculated Losses

Summary of Calculated Losses represents a tabular summary of MW and MWH load and no load losses by discrete areas of delivery within each voltage level. Losses have been identified and are derived based on summaries obtained from Exhibits 2 and 3 and losses associated with meters, capacitors and regulators.

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Exhibit 6 – Development of Loss Factors, Unadjusted

This exhibit calculates demand and energy losses and loss factors by specific voltage levels based on sales level requirements. The actual results reflect loads by level and summary totals of losses at that level, or up to that level, based on the results as shown in Exhibit 5. Finally, the estimated values at generation are developed and compared to actual generation to obtain any difference or mismatch.

Exhibit 7 – Development of Loss Factors, Adjusted

The adjusted loss factors are the results of adjusting Exhibit 6 for any difference. All differences between estimated and actual are prorated to each level based on the ratio of each level's total load plus losses to the system total. These new loss factors reflect an adjustment in losses due only to the kW and kWh mismatch.

Exhibit 8 – Adjusted Losses and Loss Factors by Facility

These calculations present an expanded summary detail of Exhibit 7 for each segment of the power system with respect to the flow of power and associated losses from the receipt of energy at the meter to the generation for the LG&E power system.

Exhibit 9 – Summary of Losses by Delivery Voltage

These calculations present a reformatted summary of losses presented in Exhibits 7 and 8 by power system delivery segment as calculated by voltage level of service based on reported metered sales.

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Appendix A

Results of LGEE (LG&E and KU) Transmission System 2010 Loss Analysis

Louisville Gas and Electric Company (LGE)
Kentucky Utilities Company (KU)
2011 Transmission Loss Analysis

Pages 1-2	Index
Schedule 1, Page 3	Presents the summary loss results of the calculated hourly losses for the Company's LGE and KU control areas at the annual peak hour and for the annual average losses for all hours of the year. Calculated loss factors are applicable to the metered (output) sales level. All data is from Schedule 2. Section I - Summarizes the transmission loss results with GSU losses included. Section II - Summarizes GSU only losses. Section III - Summarizes the transmission only losses exluding GSU losses.
Schedule 1A, Page 4	Presents the summary loss results of the calculated hourly losses for the Company's LGE control areas at the annual peak hour and for the annual average losses for all hours of the year.
Schedule 1B, Page 5	Presents the summary loss results of the calculated hourly losses for the Company's KU control areas at the annual peak hour and for the annual average losses for all hours of the year.
Schedule 2, Page 6	Summary of the summer and winter peak hour MW and annual MWH losses for LGE and KU and the total system. Results are detailed by segment and season: Summer (June, July, August, and September), Winter (all months excluding Summer months). Loss data is from Schedule 3.
Schedule 3, Page 7	Summary of MW and MWH loss results for each control area by season and voltage level.
Schedule 4, Page 8	Summary of seasonal peak hour MW and average MWH loss results for LGE by season and voltage level.

Louisville Gas and Electric Company (LGE)
Kentucky Utilities Company (KU)
2011 Transmission Loss Analysis

Schedule 5, Page 9 Summary of seasonal peak hour MW and average MWH loss results for KU by season and voltage level.

Appendices:

Page 10 A - Peak Demand
Page 11 B - Monthly Energy
Page 12 C - Energy Summary
Page 13 D - Demand Summary

Appendices include summaries of hourly calculation of losses for each identified type at transmission voltage levels by season identified by fixed and variable with GSU losses identified separately.

Workpapers:

Page 14 1 - LGE
Page 15 2 - KU

Workpapers 1 and 2 present detailed summary results of eight separate power flows for each control area (LGE and KU) for a total of sixteen unique simulations and loss results.

3 - Corona Loss Calculations

Page 16 Page presents the Corona loss estimate and calculations by voltage level and control area (LGE and KU) for the peak in MW and the annual MWH for 2010.

Page 17 Page presents the pole miles by company and voltage level.

LGEE (LGE & KU) 2011 TRANSMISSION LOSS ANALYSIS (1)

	I TRANSMISSION LOSSES WITH GSU	LOSSES	% OF TOTAL TRANSMISSION	INPUT	OUTPUT	LOSS FACTOR (Input/Output)
	A. DEMAND	**Peak (MW) Summer (June - September)**				
1	LGE	57.9	27.8%	4,060	4,002	1.01448
2	KU	150.3	72.2%	4,865	4,715	1.03187
3	Total Demand Losses Combined (3)	208.2	100.0%	7,905	7,697	1.02705
4	Unmetered Station Use Adjustment					0.00100
5	Demand Loss Factor					1.02805
	B. ENERGY	**Annual MWH**				
6	LGE	199,404	21.5%	21,626,727	21,427,323	1.00931
7	KU	727,568	78.5%	27,462,725	26,735,158	1.02721
8	Total Energy Losses Combined (3)	926,971	100.0%	43,634,621	42,707,650	1.02171
9	Unmetered Station Use Adjustment					0.00100
10	Energy Loss Factor					1.02271

	II TRANSMISSION GSU LOSSES	LOSSES (MW)			LOSSES (MWH)		
		FIXED	VARIABLE	TOTAL	FIXED	VARIABLE	TOTAL
	A. GSU LOSSES (2)						
11	LGE	2.90	8.50	11.40	15,715	38,826	54,541
12	KU	2.40	5.40	7.80	14,820	25,784	40,604
13	Total GSU Losses	5.30	13.90	19.20	30,535	64,610	95,145

	III TRANSMISSION ONLY LOSSES	LOSSES	% OF TOTAL TRANSMISSION	INPUT	OUTPUT	LOSS FACTOR (Input/Output)
	A. DEMAND LOSSES (Loss II-A)	**Peak (MW) Summer (June - September)**				
14	LGE	46.5	24.6%	4,049	4,002	1.01163
15	KU	142.5	75.4%	4,857	4,715	1.03021
16	Total Demand Combined (2)	189.0	100.0%	7,886	7,697	1.02456
17	Unmetered Station Use Adjustment					0.00100
18	Demand Loss Factor					1.02556
	B. ENERGY LOSSES (Loss II-A)	**Annual MWH**				
19	LGE	144,863	17.4%	21,572,186	21,427,323	1.00676
20	KU	686,964	82.6%	27,422,121	26,735,158	1.02570
21	Total Energy Combined (2)	831,826	100.0%	43,539,476	42,707,650	1.01948
22	Unmetered Station Use Adjustment					0.00100
23	Energy Loss Factor					1.02048

Notes:
(1) Study Period from February 2011 through January 2012.
(2) GSU losses from Schedule 3.
(3) See Schedule 1A, Schedule 1B, and Schedule 2.

LGE 2011 TRANSMISSION LOSS ANALYSIS

			LOSSES		INPUT	OUTPUT	LOSS FACTOR (Input/Output)
I	**TRANSMISSION LOSSES WITH GSU**						
	A.	**DEMAND**		**Peak (MW) Summer (June - September)**			
1		LGE	57.9		4,060	4,002	1.01448
2		Unmetered Station Use Adjustment					0.00100
3		Demand Loss Factor					1.01548
	B.	**ENERGY**		**Annual MWH**			
4		LGE	199,404		21,626,727	21,427,323	1.00931
5		Unmetered Station Use Adjustment					0.00100
6		Energy Loss Factor					1.01031

			LOSSES (MW)			LOSSES (MWH)		
II	**TRANSMISSION GSU LOSSES**		**FIXED**	**VARIABLE**	**TOTAL**	**FIXED**	**VARIABLE**	**TOTAL**
	A.	**GSU LOSSES (1)**						
7		LGE	2.90	8.50	11.40	15,715	38,826	54,541

			LOSSES		INPUT	OUTPUT	LOSS FACTOR (Input/Output)
III	**TRANSMISSION ONLY LOSSES**						
	A.	**DEMAND LOSSES**		**Peak (MW) Summer (June - September)**			
8		LGE (Line 1 - Line 7)	46.5		4,049	4,002	1.01163
9		Unmetered Station Use Adjustment					0.00100
10		Demand Loss Factor					1.01263
	B.	**ENERGY LOSSES**		**Annual MWH**			
11		LGE (Line 4 - Line 7)	144,863		21,572,186	21,427,323	1.00676
12		Unmetered Station Use Adjustment					0.00100
13		Energy Loss Factor					1.00776

Notes:
1. GSU losses from Schedule 3.
2. See Schedule 2

KU 2011 TRANSMISSION LOSS ANALYSIS

			LOSSES	INPUT	OUTPUT	LOSS FACTOR (Input/Output)
I	**TRANSMISSION LOSSES WITH GSU**					
	A.	**DEMAND**	**Peak (MW) Summer (June - September)**			
1		KU	150.3	4,865	4,715	1.03187
2		Unmetered Station Use Adjustment				0.00100
3		Demand Loss Factor				1.03287
	B.	**ENERGY**	**Annual MWH**			
4		KU	727,568	27,462,725	26,735,158	1.02721
5		Unmetered Station Use Adjustment				0.00100
6		Energy Loss Factor				1.02821

			LOSSES (MW)			LOSSES (MWH)		
II	**TRANSMISSION GSU LOSSES**		**FIXED**	**VARIABLE**	**TOTAL**	**FIXED**	**VARIABLE**	**TOTAL**
	A.	**GSU LOSSES (1)**						
7		KU	2.40	5.40	7.80	14,820	25,784	40,604

			LOSSES	INPUT	OUTPUT	LOSS FACTOR (Input/Output)
III	**TRANSMISSION ONLY LOSSES**					
	A.	**DEMAND LOSSES**	**Peak (MW) Summer (June - September)**			
8		KU (Line 1 - Line 7)	142.5	4,857	4,715	1.03021
9		Unmetered Station Use Adjustment				0.00100
10		Demand Loss Factor				1.03121
	B.	**ENERGY LOSSES**	**Annual MWH**			
11		KU (Line 4 - Line 7)	686,964	27,422,121	26,735,158	1.02570
12		Unmetered Station Use Adjustment				0.00100
13		Energy Loss Factor				1.02670

Notes:
1. GSU losses from Schedule 3.
2. See Schedule 2

LGEE (LGE & KU) POWER FLOW RESULTS - SUMMARY OF LOSSES

	TRANSMISSION LOSSES WITH GSU	PEAK (SUMMER) Total (MW)	PEAK (SUMMER) % of Total System Losses	PEAK (OTHER) Total (MW)	PEAK (OTHER) % of Total System Losses	ANNUAL Total Annual (MWH)	ANNUAL % of Total System Losses
	LGE						
1	Transmission Use (Peak MW, Annual MWH)	4,002		3,300		21,427,323	
2	Input (Line 1 + Line 5)	4,060		3,328		21,626,727	
	Transmission						
3	Fixed	5.9	2.9%	5.2	2.3%	43,657	4.7%
4	Variable	52.0	25.0%	22.5	10.0%	155,747	16.8%
5	Total Transmission - LGE	57.9	27.8%	27.7	12.3%	199,404	21.5%
6	Losses % of Input (Line 5/Line 2)	1.43%		0.83%		0.92%	
7	Losses % of Output (Line 5/Line 1)	1.45%		0.84%		0.93%	
	KU						
8	Transmission Use (Peak MW, Annual MWH)	4,715		4,961		26,735,158	
9	Input (Line 8 + Line 12)	4,865		5,159		27,462,725	
	Transmission						
10	Fixed	8.2	3.9%	8.1	3.6%	67,476	7.3%
11	Variable	142.0	68.2%	190.0	84.1%	660,091	71.2%
12	Total Transmission - KU	150.3	72.2%	198.1	87.7%	727,568	78.5%
13	Losses % of Input (Line 12/Line 9)	3.09%		3.84%		2.65%	
14	Losses % of Output (Line 2/Line 8)	3.19%		3.99%		2.72%	
	TOTAL LGE & KU						
15	LGEE Load (Peak MW, Annual MWH) Input	8,925		8,487		49,089,452	
16	LGE Energy Delivery to KU	-1,020		-1,228		-5,454,831	
17	Total Load (Peak MW, Annual MWH)	7,905		7,259		43,634,621	
	Transmission						
18	Fixed	14.2	6.8%	13.4	5.9%	111,133	12.0%
19	Variable	194.0	93.2%	212.5	94.1%	815,838	88.0%
20	Total System	208.2	100.0%	225.9	100.0%	926,971	100.0%
21	Losses % of Input (Line 20/Line 15)	2.33%		2.66%		1.89%	
22	Losses % of Output (Line 20/(Line 15/Line 20))	2.39%		2.73%		1.92%	

COMBINED LGEE DELIVERED ENERGY & LOSSES

		SUMMER		WINTER		ANNUAL	
23	LGEE Load (All data in MWH) Output	17,146,907		31,015,574		48,162,481	
24	LGE Energy Delivery to KU	-1,689,262		-3,765,569		-5,454,831	
25	Total Load (Annual MWH) Output	15,457,645		27,250,005		42,707,650	
	Transmission Losses						
26	Fixed	37,940	11.1%	73,193	12.5%	111,133	12.0%
27	Variable	303,970	88.9%	511,869	87.5%	815,838	88.0%
28	Total Transmission Losses	341,909	100.0%	585,062	100.0%	926,971	100.0%
29	Losses % of Output (Line 28/Line 23)	1.99%		1.89%		1.92%	

LGEE (LGE & KU) POWER FLOW RESULTS - TOTAL TRANSMISSION

CONDUCTOR AND TRANSFORMER LOSSES (MW)

	TIME	MW TRANSMISSION USE	Transmission Fixed	Transmission Variable	GSU Fixed	GSU Variable	Subtotal Conductor & Transformer	Load Adjustment for Combined Only
	OTHER - LGE							
1	PEAK - MW	3,300	3.15	16.50	2.10	6.00	27.75	1228.00
2	LOSS % TO LOAD		0.095%	0.500%	0.064%	0.182%	0.841%	
3	LOSS % TO TOTAL LOSSES		11.349%	59.461%	7.568%	21.622%	100.000%	
4								
5	OTHER MWH	13,679,183	18,668	63,034	10,054	24,023	115,779	3,765,569
6	LOSS % TO LOAD		0.136%	0.461%	0.073%	0.176%	0.846%	
7	LOSS % TO TOTAL LOSSES		16.124%	54.443%	8.684%	20.749%	100.000%	
	SUMMER - LGE							
8	PEAK - MW	4,002	3.05	43.50	2.90	8.50	57.95	1020.00
9	LOSS % TO LOAD		0.076%	1.087%	0.072%	0.212%	1.448%	
10	LOSS % TO TOTAL LOSSES		5.262%	75.066%	5.004%	14.668%	100.000%	
11								
12	SUMMER MWH	7,748,140	9,274	53,887	5,661	14,803	83,625	1,689,262
13	LOSS % TO LOAD		0.120%	0.695%	0.073%	0.191%	1.079%	
14	LOSS % TO TOTAL LOSSES		11.090%	64.439%	6.770%	17.702%	100.000%	
	TOTAL ANNUAL - LGE							
15	SUMMER PEAK - MW	4,002	3.05	43.50	2.90	8.50	57.95	1020.00
16	ANNUAL MWH	21,427,323	27,942	116,921	15,715	38,826	199,404	5,454,831
17	LOSS % TO TOTAL ANNUAL OUTPUT		0.130%	0.546%	0.073%	0.181%	0.931%	
	LOSS FACTORS - LGE							
18	Demand						1.01448	
19	Energy						1.00931	
	OTHER - KU							
20	PEAK - MW	4,961	5.81	183.94	2.30	6.10	198.15	
21	LOSS % TO LOAD		0.117%	3.708%	0.046%	0.123%	3.994%	
22	LOSS % TO TOTAL		2.930%	92.831%	1.161%	3.079%	100.000%	
23								
24	OTHER MWH	17,336,391	35,105	408,661	9,366	16,151	469,283	
25	LOSS % TO LOAD		0.202%	2.357%	0.054%	0.093%	2.707%	
26	LOSS % TO TOTAL LOSSES		7.481%	87.082%	1.996%	3.442%	100.000%	
	SUMMER - KU							
27	PEAK - MW	4,715	5.81	136.65	2.40	5.40	150.25	
28	LOSS % TO LOAD		0.123%	2.898%	0.051%	0.115%	3.187%	
29	LOSS % TO TOTAL		3.864%	90.945%	1.597%	3.594%	100.000%	
30								
31	SUMMER MWH	9,398,766	17,551	225,647	5,454	9,633	258,285	
32	LOSS % TO LOAD		0.187%	2.401%	0.058%	0.102%	2.748%	
	TOTAL ANNUAL - KU							
33	PEAK - MW	4,715	5.81	136.65	2.40	5.40	150.25	
34	ANNUAL MWH	26,735,158	52,656	634,307	14,820	25,784	727,568	
35	LOSS % TO TOTAL ANNUAL OUTPUT		0.197%	2.373%	0.055%	0.096%	2.721%	
	LOSS FACTORS - KU							
36	Demand						1.03187	
37	Energy						1.02721	
	TOTAL ANNUAL - LGEE OUTPUT & LOSSES							
38	PEAK SUMMER - MW	8,717	8.86	180.15	5.30	13.90	208.20	1020.00
39	SUMMER MWH	17,146,907	26,825	279,534	11,115	24,436	341,909	1,689,262
40	PEAK OTHER MW	8,262	8.96	200.44	4.40	12.10	225.90	1228.00
41	OTHER MWH	31,015,574	53,773	471,695	19,420	40,174	585,062	3,765,569
42	ANNUAL MWH	48,162,481	80,598	751,228	30,535	64,610	926,971	5,454,831

LGE POWER FLOW RESULTS

CONDUCTOR AND TRANSFORMER LOSSES (MW)

	TIME	MW-LGE TRANSMISSION USE	Transmission Fixed (4)	Transmission Variable	GSU Fixed	GSU Variable	Subtotal Conductor & Transformer
	OTHER - LGE						
1	PEAK - MW	3,300	3.15	16.50	2.10	6.00	27.75
2	LOSS % TO LOAD		0.095%	0.500%	0.064%	0.182%	0.841%
3	LOSS % TO TOTAL LOSSES		11.349%	59.461%	7.568%	21.622%	100.000%
4							
5	OTHER MWH	13,679,183	18,668	63,034	10,054	24,023	115,779
6	LOSS % TO LOAD		0.136%	0.461%	0.073%	0.176%	0.846%
7	LOSS % TO TOTAL LOSSES		16.124%	54.443%	8.684%	20.749%	100.000%
	SUMMER - LGE						
8	PEAK - MW	4,002	3.05	43.50	2.90	8.50	57.95
9	LOSS % TO LOAD		0.076%	1.087%	0.072%	0.212%	1.448%
10	LOSS % TO TOTAL LOSSES		5.262%	75.066%	5.004%	14.668%	100.000%
11							
12	SUMMER MWH	7,748,140	9,274	53,887	5,661	14,803	83,625
13	LOSS % TO LOAD		0.120%	0.695%	0.073%	0.191%	1.079%
14	LOSS % TO TOTAL LOSSES		11.090%	64.439%	6.770%	17.702%	100.000%
	TOTAL ANNUAL - LGE						
15	SUMMER PEAK - MW	4,002	3.05	43.50	2.90	8.50	57.95
16	LOSS % TO SUMMER PEAK MW		0.076%	1.087%	0.072%	0.212%	1.448%
17	ANNUAL MWH	21,427,323	27,942	116,921	15,715	38,826	199,404
18	LOSS % TO ANNUAL MWH		0.130%	0.546%	0.073%	0.181%	0.931%
	LOSS FACTORS - LGE						
19	Demand						1.01448
20	Energy						1.00931

NOTES:
(1) Summer Period includes June, July, August, and September.
(2) Other Period includes all non Summer Period months.
(3) Transmission Use = Load + Exports + Passthroughs
(4) Transmission Fixed includes Corona Losses

KU POWER FLOW RESULTS

CONDUCTOR AND TRANSFORMER LOSSES (MW)

	TIME	MW-KU TRANSMISSION USE	Transmission Fixed (4)	Transmission Variable (5)	GSU Fixed	GSU Variable	Subtotal Conductor & Transformer
	OTHER - KU						
1	PEAK - MW	4,961	5.81	183.94	2.30	6.10	198.15
2	LOSS % TO LOAD		0.117%	3.708%	0.046%	0.123%	3.994%
3	LOSS % TO TOTAL LOSSES		2.930%	92.831%	1.161%	3.079%	100.000%
4							
5	OTHER MWH	17,336,391	35,105	408,661	9,366	16,151	469,283
6	LOSS % TO LOAD		0.202%	2.357%	0.054%	0.093%	2.707%
7	LOSS % TO TOTAL LOSSES		7.481%	87.082%	1.996%	3.442%	100.000%
	SUMMER - KU						
8	PEAK - MW	4,715	5.81	136.65	2.40	5.40	150.25
9	LOSS % TO LOAD		0.123%	2.898%	0.051%	0.115%	3.187%
10	LOSS % TO TOTAL LOSSES		3.864%	90.945%	1.597%	3.594%	100.000%
11							
12	SUMMER MWH	9,398,766	17,551	225,647	5,454	9,633	258,285
13	LOSS % TO LOAD		0.187%	2.401%	0.058%	0.102%	2.748%
14	LOSS % TO TOTAL LOSSES		6.795%	87.364%	2.112%	3.730%	100.000%
	TOTAL ANNUAL - KU						
15	SUMMER PEAK - MW	4,715	5.81	136.65	2.40	5.40	150.25
16	LOSS % TO SUMMER PEAK MW		0.123%	2.898%	0.051%	0.115%	3.187%
17	ANNUAL MWH	26,735,158	52,656	634,307	14,820	25,784	727,568
18	LOSS % TO ANNUAL MWH		0.197%	2.373%	0.055%	0.096%	2.721%
	LOSS FACTORS - KU						
19	Demand						1.03187
20	Energy						1.02721

NOTES:

(1) Summer Period includes June, July, August, and September.
(2) Other Period includes all non Summer Period months.
(3) Transmission Use = Load + Exports + Passthroughs
(4) Transmission Fixed includes Corona Losses
(5) Transmission Variable includes Losses at 0.5% from Appendix A (MW) and Appendix B (MWH)

Kentucky Utilities	OTHER 2/11/11 8:00 February-11	SUMMER 7/11/11 16:00 July-11	OTHER	SUMMER
Loads:				
1 KU Load (including losses)	4,292	4,102		
2 EKPC on KU	446	355		
3 TVA on KU	59	58		
4 OMU Load (3%)	-	12		
5 BREC on KU	6	6		
6 KMPA Load (3%)	108	129		
7 Total Load	4,911	4,662	4,911.00	4,662.00
Export (Delivered):				
8 KU Off-System Sales	-	-		
9 AMEM - Pass Through	-	-		
10 CARGILL - Pass Through	-	-		
11 OMU Exports	249	204		
12 KMPA Exports	-	-		
13 Constellation - Pass Through	-	-		
14 TEA - Pass Through	-	-		
15 TVA (OATT) - Pass Through	-	-		
16 Total Exports	249	204	249.00	204.00
17 BTM (0.5%) - OMU Network Load	112	182		
18 BTM (0.5%) - KMPA Gen	-	49		
19 Total BTM	112	231		
			5,160.00	4,866.00
20 Losses at 0.5%	0.560	1.155		
21 Losses from Schedule 5, Lines 1 and 8			-198.71	-151.41
22 Peak MW Load			4,961.29	4,714.59

Louisville Gas and Electric

Loads:				
23 LGE Load (including losses)	1,725	2,654		
23 EKPC on LGE	61	77		
24 Hoosier on LGE	5	6		
25 Total Load	1,791	2,737	1,791.00	2,737.00
Export (Delivered):				
26 IMEA	146	146		
27 IMPA	155	157		
28 LGE Off-System Sales	8	-		
29 OVEC to SIGE	-	-		
30 Total Exports	309	303	309.00	303.00
31 LGE to KU	1,228	1,020	1,228.00	1,020.00
			3,328.00	4,060.00
32 Losses from Schedule 4, Lines 1 and 8			-27.75	-57.95
33 Peak MW Load			3,300.25	4,002.05

Notes:
(1) Information above was gathered through the Peak Load spreadsheet which is used for FERC Form 1 data collection. Additionally, information was gathered from the individual billings each month, which also flows into FERC Form 1.
(2) OSS information was gathered through multiple spreadsheets from Revenue Accounting and Transmission groups.

Kentucky Utilities

Prepared by: FR/DH

	February-11	March-11	April-11	May-11	June-11	July-11	August-11	September-11	October-11	November-11	December-11	January-12	Total	Other	Summer
Loads:															
1 KU Load (including losses)	1,882,033	1,838,010	1,567,127	1,688,187	1,906,541	2,167,087	2,097,914	1,653,158	1,650,548	1,687,623	1,918,215	2,083,767	22,140,210		
2 EKPC on KU	192,766	183,756	155,967	163,451	164,293	182,579	182,121	147,273	142,289	161,421	192,322	213,632	2,081,870		
3 TVA on KU	30,019	26,656	20,497	22,985	27,885	34,587	29,211	21,634	19,664	26,719	36,278	34,830	330,965		
4 OMU Load (3%)	-	-	-	555	-	1,043	1,328	165	6,757	-	-	-	9,848		
5 BREC on KU	3,047	2,972	2,440	2,382	2,575	2,943	3,367	3,272	3,715	2,495	3,797	4,364	37,370		
6 KMPA Load (3%)	53,933	54,624	50,868	58,455	71,032	79,177	77,514	57,137	49,740	51,011	56,115	56,274	715,880		
7 Total Load	2,161,798	2,106,018	1,796,898	1,936,015	2,172,326	2,467,416	2,391,455	1,882,639	1,872,713	1,929,269	2,206,727	2,392,867	25,316,143	16,402,307	8,913,836
Export (Delivered):															
8 KU Off-System Sales	10,003	1,971	14	13,001	23,568	12,175	4,828	384	29,307	2,890	542	265	98,948		
9 AMEM - Pass Through	-	-	2,400	-	-	-	-	-	12,000	2,400	11,338	51,500	79,638		
10 CARGILL - Pass Through	31,261	100	-	23,399	2,400	-	-	20,527	13,749	70	-	-	91,506		
11 OMU Exports	165,206	183,023	175,905	50,051	156,463	143,444	137,842	155,042	106,507	137,874	176,030	158,940	1,746,327		
12 KMPA Exports	-	-	-	-	-	-	-	-	59	-	-	-	59		
13 Constellation - Pass Through	-	-	-	11,734	4,740	24,485	34,163	25,048	34,099	-	-	-	134,269		
14 TEA - Pass Through	-	-	-	-	-	-	-	-	59	66	-	-	125		
15 TVA (OATT) - Pass Through	-	-	308	-	-	-	-	-	-	-	-	-	308		
16 Total Exports	206,470	185,094	178,627	98,185	187,171	180,104	176,833	201,001	195,780	143,300	187,910	210,705	2,151,180	1,406,071	745,109
17 BTM (0.5%) - OMU Network Load	64,375	67,851	62,989	71,662	86,097	103,156	96,293	73,876	61,587	65,420	69,832	70,719	893,857		
18 BTM (0.5%) - KMPA Gen	-	-	-	1,054	4,315	9,837	4,422	858	1,839	-	1,479	1,872	25,677		
19 Total BTM	64,375	67,851	62,989	72,716	90,412	112,993	100,715	74,734	63,426	65,420	71,311	72,591	919,534		
20 Losses at 0.5%	322	339	315	364	452	565	504	374	317	327	357	363	4,598		
21 Total MWH Input														17,808,378	9,658,945
22 Losses from Schedule 5, Lines 5 and 12														-471,986	-260,179
23 Total MWH Output														17,336,391	9,398,766

Louisville Gas and Electric

	February-11	March-11	April-11	May-11	June-11	July-11	August-11	September-11	October-11	November-11	December-11	January-12	Total		
Loads:															
23 LGE Load (including losses)	903,869	935,217	852,840	998,568	1,189,433	1,431,090	1,316,506	968,118	877,979	870,461	958,046	988,020	12,290,147		
24 EKPC on LGE	25,617	24,530	20,953	24,482	30,141	37,883	33,856	23,583	21,869	22,649	27,706	29,346	322,615		
25 Hoosier on LGE	3,006	3,093	2,628	3,247	3,465	3,908	3,767	3,220	3,081	2,998	3,210	3,263	38,886		
26 Total Load	932,492	962,840	876,421	1,026,297	1,223,039	1,472,881	1,354,129	994,921	902,929	896,108	988,962	1,020,629	12,651,648	7,606,677	5,044,971
Export (Delivered):															
27 IMEA	87,925	74,691	45,921	89,073	102,288	100,626	86,582	74,691	75,238	61,640	90,715	99,872	989,262		
28 IMPA	93,431	79,319	48,912	94,516	107,515	106,729	90,741	77,329	79,575	65,340	97,587	105,971	1,046,965		
29 LGE Off-System Sales	155,240	139,458	45,904	124,917	96,244	96,890	49,158	108,739	205,726	207,341	158,716	95,688	1,484,021		
30 OVEC to SIGE	-	-	-	-	-	-	-	-	-	-	-	-	-		
31 Total Exports	336,596	293,468	140,737	308,506	306,047	304,245	226,481	260,759	360,539	334,321	347,018	301,531	3,520,248	2,422,716	1,097,532
32 LGE to KU	484,518	444,877	370,225	397,072	364,002	440,065	446,201	438,994	458,456	438,203	561,790	610,428	5,454,831	3,765,569	1,689,262
33 Total MWH Input														13,794,962	7,831,765
34 Losses from Schedule 4, Lines 5 and 12														-115,779	-83,625
35 Total MWH Output														13,679,183	7,748,140

Information above was gathered through the Peak Load spreadsheet which is used for FERC Form 1 data collection. Additionally, information was gathered from the individual billings each month, which also flows into FERC Form 1
OSS information was gathered through multiple spreadsheets from Revenue Accounting and Transmission groups.

LGEE Loss Summary

	LGE Loss Summary		Transmission Losses		Generation Losses	
	Season	Month	Fixed	Variable	Fixed	Variable
1	O	01	1,944	8,405	1,405	3,124
2	O	02	1,753	7,950	1,165	3,114
3	O	03	1,970	8,159	1,205	3,317
4	O	04	1,923	6,323	1,217	2,547
5	O	05	1,978	9,932	1,207	3,076
6	S	06	1,877	13,384	1,289	3,615
7	S	07	1,933	16,655	1,542	4,380
8	S	08	1,940	15,067	1,454	3,936
9	S	09	1,915	8,781	1,376	2,872
10	O	10	1,999	7,087	1,180	2,917
11	O	11	1,937	6,926	1,273	2,856
12	O	12	1,960	8,252	1,402	3,072
13		Total	23,129	116,921	15,715	38,826
14		Summer Corona	1,609			
15	S	Total LGE Summer	9,274	53,887	5,661	14,803
16		Other Corona	3,204			
17	O	Total LGE Other	18,668	63,034	10,054	24,023

	KU Loss Summary		Transmission Losses		Generation Losses	
	Season	Month	Fixed	Variable	Fixed	Variable
18	O	01	3,246	66,020	1,272	2,314
19	O	02	2,937	65,153	1,209	2,146
20	O	03	3,279	51,357	1,244	2,220
21	O	04	3,200	40,542	1,058	1,929
22	O	05	3,312	41,568	1,190	2,000
23	S	06	3,155	59,549	1,405	2,449
24	S	07	3,247	64,025	1,459	2,832
25	S	08	3,260	61,754	1,436	2,666
26	S	09	3,187	42,213	1,154	1,686
27	O	10	3,306	42,719	1,079	1,752
28	O	11	3,189	49,382	1,089	1,865
29	O	12	3,271	54,623	1,225	1,925
30		Total	38,589	638,905	14,820	25,784
31		Summer Corona	4,702			
32	S	Total KU Summer	17,551	227,541	5,454	9,633
33		Other Corona	9,365			
34	O	Total KU Other	35,105	411,364	9,366	16,151

	LGEE Loss Summary		Transmission Losses		Generation Losses	
	Season	Month	Fixed	Variable	Fixed	Variable
35	O	01	5,190	74,425	2,677	5,438
36	O	02	4,690	73,103	2,374	5,260
37	O	03	5,249	59,516	2,449	5,537
38	O	04	5,123	46,865	2,275	4,476
39	O	05	5,290	51,500	2,397	5,076
40	S	06	5,032	72,933	2,694	6,064
41	S	07	5,180	80,680	3,001	7,212
42	S	08	5,200	76,821	2,890	6,602
43	S	09	5,102	50,994	2,530	4,558
44	O	10	5,305	49,806	2,259	4,669
45	O	11	5,126	56,308	2,362	4,721
46	O	12	5,231	62,875	2,627	4,997
47		Total	61,718	755,826	30,535	64,610
48		Summer Corona	6,311			
49	S	Total LGEE Summer	26,825	281,428	11,115	24,436
50		Other Corona	12,569			
51	O	Total LGEE Other	53,773	474,398	19,420	40,174

Notes:
(1) Includes Corona Losses from Workpaper 3

Summer Peak Hour 2011-07-11-1600

		Transmission Losses		Generation Losses	
		Fixed (1)	Variable	Fixed	Variable
1	KU	5.8	137.8	2.4	5.4
2	LG&E	3.0	43.5	2.9	8.5
3	Combined	8.9	181.3	5.3	13.9

Winter Peak Hour 2011-02-11-0800

		Transmission Losses		Generation Losses	
		Fixed (1)	Variable	Fixed	Variable
4	KU	5.8	184.5	2.3	6.1
5	LG&E	3.1	16.5	2.1	6.0
6	Combined	9.0	201.0	4.4	12.1

		Corona Losses (MW)
		Fixed (1)
7	KU	1.606
8	LG&E	0.549
9	Combined	2.155

Notes:
(1) Includes Corona Losses from Workpaper 3

Hour	LG&E Load	KU on LG&E	EKPC on LG&E	HE on LG&E	LG&E T Loss-f	LG&E T Loss-v	LG&E G Loss-f	LG&E G Loss-v	Net Export	BLG Export	Month
2011-02-01-0100	1217.7	6.3	35.6	4.3	2.6	11.5	1.7	4.6	1394.6	0	02
2011-02-01-0200	1179.1	6	34.4	4.4	2.6	11	1.7	4.4	1373.9	0	02
2011-02-01-0300	1147.9	5.8	33.6	4	2.6	10.8	1.7	4.3	1354.7	0	02
2011-02-01-0400	1138.1	5.6	33	4	2.6	11.6	1.7	4.3	1374.9	0	02
2011-02-01-0500	1149.1	5.7	33.8	3.9	2.6	12	1.7	4.5	1398.1	0	02
2011-02-01-0600	1201.1	6	37.3	4	2.6	12.5	1.7	4.6	1379.2	0	02
2011-02-01-0700	1347.6	6.8	41.9	4.1	2.6	15.3	1.7	5.6	1454.3	0	02
2011-02-01-0800	1429.8	7.2	43.4	4.3	2.6	15.6	1.7	5.6	1354.1	0	02
2011-02-01-0900	1431	7.1	41.9	4.7	2.6	15.6	1.7	5.5	1329.5	0	02
2011-02-01-1000	1424.8	7	41	4.6	2.6	15.4	1.7	5	1236.6	0	02
2011-02-01-1100	1440.5	7	40.8	4.6	2.6	14	1.7	4.6	1122.7	0	02
2011-02-01-1200	1442.4	6.9	40.3	4.5	2.6	14.3	1.7	4.7	1132	0	02
2011-02-01-1300	1438.7	6.8	40.3	4.5	2.6	14.5	1.7	4.8	1159.1	0	02
2011-02-01-1400	1394.7	6.7	39.4	4.4	2.6	13.6	1.7	4.6	1138.9	0	02
2011-02-01-1500	1371.6	6.6	39	4.6	2.6	13.2	1.7	4.3	1098	0	02
2011-02-01-1600	1388.5	6.7	39.7	4.6	2.6	13.2	1.7	4.2	1038.9	0	02
2011-02-01-1700	1408.8	6.8	41.6	4.3	2.6	13.5	1.7	4.3	1064.8	0	02
2011-02-01-1800	1448.7	7	44.2	4.3	2.6	14.7	1.7	4.6	1129.1	0	02
2011-02-01-1900	1483.7	7.2	45.7	4.4	2.6	15.1	1.7	4.8	1162.1	0	02
2011-02-01-2000	1450.8	7.1	45.2	4.7	2.6	15	1.7	4.6	1149.2	0	02
2011-02-01-2100	1414.2	7	44	4.7	2.6	14.5	1.7	4.6	1163.9	0	02
2011-02-01-2200	1337.9	6.6	41.1	4.6	2.6	12.8	1.7	4.5	1190.9	0	02
2011-02-01-2300	1255.5	6.1	37.2	4.2	2.6	11.5	1.7	4.1	1168.2	0	02
2011-02-02-0000	1140.4	5.7	32.8	4	2.6	9	1.7	3.4	1062.1	0	02
2011-02-02-0100	1076.3	5.4	30.7	4.3	2.6	8.1	1.7	3.2	1029.2	0	02
2011-02-02-0200	1046.7	5.3	30.5	4.2	2.6	7.9	2.1	3.3	1168.7	0	02
2011-02-02-0300	1071.2	5.4	32.4	4.1	2.6	8.1	2.1	3.5	1273.5	0	02
2011-02-02-0400	1101.7	5.7	35.5	4.2	2.6	8.3	2	3.6	1282.3	0	02
2011-02-02-0500	1162.1	6.1	38.3	4.3	2.6	9.4	2.1	4.2	1451.1	0	02
2011-02-02-0600	1230.2	7	42.9	4.5	2.6	10.5	2.1	4.6	1495.4	0	02
2011-02-02-0700	1387.9	8.1	49.3	4.7	2.6	13.1	2.1	5.6	1531.5	0	02
2011-02-02-0800	1502.7	9	51.8	4.6	2.6	15.4	2.1	6.5	1611.9	0	02
2011-02-02-0900	1511.5	9	50.4	4.6	2.6	15.2	2.1	6.3	1585.1	0	02
2011-02-02-1000	1514.9	9.3	49.8	4.8	2.6	15.1	2.1	6.2	1560.6	0	02
2011-02-02-1100	1544.2	9.1	49.4	4.9	2.6	15.6	2.1	6.4	1580	0	02
2011-02-02-1200	1552	9.1	49	4.7	2.6	15.7	2.1	6.4	1549	0	02
2011-02-02-1300	1558.5	9	48.6	4.5	2.6	15.9	2.1	6.8	1617.1	0	02
2011-02-02-1400	1559.7	8.9	48.3	4.5	2.6	16	2.1	6.7	1606.8	0	02
2011-02-02-1500	1554.9	8.8	47.3	4.5	2.6	15.8	2.1	6.6	1601.7	0	02
2011-02-02-1600	1538.9	8.7	47.9	4.6	2.6	15.6	2.1	6.5	1595	0	02
2011-02-02-1700	1537.9	8.6	50.4	5	2.6	15.6	2.1	6.9	1654.1	0	02
2011-02-02-1800	1556.3	9	52.5	5	2.6	15.6	2.1	6.7	1595.9	0	02
2011-02-02-1900	1616.8	9.4	56.5	5	2.6	16.6	2.1	6.5	1492.9	0	02
2011-02-02-2000	1618.7	9.4	57.6	5	2.6	16.6	2.1	6.5	1486	0	02

Hour	KU Load	KU on LG&E	KU on EKPC	EKPC on KU	BREC on KU	TVA on KU	OMU on KU	KMPA on KU	KU T Loss-f	KU T Loss-v	KU G Loss-f	KU G Loss-v	Net Export	OMU Export	PADP Gen	Month
2011-02-01-0100	2345.7	6.3	59.6	280.6	5	37.6	82	68.6	4.4	85.8	1.9	2.1	-1050.5	146.1	0	02
2011-02-01-0200	2259.9	6	57.9	265.6	4.9	35.2	83.5	65	4.4	82.9	1.9	1.9	-924.7	200.2	0	02
2011-02-01-0300	2191.3	5.8	56.9	257.6	4.7	33.7	82.5	63.8	4.4	82.7	1.9	1.8	-891.2	209	0	02
2011-02-01-0400	2131.8	5.6	56.5	257.6	4.7	32.5	83.8	63.4	4.4	88.1	1.9	1.9	-713	261.3	0	02
2011-02-01-0500	2137.1	5.7	56.5	259.3	4.5	32.5	85.3	64.1	4.4	88	1.9	2.1	-658.3	285.5	0	02
2011-02-01-0600	2244.3	6	58.2	274.8	5.3	33.8	86.3	66.1	4.4	92.3	1.9	2.3	-679.2	282.5	0	02
2011-02-01-0700	2500.3	6.8	62.4	286.8	5.5	37.6	91.7	72.1	4.3	103.6	1.9	3.5	-549.8	277.5	0	02
2011-02-01-0800	2682.1	7.2	67.2	271.4	5.6	43	102.2	82.5	4.3	100	1.9	3.5	-768.4	277	0	02
2011-02-01-0900	2691.9	7.1	68.7	287	5.7	40.3	110.7	88.1	4.3	100.7	1.9	3.5	-802.1	259.3	0	02
2011-02-01-1000	2698.6	7	69	273.9	6.1	38.8	111.1	91.6	4.3	100.1	1.9	3.5	-811.1	222.6	0	02
2011-02-01-1100	2693.2	7	68.6	279.1	5.4	38.7	111.1	92.6	4.4	92.6	1.9	3.1	-1025.6	139.2	0	02
2011-02-01-1200	2651	6.9	67.8	248.7	5.9	38.1	111	93.1	4.4	90.2	1.9	3	-973.1	146.9	0	02
2011-02-01-1300	2613.9	6.8	67	275.6	6	37.6	110	93.3	4.4	90.3	1.8	3.2	-891.5	181	0	02
2011-02-01-1400	2572.4	6.7	66.8	272.8	5.7	37.1	108.8	92.7	4.4	85.9	1.8	2.9	-969.7	143.2	0	02
2011-02-01-1500	2589.4	6.6	67.4	265.5	5.9	36.7	111.3	91.2	4.4	86.2	1.8	3.1	-898.7	166	0	02
2011-02-01-1600	2575.3	6.7	66.9	274.1	6.1	36.9	111.4	89.8	4.4	88.3	1.8	3.3	-812.7	181	0	02
2011-02-01-1700	2602.6	6.8	67.8	275.4	6.3	38.4	108.4	87.5	4.4	91.7	1.8	3.4	-803	190.5	0	02
2011-02-01-1800	2624.9	7	68.9	238.4	5.8	41.1	109.3	86.5	4.4	94.1	1.8	3.5	-723.5	205.5	0	02
2011-02-01-1900	2663.8	7.2	69.2	302.1	5.5	43.6	111.1	87.6	4.4	92.3	1.8	3.7	-789.1	204.2	0	02
2011-02-01-2000	2622.6	7.1	68.4	289	5.7	44.3	112.1	87.7	4.4	93.4	1.8	3.6	-713.7	256.7	0	02
2011-02-01-2100	2563.1	7	66.5	273.6	6	43.4	110.2	89.2	4.4	90.2	1.8	3.4	-687.2	282	0	02
2011-02-01-2200	2507.5	6.6	64.8	209.9	6.6	42.3	103.5	89.6	4.4	82.9	1.8	3	-751.7	205	0	02
2011-02-01-2300	2368.7	6.1	61.7	207	6	40.3	99.1	87.9	4.4	79.3	1.8	2.5	-830.1	182.7	0	02
2011-02-02-0000	2254.8	5.7	59.2	259.1	6.1	39.4	100.7	85.1	4.4	67.9	1.8	1.7	-1208.7	5.4	0	02
2011-02-02-0100	2176.4	5.4	57.5	224.2	5	38.8	96.9	81.1	4.4	58.5	1.8	1.6	-1101	62.2	0	02
2011-02-02-0200	2133.6	5.3	56.1	215.2	5.4	41	96.4	79.9	4.4	65.9	1.8	1.8	-950.7	105.5	0	02
2011-02-02-0300	2110	5.4	57.9	216.3	5.3	44.4	98.6	79.9	4.4	68.5	1.8	1.7	-899.7	151.2	0	02
2011-02-02-0400	2176.8	5.7	60.6	227	5.2	47	96.1	79.4	4.4	69.7	1.8	1.8	-955	156	0	02
2011-02-02-0500	2336.8	6.1	63.4	169.1	5	48.8	95.2	80.5	4.4	77.7	1.8	1.9	-1049.8	155.8	0	02
2011-02-02-0600	2567.8	7	68.1	194.7	5.6	52.8	96.9	83.3	4.4	88.2	1.8	2.4	-1133.3	155	0	02
2011-02-02-0700	2924.8	8.1	74.6	226.9	5.4	58.2	102.9	89.2	4.3	112.3	1.9	3.4	-1207.1	154.8	0	02
2011-02-02-0800	3226	9	81.8	238.4	5.4	64.2	113.3	99.3	4.3	124.3	1.9	4.5	-1232.2	149.9	0	02
2011-02-02-0900	3300.9	9	84.2	232.4	6	62.8	119.2	103.1	4.3	126.6	1.9	4.6	-1250.3	142.5	0	02
2011-02-02-1000	3382	9.3	84.9	235.4	6.4	63	121.8	105.2	4.3	133.4	1.9	4.8	-1295.4	137.9	0	02
2011-02-02-1100	3356	9.1	85.9	238.8	6.8	63.9	123.4	106.3	4.3	134.6	1.9	4.8	-1275.6	137.7	0	02
2011-02-02-1200	3363.5	9.1	86.2	239.7	6.6	62.9	123.4	106.9	4.3	136.2	2	4.8	-1235.3	138.5	0	02
2011-02-02-1300	3378.4	9	85.4	236.6	6.5	62.3	123.5	106.1	4.3	141.1	2	4.7	-1315.8	137.3	0	02
2011-02-02-1400	3340.1	8.9	85.3	232.6	7.3	60.8	125.9	104.4	4.3	142.4	2	4.7	-1293.7	137.4	0	02
2011-02-02-1500	3329	8.8	84.5	230.2	6.9	60.1	127.1	103.6	4.3	141.5	2	4.6	-1289.9	137.4	0	02
2011-02-02-1600	3260.3	8.7	83.9	232.4	7.1	60.1	125.4	102.5	4.3	139.7	2	4.5	-1250.9	138.6	0	02
2011-02-02-1700	3267.5	8.6	84.2	273.5	7.4	61.6	110.9	100.9	4.3	142.4	1.9	4.4	-1376.6	138.8	0	02
2011-02-02-1800	3385	9	85	325.2	7.4	64.4	112.4	102.1	4.3	138.9	1.9	4.6	-1384.8	180.4	0	02
2011-02-02-1900	3495.9	9.4	86.9	325.3	6.7	68.5	119	106.7	4.3	143.5	1.9	4.9	-1408.1	233.8	0	02
2011-02-02-2000	3498	9.4	87.8	340	6.3	69.5	122.9	108.5	4.3	146.4	1.9	4.9	-1405.7	260.1	0	02

LGE & KU - CORONA LOSS ESTIMATE

		VOLTAGE (kV)	MILES	CORONA PEAK LOSS FACTOR (MW Mile)	CORONA LOSSES (MW)	CORONA WINTER HOURS & LOSSES (MWH)	CORONA SUMMER HOURS & LOSSES (MWH)	CORONA TOTAL LOSSES (MWH)
A.	Fair Weather Corona Losses							
	LGE					5,832	2,928	
1		345	172	0.0032	0.549	3,204	1,609	4,813
2		161	116	0.0000	0.000	0	0	0
3		138	334	0.0000	0.000	0	0	0
4		69	289	0.0000	0.000	0	0	0
5	Subtotal		911		0.549	3,204	1,609	4,813
	KU					5,832	2,928	
6		500	57	0.0060	0.341	1,990	999	2,989
7		345	395	0.0032	1.265	7,375	3,703	11,078
8		161	518	0.0000	0.000	0	0	0
9		138	888	0.0000	0.000	0	0	0
10		69	2,218	0.0000	0.000	0	0	0
11	Subtotal		4,076		1.606	9,365	4,702	14,067
12	TOTAL		4,987		2.155	12,569	6,311	18,880
B.	Unmetered Station Use							
13	Estimated Unmetered Substation Use at				0.0010			

NOTE:
(1) Lines 5 and 11 loss results included in Schedules 3, 4, and 5.

LGE & KU

	Voltage by Company	Number of Miles LGE	KU	Total
1	**LGE**			
2	Overhead			
3	345	171.7		
4	161	116.4		
5	138	329.6		
6	69	286.3		
7	Total Overhead	904.0		904.0
8				
9	Underground			
10	138	4.0		
11	69	2.9		
12	Total Underground	6.9		6.9
13				
14	**Total LGE**	910.9		910.9
15				
16	**KU**			
17	500		56.9	
18	345		395.2	
19	161		518.2	
20	138		887.6	
21	69		2,218.4	
22				
23	**Total KU**		4,076.3	4,076.3
24				
25				
26	**Total Pole Miles**	910.9	4,076.3	4,987.2

LG&E AND KU SERVICES COMPANY
2010 Analysis of System Losses – LG&E Power System

Appendix B

Results of LG&E 2010 Loss Analysis

LG 2010 LOSS ANALYSIS

LG&E

EXHIBIT 1

SUMMARY OF COMPANY DATA

ANNUAL PEAK	2,852	MW
ANNUAL SYSTEM INPUT	12,966,029	MWH
ANNUAL SALES	12,399,868	MWH
SYSTEM LOSSES @ INPUT	566,161	or 4.37%
SYSTEM LOAD FACTOR	51.9%	

SUMMARY OF LOSSES - OUTPUT RESULTS

SERVICE	KV	--- MW --- Input		% TOTAL	--- MWH --- Input		% TOTAL
TRANS	500,345,138 69	43.5	1.53%	27.43%	132,516	1.02%	23.41%
PRIM SUBS	33,12,1	16.2	0.57%	10.21%	70,977	0.55%	12.54%
PRIMARY	33,12,1	55.2	1.94%	34.83%	160,720	1.24%	28.39%
SECONDARY	120/240,to,477	43.7	1.53%	27.54%	201,948	1.56%	35.67%
TOTAL		158.6	5.56%	100.00%	566,161	4.37%	100.00%

SUMMARY OF LOSS FACTORS

SERVICE	KV	CUMMULATIVE SALES EXPANSION FACTORS DEMAND (Peak) d	1/d	ENERGY (Annual) e	1/e
TOT TRANS	500,345,138 69	1.01549	0.98475	1.01033	0.98978
PRIM SUBS	33,12,1	1.02152	0.97894	1.01619	0.98407
PRIMARY	33,12,1	1.04295	0.95882	1.02998	0.97089
SECONDARY	120/240,to,477	1.06325	0.94052	1.05235	0.95025

LG 2010 LOSS ANALYSIS

SUMMARY OF CONDUCTOR INFORMATION

DESCRIPTION	CIRCUIT MILES	LOADING % RATING	MW LOSSES LOAD	MW LOSSES NO LOAD	MW LOSSES TOTAL	MWH LOSSES LOAD	MWH LOSSES NO LOAD	MWH LOSSES TOTAL
--- BULK ---------- 500 KV OR GREATER ----------								
TIE LINES	0.0	0.00%	0.000	0.000	0.000	0	0	0
BULK TRANS	0.0	0.00%	0.000	0.000	0.000	0	0	0
SUBTOT	0.0		0.000	0.000	0.000	0	0	0
--- TRANS --------- 138 KV TO 500.00 KV								
TIE LINES	0	0.00%	0.000	0.000	0.000	0	0	0
TRANS1 345 KV	0.0	0.00%	0.000	0.000	0.000	0	0	0
TRANS2 138 KV	0.0	0.00%	0.000	0.000	0.000	0	0	0
SUBTOT	0.0		0.000	0.000	0.000	0	0	0
--- SUBTRANS ------ 35 KV TO 138 KV								
TIE LINES	0	0.00%	0.000	0.000	0.000	0	0	0
SUBTRANS1 KV	0.0	0.00%	0.000	0.000	0.000	0	0	0
SUBTRANS2 KV	0.0	0.00%	0.000	0.000	0.000	0	0	0
SUBTRANS3 KV	0.0	0.00%	0.000	0.001	0.001	0	6	6
SUBTOT	0.0		0.000	0.001	0.001	0	6	6
PRIMARY LINES	6,278		50.143	2.685	52.828	129,898	23,520	153,418
SECONDARY LINES	3,543		4.845	0.000	4.845	8,557	0	8,557
SERVICES	5,656		9.764	0.824	10.587	26,554	7,214	33,768
TOTAL	15,477		64.752	3.509	68.261	165,009	30,739	195,748

LG 2010 LOSS ANALYSIS

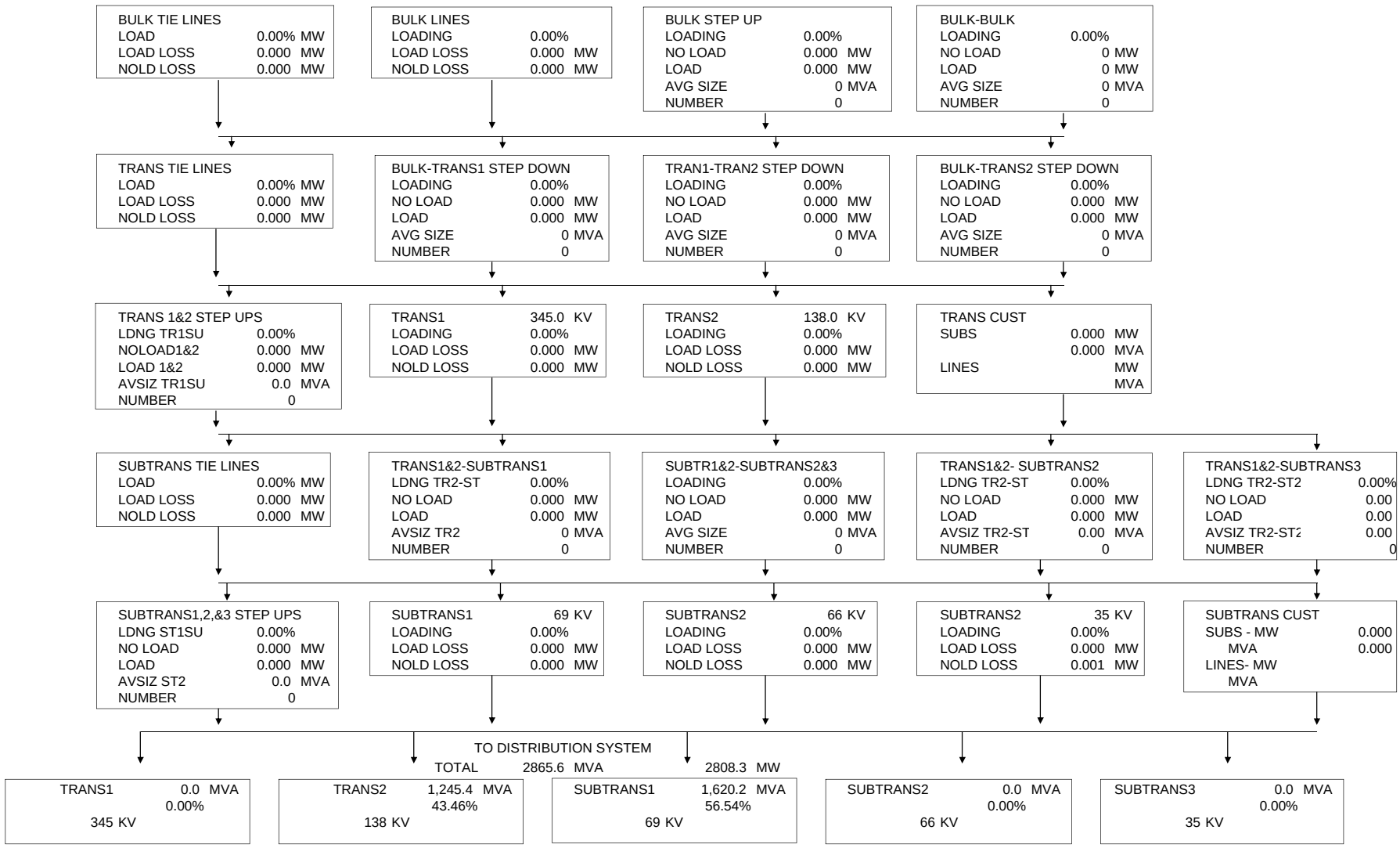
EXHIBIT 3

SUMMARY OF TRANSFORMER INFORMATION

DESCRIPTION	KV CAPACITY VOLTAGE	MVA	NUMBER TRANSFMR	AVERAGE SIZE	LOADING %	MVA LOAD	MW LOSSES LOAD	MW LOSSES NO LOAD	MW LOSSES TOTAL	MWH LOSSES LOAD	MWH LOSSES NO LOAD	MWH LOSSES TOTAL
BULK STEP-UP	500	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
BULK - BULK		0.0	0	0.0	0.00%	0	0	0.000	0.000	0	0	0
BULK - TRANS1	345	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
BULK - TRANS2	138	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
TRANS1 STEP-UP	345	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
TRANS1 - TRANS2	138	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
TRANS1-SUBTRANS1	69	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
TRANS1-SUBTRANS2	66	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
TRANS1-SUBTRANS3	35	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
TRANS2 STEP-UP	138	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
TRANS2-SUBTRANS1	69	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
TRANS2-SUBTRANS2	66	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
TRANS2-SUBTRANS3	35	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
SUBTRAN1 STEP-UP	69	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
SUBTRAN2 STEP-UP	66	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
SUBTRAN3 STEP-UP	35	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
SUBTRAN1-SUBTRAN2	66	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
SUBTRAN1-SUBTRAN3	35	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
SUBTRAN2-SUBTRAN3	35	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
DISTRIBUTION SUBSTATIONS												
TRANS1 - 345	33	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
TRANS1 - 345	12	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
TRANS1 - 345	1	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
TRANS2 - 138	33	115.5	4	28.9	60.99%	70	0.209	0.205	0.415	503	1,501	2,004
TRANS2 - 138	12	1,464.0	50	29.3	80.26%	1,175	3.771	2.805	6.576	9,059	19,624	28,683
TRANS2 - 138	1	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
SUBTRAN1- 69	33	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
SUBTRAN1- 69	12	1,817.3	81	22.4	89.16%	1,620	5.000	3.745	8.745	12,012	25,976	37,988
SUBTRAN1- 69	1	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
SUBTRAN2- 66	33	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
SUBTRAN2- 66	12	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
SUBTRAN2- 66	1	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
SUBTRAN3- 35	33	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
SUBTRAN3- 35	12	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
SUBTRAN3- 35	1	0.0	0	0.0	0.00%	0	0.000	0.000	0.000	0	0	0
PRIMARY - PRIMARY		172.7	38	4.5	86.05%	149	0.870	0.307	1.177	2,090	2,687	4,777
LINE TRANSFRMR		5,499.8	86,403	63.7	45.60%	2,508	12.631	14.398	27.028	26,952	126,123	153,074
TOTAL		9,069	86,576				22.481	21.460	43.941	50,615	175,911	226,527

LG 2010 LOSS ANALYSIS

SUMMARY OF LOSSES DIAGRAM - DEMAND MODEL - SYSTEM PEAK 2852 MW



LG 2010 LOSS ANALYSIS

FROM HIGH VOLTAGE SYSTEM

TOTAL 2,866 MVA 2,808 MW

TRANS1	TRANS2	SUBTRANS1	SUBTRANS2	SUBTRANS3
0.0 MVA	1,245.4 MVA	1,620.2 MVA	0.0 MVA	0.0 MVA
0.00%	43.46%	56.54%	0.00%	0.00%
345 KV	138 KV	69 KV	66 KV	35 KV

DISTRIBUTION SYSTEM LOAD

	TRANS1 PRIM1	TRANS1 PRIM2	TRANS1 PRIM3	TRANS2 PRIM1	TRANS2 PRIM2	TRANS2 PRIM3	SUBTRANS1 PRIM1	SUBTRANS1 PRIM2	SUBTRANS1 PRIM3	SUBTRANS2 PRIM1	SUBTRANS2 PRIM2	SUBTRANS2 PRIM3	SUBTRANS3 PRIM1	SUBTRANS3 PRIM2	SUBTRANS3 PRIM3
VOLTAGE	33	12	1	33	12	1	33	12	1	33	12	1	33	12	1
LOAD MVA	0	0	0	70	1,175	0	0	1,620	0	0	0	0	0	0	0
% SYS TOT	0.00%	0.00%	0.00%	2.46%	41.00%	0.00%	0.00%	56.54%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NOLD LOSS	0.000	0.000	0.000	0.205	2.805	0.000	0.000	3.745	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LOAD LOSS	0.000	0.000	0.000	0.209	3.771	0.000	0.000	5.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AVG SIZE	0.0	0.0	0.0	28.9	29.3	0.0	0.0	22.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NUMBER	0	0	0	4	50	0	0	81	0	0	0	0	0	0	0
DIVERSITY	0.000	0.000	0.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RATIO															

PRIMARY LINES

LOADING	2685.191	MW
@ SYS PF	2739.991	MVA
LOAD LOSS	50.143	MW
NOLD LOSS	2.685	MW
TOT LOSS	52.828	MW

PRIM/PRIM TRANSF

LOADING	148.562	MW
NOLD LOSS	0.307	MW
LOAD LOSS	0.870	MW
AVG SIZE	4.54	
NUMBER	38	

PRIM CUST LOADS

NO LINES	0.000	MW
CUST SUB	0.000	MVA
NO LINES	38.300	MW
CO. SUB	39.082	MVA
PRIM WITH	345.000	MW
LINES	375.000	MVA

LINE TRANSFORMERS

LOADING	2286.187	MW MVA	2534.666
NOLD LOSS	14.398	MW	
LOAD LOSS	12.631	MW	
AVG SIZE	63.7	KVA	
NUMBER	86403		

SECONDARY LINES

LOAD	894.040	MW
LOAD LOSS	4.845	MW
NOLD LOSS	0.000	MW
TOT LOSS	4.845	MW

NO SECONDARY LINES

LOAD	1365.118	MW

SERVICES

LOAD	2254.313	MW
LOAD LOSS	9.764	MW
NOLD LOSS	0.824	MW
TOT LOSS	10.587	MW

CUSTOMER SECONDARY LOAD

2243.726 MW

0

LG 2010 LOSS ANALYSIS

SUMMARY of SALES and CALCULATED LOSSES

LOSS # AND LEVEL	MW LOAD	NO LOAD +	LOAD =	TOT LOSS	EXP FACTOR	CUM EXP FAC	MWH LOAD	NO LOAD +	LOAD =	TOT LOSS	EXP FACTOR	CUM EXP FAC
1 BULK XFMMR	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0	0
2 BULK LINES	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
3 TRANS1 XFMR	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
4 TRANS1 LINES	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
5 TRANS2TR1 SD	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
6 TRANS GSU	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
7 TRANS2 LINES	0.0	4.43	39.07	43.50	0.000000	0.000000	0	29,013	103,503	132,516	0.0000000	0.0000000
TOTAL TRAN	2,852.0	4.43	39.07	43.50	1.015489	1.015489	12,966,029	29013	103503	132,516	1.0103258	1.0103258
8 STR1BLK SD												
9 STR1T1 SD	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
10 SRT1T2 SD	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
11 SUBTRANS1 LINES	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
12 STR2T1 SD	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
13 STR2T2 SD	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
14 STR2S1 SD	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
15 SUBTRANS2 LINES	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
16 STR3T1 SD	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
17 STR3T2 SD	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
18 STR3S1 SD	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
19 STR3S2 SD	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
20 SUBTRANS3 LINES	0.0	0.00	0.00	0.00	0.000000		0	6	0	6	0.0000000	
21 SUBTRANS TOTAL	0.0	0.00	0.00	0.00	0.000000		0	6	0	6	0.0000000	
22 TOT TRANS LOSS FAC	**2,852.0**	**4.43**	**39.07**	**43.50**	**1.015489**	**1.015489**	**12,966,029**	**29,013**	**103,503**	**132,516**	**1.010326**	**1.0103258**
DISTRIBUTION SUBST												
TRANS1	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
TRANS2	1,151.5	3.01	3.98	6.99	1.006108	0.000000	5,338,276	21,126	9,562	30,687	1.0057818	0.0000000
SUBTR1	1,587.8	3.74	5.00	8.74	1.005538	0.000000	6,944,729	25,976	12,012	37,988	1.0055001	0.0000000
SUBTR2	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
SUBTR3	0.0	0.00	0.00	0.00	0.000000	0.000000	0	0	0	0	0.0000000	0.0000000
WEIGHTED AVERAGE	2,739.2	6.76	8.98	15.74	1.005778	1.021356	12,283,005	47,102	21,574	68,675	1.0056225	1.0160063
PRIMARY INTRCHNGE	0.0				0.000000		0				0.0000000	
PRIMARY LINES	2,684.9	2.68	51.01	53.70	1.020408	1.042200	11,989,742	23,520	131,988	155,508	1.0131405	1.0293572
LINE TRANSF	2,286.2	14.40	12.63	27.03	1.011964	1.054669	9,493,517	126,123	26,952	153,074	1.0163883	1.0462266
SECONDARY	2,259.2	0.00	4.84	4.84	1.002149	1.056935	9,340,443	0	8,557	8,557	1.0009169	1.0471860
SERVICES	2,254.3	0.82	9.76	10.59	1.004719	1.061923	9,331,886	7,214	26,554	33,768	1.0036317	1.0509890
		==========	==========	==========				==========	==========	==========		
TOTAL SYSTEM		29.09	126.30	155.39				232,971	319,127	552,098		

LG 2010 LOSS ANALYSIS

DEVELOPMENT of LOSS FACTORS

UNADJUSTED
DEMAND

LOSS FACTOR LEVEL	CUSTOMER SALES MW a	CALC LOSS TO LEVEL b	SALES MW @ GEN c	CUM PEAK EXPANSION FACTORS d	1/d
BULK LINES	0.0	0.0	0.0	0.00000	0.00000
TRANS SUBS	0.0	0.0	0.0	0.00000	0.00000
TRANS LINES	0.0	0.0	0.0	0.00000	0.00000
SUBTRANS SUBS	0.0	0.0	0.0	0.00000	0.00000
TOTAL TRANS	66.4	1.0	67.4	1.01549	0.98475
PRIM SUBS	38.3	0.8	39.1	1.02136	0.97909
PRIM LINES	345.0	14.6	359.6	1.04220	0.95951
SECONDARY	2,243.7	138.9	2,382.7	1.06192	0.94169
TOTALS	2,693.4	155.3	2,848.8		

DEVELOPMENT of LOSS FACTORS
UNADJUSTED
ENERGY

LOSS FACTOR LEVEL	CUSTOMER SALES MWH a	CALC LOSS TO LEVEL b	SALES MWH @ GEN c	CUM ANNUAL EXPANSION FACTORS d	1/d
BULK LINES	0	0	0	0.00000	0.00000
TRANS SUBS	0	0	0	0.00000	0.00000
TRANS LINES	0	0	0	0.00000	0.00000
SUBTRANS SUBS	0	0	0	0.00000	0.00000
TOTAL TRANS	536,042	5,535	541,577	1.01033	0.98978
PRIM SUBS	224,991	3,601	228,592	1.01601	0.98425
PRIM LINES	2,340,717	68,717	2,409,434	1.02936	0.97148
SECONDARY	9,298,118	474,102	9,772,220	1.05099	0.95148
TOTALS	12,399,868	551,955	12,951,823		

ESTIMATED VALUES AT GENERATION

LOSS FACTOR AT VOLTAGE LEVEL	MW	MWH
BULK LINES	0.00	0
TRANS SUBS	0.00	0
TRANS LINES	0.00	0
SUBTRANS SUBS	0.00	0
SUBTRANS LINES	67.43	541,577
PRIM SUBS	39.12	228,592
PRIM LINES	359.56	2,409,434
SECONDARY	2,382.66	9,772,220
SUBTOTAL	2,848.77	12,951,823
ACTUAL ENERGY	2,852.00	12,966,029
MISSMATCH	(3.23)	(14,206)
% MISSMATCH	-0.11%	-0.11%

LG 2010 LOSS ANALYSIS

DEVELOPMENT of LOSS FACTORS
ADJUSTED
DEMAND

LOSS FACTOR LEVEL	CUSTOMER SALES MW a	SALES ADJUST b	CALC LOSS TO LEVEL c	SALES MW @ GEN d	CUM PEAK EXPANSION FACTORS e	f=1/e
BULK LINES	0.0	0.0	0.0	0.0	0.00000	0.00000
TRANS SUBS	0.0	0.0	0.0	0.0	0.00000	0.00000
TRANS LINES	0.0	0.0	0.0	0.0	0.00000	0.00000
SUBTRANS SUBS	0.0	0.0	0.0	0.0	0.00000	0.00000
TOTAL TRANS	66.4	0.0	1.0	67.4	1.01549	0.98475
PRIM SUBS	38.3	0.0	0.8	39.1	1.02152	0.97894
PRIM LINES	345.0	0.0	14.8	359.8	1.04295	0.95882
SECONDARY	2,243.7	0.0	141.9	2,385.6	1.06325	0.94052
			158.6			
TOTALS	2,693.4	0.0	158.6	2,852.0		

DEVELOPMENT of LOSS FACTORS
ADJUSTED
ENERGY

LOSS FACTOR LEVEL	CUSTOMER SALES MWH a	SALES ADJUST b	CALC LOSS TO LEVEL c	SALES MWH @ GEN d	CUM ANNUAL EXPANSION FACTORS e	f=1/e
BULK LINES	0	0	0	0	0.00000	0.00000
TRANS SUBS	0	0	0	0	0.00000	0.00000
TRANS LINES	0	0	0	0	0.00000	0.00000
SUBTRANS SUBS	0	0	0	0	0.00000	0.00000
TOTAL TRANS	536,042	0	5,535	541,577	1.01033	0.98978
PRIM SUBS	224,991	0	3,643	228,634	1.01619	0.98407
PRIM LINES	2,340,717	0	70,184	2,410,901	1.02998	0.97089
SECONDARY	9,298,118	0	486,797	9,784,915	1.05235	0.95025
			566,159			
TOTALS	12,399,868	0	566,161	12,966,027		

ESTIMATED VALUES AT GENERATION

LOSS FACTOR AT VOLTAGE LEVEL	MW	MWH
BULK LINES	0.00	0
TRANS SUBS	0.00	0
TRANS LINES	0.00	0
SUBTRANS SUBS	0.00	0
SUBTRANS LINES	67.43	541,577
PRIM SUBS	39.12	228,634
PRIM LINES	359.82	2,410,901
SECONDARY	2,385.63	9,784,915
	2,852.00	12,966,027
ACTUAL ENERGY	2,852.00	12,966,029
MISSMATCH	0.00	(2)
% MISSMATCH	0.00%	0.00%

LG 2010 LOSS ANALYSIS

Adjusted Losses and Loss Factors by Facility EXHIBIT 8

Unadjusted Losses by Segment

	MW	Unadjusted	MWH	Unadjusted
Service Drop Losses	10.59	10.58	33,768	33,756
Secondary Losses	4.84	4.84	8,557	8,554
Line Transformer Losses	27.03	27.02	153,074	153,022
Primary Line Losses	53.70	53.67	155,508	155,455
Distribution Substation Losses	15.74	15.73	68,675	68,652
Transmission System Losses	43.50	43.50	132,516	132,516
Total	155.39	155.34	552,098	551,955

Mismatch Allocation by Segment

	MW	MWH
Service Drop Losses	-0.31	-1,143
Secondary Losses	-0.14	-290
Line Transformer Losses	-0.78	-5,183
Primary Line Losses	-1.55	-5,265
Distribution Substation Losses	-0.45	-2,325
Transmission System Losses	0.00	0
Total	-3.23	-14,206

Adjusted Losses by Segment

	MW	% of Total	MWH	% of Total
Service Drop Losses	10.89	6.9%	34,899	6.2%
Secondary Losses	4.98	3.1%	8,844	1.6%
Line Transformer Losses	27.80	17.5%	158,205	27.9%
Primary Line Losses	55.22	34.8%	160,720	28.4%
Distribution Substation Losses	16.18	10.2%	70,977	12.5%
Transmission System Losses	43.50	27.4%	132,516	23.4%
Total	158.57	100.0%	566,161	100.0%

Loss Factors by Segment	**MW**	**MWH**	
Retail Sales from Service Drops	2,243.726	9,298,118	
Adjusted Service Drop Losses	10.888	34,899	
Input to Service Drops	2,254.614	9,333,017	
Service Drop Loss Factor	**1.00485**	**1.00375**	
Output from Secondary	2,254.614	9,333,017	
Adjusted Secondary Losses	4.983	8,844	
Input to Secondary	2,259.597	9,341,861	
Secondary Conductor Loss Factor	**1.00221**	**1.00095**	
Output from Line Transformers	2,259.597	9,341,861	
Adjusted Line Transformer Losses	27.796	158,205	
Input to Line Transformers	2,287.393	9,500,066	
Line Transformer Loss Factor	**1.01230**	**1.01694**	
Retail Sales from Primary	345.000	2,340,717	
Req. Whls Sales from Primary	0.000	0	
Input to Line Transformers	2,287.393	9,500,066	
Output from Primary Lines	2,632.393	11,840,783	
Adjusted Primary Line Losses	55.224	160,720	
Input to Primary Lines	2,687.617	12,001,503	
Primary Line Loss Factor	**1.02098**	**1.01357**	
Output Pl from Distribution Substations	2,687.617	12,001,503	
Req. Whls Sales from Substations	0.000	0	
Retail Sales from Substations	38.300	224,991	
TotalOutput from Distribution Substations	2,725.917	12,226,494	
Adjusted Distribution Substation Losses	16.183	70,977	
Input to Distribution Substations	2,742.100	12,297,471	
Distribution Substation Loss Factor	**1.00594**	**1.00581**	
Retail Sales at from SubTransmission	66.400	536,042	
Req. Whls Sales from SubTransmission	0.000	0	
Non-Req. Whls Sales from SubTransmission	0.000	0	
Losses	0.000	0	4457
Input to Distribution Substations	2,742.100	12,297,471	
Output from SubTransmission	2,808.500	12,833,513	2,852.000
SubTransmission System Losses	43.500	132,516	43.500
Input to Transmission	2,852.000	12,966,029	43.500
TotTransmission System Loss Factor	**1.01549**	**1.01033**	43.500

DEMAND MW **SUMMARY OF LOSSES AND LOSS FACTORS BY DELIVERY VOLTAGE** **EXHIBIT 9**

PAGE 1 of 2

	SERVICE LEVEL		SALES MW	LOSSES	SECONDARY	PRIMARY	SUBSTATION	SUBTRANS	TRANSMISSION
1	**SERVICES**								
2	SALES		2,243.7		2,243.7				
3	LOSSES			10.9	10.9				
4	INPUT				2,254.6				
5	**EXPANSION FACTOR**	**1.00485**							
6	**SECONDARY**								
7	SALES								
8	LOSSES			5.0	5.0				
9	INPUT				2,259.6				
10	**EXPANSION FACTOR**	**1.00221**							
11	**LINE TRANSFORMER**								
12	SALES								
13	LOSSES			27.8	27.8				
14	INPUT				2,287.4				
15	**EXPANSION FACTOR**	**1.01230**							
16	**PRIMARY**								
17	SECONDARY				2,287.4				
18	SALES		345.0			345.0			
19	LOSSES			55.2	48.0	7.2			
20	INPUT				2,335.4	352.2			
21	**EXPANSION FACTOR**	**1.02098**							
22	**SUBSTATION**								
23	PRIMARY				2,335.4	352.2			
24	SALES		38.3				38.3		
25	LOSSES			16.2	13.9	2.1	0.2		
26	INPUT				2,349.2	354.3	38.5		
27	**EXPANSION FACTOR**	**1.00594**							
28	**SUB-TRANSMISSION**								
29	DISTRIBUTION SUBS								
30	SALES								
31	LOSSES								
32	INPUT								
33	**EXPANSION FACTOR**								
34	**TRANSMISSION**								
35	SUBTRANSMISSION								
36	DISTRIBUTION SUBS				2,349.2	354.3	38.5		
37	SALES		66.4						66.4
38	LOSSES			43.5	36.4	5.5	0.6		1.0
39	INPUT				2,385.6	359.8	39.1		67.4
40	**EXPANSION FACTOR**	**1.01549**							
41	**TOTALS**	LOSSES		158.6	141.9	14.8	0.8		1.0
42		% OF TOTAL		100%	89.49%	9.34%	0.52%		0.65%
43		SALES	2,693.4		2,243.7	345.0	38.3		66.4
44		% OF TOTAL	100.00%		83.30%	12.81%	1.42%		2.47%
45		INPUT	2,852.0		2,385.6	359.8	39.1		67.4
46	**CUMMULATIVE EXPANSION LOSS FACTORS** (from meter to system input)				**1.06325**	**1.04295**	**1.02152**		**1.01549**

ENERGY MWH **SUMMARY OF LOSSES AND LOSS FACTORS BY DELIVERY VOLTAGE** **EXHIBIT 9**
PAGE 2 of 2

	SERVICE LEVEL		SALES	LOSSES SECONDARY	PRIMARY	SUBSTATION	SUBTRANS	TRANSMISSION	
1	**SERVICES**								
2	SALES		9,298,118		9,298,118				
3	LOSSES			34,899	34,899				
4	INPUT				9,333,017				
5	**EXPANSION FACTOR**	**1.00375**							
6	**SECONDARY**								
7	SALES								
8	LOSSES			8,844	8,844				
9	INPUT				9,341,861				
10	**EXPANSION FACTOR**	**1.00095**							
11	**LINE TRANSFORMER**								
12	SALES								
13	LOSSES			158,205	158,205				
14	INPUT				9,500,066				
15	**EXPANSION FACTOR**	**1.01694**							
16	**PRIMARY**								
17	SECONDARY				9,500,066				
18	SALES		2,340,717.000			2,340,717			
19	LOSSES			160,720	128,948	31,772			
20	INPUT				9,629,014	2,372,489			
21	**EXPANSION FACTOR**	**1.01357**							
22	**SUBSTATION**								
23	PRIMARY				9,629,014	2,372,489			
24	SALES		224,991				224,991		
25	LOSSES			70,977	55,898	13,773	1,306		
26	INPUT				9,684,912	2,386,261	226,297		
27	**EXPANSION FACTOR**	**1.00581**							
28	**SUB-TRANSMISSION**								
29	DISTRIBUTION SUBS								
30	SALES								
31	LOSSES								
32	INPUT								
33	**EXPANSION FACTOR**								
34	**TRANSMISSION**								
35	SUBTRANSMISSION								
36	DISTRIBUTION SUBS				9,684,912	2,386,261	226,297		
37	SALES		536,042						536,042
38	LOSSES			132,516	100,004	24,640	2,337		5,535
39	INPUT				9,784,917	2,410,901	228,634		541,577
40	**EXPANSION FACTOR**	**1.01033**							
41	**TOTALS**	LOSSES		566,161	486,799	70,184	3,643		5,535
42		% OF TOTAL		100%	85.98%	12.40%	0.64%		0.98%
43		SALES	12,399,868		9,298,118	2,340,717	224,991		536,042
44		% OF TOTAL	100.00%		74.99%	18.88%	1.81%		4.32%
45		INPUT	12,966,029		9,784,917	2,410,901	228,634		541,577
46	**CUMMULATIVE EXPANSION LOSS FACTORS** (from meter to system input)				**1.05235**	**1.02998**	**1.01619**		**1.01033**

LG&E AND KU SERVICES COMPANY
2010 Analysis of System Losses – LG&E Power System

Appendix C

Discussion of Hoebel Coefficient

COMMENTS ON THE HOEBEL COEFFICIENT

The Hoebel coefficient represents an established industry standard relationship between peak losses and average losses and is used in a loss study to estimate energy losses from peak demand losses. H. F. Hoebel described this relationship in his article, "Cost of Electric Distribution Losses," Electric Light and Power, March 15, 1959. A copy of this article is attached.

Within any loss evaluation study, peak demand losses can readily be calculated given equipment resistance and approximate loading. Energy losses, however, are much more difficult to determine given their time-varying nature. This difficulty can be reduced by the use of an equation which relates peak load losses (demand) to average losses (energy). Once the relationship between peak and average losses is known, average losses can be estimated from the known peak load losses.

Within the electric utility industry, the relationship between peak and average losses is known as the loss factor. For definitional purposes, loss factor is the ratio of the average power loss to the peak load power loss, during a specified period of time. This relationship is expressed mathematically as follows:

$$(1)\ F_{LS} = A_{LS} / P_{LS}$$

where: F_{LS} = Loss Factor
A_{LS} = Average Losses
P_{LS} = Peak Losses

The loss factor provides an estimate of the degree to which the load loss is maintained throughout the period in which the loss is being considered. In other words, loss factor is the ratio of the actual kWh losses incurred to the kWh losses which would have occurred if full load had continued throughout the period under study.

Examining the loss factor expression in light of a similar expression for load factor indicates a high degree of similarity. The mathematical expression for load factor is as follows:

$$(2)\ F_{LD} = A_{LD} / P_{LD}$$

where: F_{LD} = Load Factor
A_{LD} = Average Load
P_{LD} = Peak Load

This load factor result provides an estimate of the degree to which the load loss is maintained throughout the period in which the load is being considered. Because of the similarities in definition, the loss factor is sometimes called the "load factor of losses." While the definitions are similar, a strict equating of the two factors cannot be made. There does exist, however, a relationship between these two factors which is dependent upon the shape of the load duration curve. Since resistive losses vary as the square of the load, it can be shown mathematically that the loss factor can vary between the extreme limits of load factor and load factor squared. The relationship between load factor and loss factor has become an industry standard and is as follows:

(3) $F_{LS} = H*F_{LD}^2 + (1-H)*F_{LD}$

where: F_{LS} = Loss Factor
F_{LD} = Load Factor
H = Hoebel Coeff

As noted in the attached article, the suggested value for H (the Hoebel coefficient) is 0.7. The exact value of H will vary as a function of the shape of the utility's load duration curve. In recent years, values of H have been computed directly for a number of utilities based on EEI load data. It appears on this basis, the suggested value of 0.7 should be considered a lower bound and that values approaching unity may be considered a reasonable upper bound. Based on experience, values of H have ranged from approximately 0.85 to 0.95. The standard default value of 0.9 is generally used.

Inserting the Hoebel coefficient estimate gives the following loss factor relationship using Equation (3):

(4) $F_{LS} = 0.90*F_{LD}^2 + 0.10*F_{LD}$

Once the Hoebel constant has been estimated and the load factor and peak losses associated with a piece of equipment have been estimated, one can calculate the average, or energy losses as follows:

(5) $A_{LS} = P_{LS} * [H*F_{LD}^2 + (1-H)*F_{LD}]$

where: A_{LS} = Average Losses
P_{LS} = Peak Losses
H = Hoebel Coefficient
F_{LD} = Load Factor

Loss studies use this equation to calculate energy losses at each major voltage level in the analysis.