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Ms. Elizabeth O'Donnell
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December 28, 2006

RE: Seasonal Electric Rate Differential – Louisville Gas and Electric Company

Dear Ms. O'Donnell:

Louisville Gas and Electric Company ("LGE") in Case No. 2003-00433 eliminated the seasonal rate differential in its Residential Service. The Commission by its Order dated June 30, 2004 in that case directed ("LGE") to monitor its summer load beginning July 1, 2004 and continuing through September 30, 2006 to ascertain the impact on its demand and file a report on any impact the change in rate design may have had. The report was to be file within 90 days of September 30, 2006.

Attached is the ordered report. In summary, LGE finds no discernable impact from the elimination of the residential seasonal rate differential. Please feel free to contact us if you have any questions.

Yours very truly,

F. Howard Bush
Manager, Tariffs and Special Contracts

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Impact Study – 2004 LG&E Residential Rate Change

Introduction

In the 2004 rate case¹, LG&E eliminated the stepped, seasonal rate structure in its Residential base rate and replaced it with a flat, non-seasonal rate. The effect of this change was to lower the base rate during the summer period (June – September), and to raise the base rate during the winter period. Observing this change and mindful of energy conservation considerations, the Kentucky Public Service Commission (“KPSC”), in its order dated June 30, 2004 in Case No. 2003-00433, required LG&E to “monitor its summer demand, beginning July 1, 2004 and continuing through September 30, 2006 to ascertain the impact on its demand, if any, resulting from this rate design change.” The relevant portion of the commission’s order is included below.

Therefore, we find that LG&E should be required to monitor its summer demand, beginning July 1, 2004 and continuing through September 30, 2006 to ascertain the impact on its demand, if any, resulting from this rate design change. We also find that LG&E should, within 90 days of the end of this monitoring period, prepare a brief analysis and report on the results of its monitoring. LG&E should compare the actual growth in its residential summer demand to the growth it has forecast for its residential summer demand. While many factors can affect the difference between actual and forecast demand growth, LG&E should determine whether any unanticipated growth is the result of the change to a single year-round energy rate for residential customers.

Pursuant to the Commission’s June 30, 2004 Order, this report evaluates the change in rate structure and its impact on residential demand.

Changes to the LG&E Residential Rate and Rate Structure in July 2004

In July 2004 LG&E introduced the following changes to the Residential tariff:

- the *structure* of the base rate was changed, with the previous seasonal block rate (with two inclining blocks in the summer months and two declining blocks in winter) being replaced by a year-round flat energy rate (Table 1);
- this structural change was accompanied by an adjustment to the *level* of base rates, with the year-round flat rate set above the previous winter rates but below the previous summer rates;
- at the same time LG&E increased the Residential Customer Charge from \$3.40 per meter per month to \$5.00 per meter per month.

¹ In the Matter of: *An Adjustment of the Gas and Electric Rates, Terms and Conditions of Louisville Gas and Electric Company, Case No. 2003-00433* (June 30, 2004).

Table 1 – LG&E Residential Base Rates

cents/kWh	Previous Base Rate	New Base Rate
Summer (June-September)		
- first 600 kWh/month	6.149	5.887
- all additional energy	6.319	5.887
Winter (all other months)		
- first 600 kWh/month	5.669	5.887
- all additional energy	4.370	5.887

In principle, the base rate is a key point of reference allowing residential customers to assess the service cost impact of incremental changes to their consumption patterns. However, customer behavior may also be influenced by other pricing signals:

- the all-in variable rate incorporates other components to recover changes in fuel costs and to capture the costs (or benefits) of various environmental and other programs approved by the KPSC; and
- the total bill (although this latter measure – which includes the (fixed) customer charge and is also heavily influenced by weather conditions - does not provide a reliable indication of the marginal costs applying to incremental consumption).

Table 2 and Appendix Table A.1 present the trends in these various indicators of service cost over the period under review.

Table 2 – LG&E Residential Electricity Consumption, Unit Rates and Monthly Bills:
Summer 2003 – Summer 2006

	Consumption ² (kWh, Jun-Sep total)		Average Base Rate ³ (c/kWh)		All-in Variable Rate ⁴ (c/kWh)		Ave monthly bill ⁵	
2003	4694		6.23		6.30		\$77.3	
2004	4777	1.8%	5.97	-4.2%	6.06	-3.8%	\$76.9	-0.5%
2005	5365	12.3%	5.97	0.0%	6.04	-0.3%	\$85.9	11.7%
2006	4949	-7.8%	6.00	0.5%	6.17	2.1%	\$81.2	-5.5%

The table illustrates the challenge for the customer in forming a clear impression of the trend in costs of service – and for the utility in gaining a reliable assessment of the demand response to changes in rates or in rate structure. Whereas reference to the trend in base rates indicates a clear step decline in 2004, the inclusion of fuel cost and other adjustments quickly moderates this position. And at the same time, the fluctuations in the total bill – reflecting the combined impact of weather patterns and rate changes - add further complexity to the picture.

² Represents actual billed sales (not weather-normalized) over the 4-month summer period (June, July, August and September). Since the focus of this analysis is customer response to changes in utility bills, energy consumption (kWh) is expressed on an as-billed basis throughout.

³ Where block rates apply (pre-July 2004), average base rate is a function of average consumption. 2004 change reflects rate redesign in July 2004. 2005 change reflects July 2005 roll-in of ECR costs.

⁴ Includes FAC and DSM adders as well as ECR, ESM, Merger Surcredit and Value Delivery Surcredit adjustments.

⁵ Includes (fixed) customer charge.

Expected Results of the Rate Change

The above actual changes in rate structure and levels might be expected to encourage the following responses in customer demand – *all other things remaining equal*:

- the elimination of the inclining block structure (in summer) weakens the incentive to limit higher levels of consumption;
- the lowering of the new base rate – relative to the previous summer block rates - provides a further incentive to increase total consumption;
- on the other hand, the increase in other cost components of the energy rate (non-base rate components) moderates this response; and
- to the extent that customers base decisions to increase or decrease demand for service by reference to average (or total) costs rather than marginal costs, the expected response will be dependent on their level of consumption. Since the rate adjustment included an increase in the fixed monthly customer charge, the all-in unit rate faced by customers taking <600kWh/month⁶ increased; whereas for customers on higher levels of consumption, the all-in rate declined by 2-3%⁷ (i.e. for this group the benefit of the lower energy rates outweighed the increase in fixed charges).

The impact of price changes on customer demand for service is recognized explicitly in LG&E's residential load forecasting model. The company's forecast of residential use per customer is based on a 'statistically adjusted end-use' (SAE) methodology which distinguishes three separate components of residential electricity demand – heating use, cooling use, and 'other' use – and, for each end-use, identifies key statistically-significant drivers of demand.^{8,9} These include various economic, demographic and technological variables such as household size, income, and the efficiency and saturation of electrical appliances, as well as changes in the price of electricity – in *real* terms - and weather conditions¹⁰. Historically, the price of electricity has *not* been a major factor in the sales trend over the longer term given the stability of electricity rates relative to most other commodities and services. LG&E uses EIA estimates of the price elasticity of demand applying to each specific end-use application¹¹.

⁶ Around 73,000 LG&E electricity customers - 22% of the total – are billed for less than 600 kWh/month in the summer period (J/J/A/S billing periods) (average over 2003-06; numbers fluctuate significantly by month, depending on weather).

⁷ The average LG&E customer takes ~1200 kWh/month in the summer period, and between 2003 and 2004 enjoyed a 2.3% reduction in the all-in average unit rate (including customer charge). At a consumption level of 2000 kWh/month, the reduction in average rate was ~3%.

⁸ The residential load forecasting model is described in detail in Volume II, Technical Appendices 1 & 2, of the 2005 Joint Integrated Resource Plan of LG&E and KU (April 21, 2005) filed in Case No. 2005-00162.

⁹ LG&E's forecast of residential sales is developed from separate forecasts of the number of customers and of use-per-customer.

¹⁰ For the residential sales class, weather (average temperature) is the predominant explanatory variable behind historical sales fluctuations; in the forecast, 'normal' weather is assumed throughout.

¹¹ Given the multiplicity of rate structures across different utilities, the elasticities developed by the US Energy Information Administration relate to average unit rates rather than to the individual components of the tariff.

Based solely on the price elasticity parameters in the 2004 forecast model – and assuming ‘perfect’ foresight regarding the course of average rates – the utility would have anticipated the demand response indicated in Table 3.

Table 3 – Anticipated impact of price changes on residential energy sales (summer period)

	Base Rate from 2004 Rate Case ¹² (c/kWh)	Change from 2003 (c/kWh)	All-in variable rate ¹³ (c/kWh)	Change from 2003 (c/kWh)	Change from 2003 (%) -nominal	Change from 2003 (%) -real	Demand response (%) ¹⁴	Implied change in sales ¹⁵ (MWh)	Equip peak load impact (MW)
2003	6.23		6.30						
2004	6.02	-0.28	6.06	-0.24	-3.8%	-6.2%	1.5%	6157	14
2005	6.00	-0.30	6.04	-0.26	-4.1%	-8.8%	2.2%	8924	21
2006	6.00	-0.30	6.17	-0.13	-2.0%	-9.2%	2.3%	9340	22

- The rate re-design in July 2004 – eliminating the seasonal block rate and introducing a year-round flat rate – was only one of several influences shaping the trend in the cost of energy (all-in variable unit cost) over the review period; underlying fuel and environmental cost trends were also significant.
- Although the decline since 2003 in the all-in energy rate - at 2% - appears moderate, this represents a 9% decline in real (2003\$) terms.
- This decline in real rates triggers an increase in demand of just over 2%, with an estimated peak impact of 20MW.

Variance analysis of observed trends in residential sales volume against LG&E forecast

Table 4 presents an analysis of the differences between forecasted¹⁶ and actual summer consumption per residential customer (average kWh/month) over the period 2002-2006.

¹² Represents average base rates (excluding ECR roll-in); changes in this column are attributable solely to the July 2004 rate re-design

¹³ Represents average all-in variable unit costs; changes reflect the combined impact of the 2004 rate re-design and all current rate adders and bill adjustments (including FAC and ECR)

¹⁴ Relative to 2003 consumption level

¹⁵ Total for summer period (4 months)

¹⁶ 2004-vintage forecast, prepared in late-2003 and adopted in January 2004.

Table 4 – LG&E Residential Use per Customer (kWh) 2002-2006

Summer (Jun – Sep)	Actual UPC (kWh)	2004 Forecast (kWh)	Forecast variance (Actual – Forecast)	Weather variance			Price variance			Residual (unexplained) variance	
				5	6	7	8	9	10	11	12
1	2	3	4 (2-3)			(2-6)			(7-9)	(10-3)	(11/3)
				CDDs	Impact (kWh)	Adj UPC	Price error ¹⁷	Impact (kWh)	Adj UPC	kWh	%
2002	5,513			1673		4,877					
2003	4,694			1137		5,043					
2004	4,777	4,955	(178)	1305	(91)	4,868	(6.4%)	80	4,788	(167)	(3.4%)
2005	5,366	4,966	399	1508	323	5,042	(9.4%)	119	4,923	(43)	(0.9%)
2006	4,950	5,014	(65)	1328	(30)	4,978	(7.9%)	101	4,877	(136)	(2.7%)

In this context, the ‘weather variance’ and ‘price variance’ columns indicate the contributions to total variance attributable to ‘inaccuracies’ in the *projections* of weather and of average unit rates, respectively, incorporated in the forecast.

- Comparing actual sales in the period 2004-06 with the 2004 forecast for these years, deviations from ‘normal’ weather accounted for around half of the observed variance in 2004 & 2006, and for over 80% of variance in 2005 (Columns 4 & 6).
- Adjusting for the influence of weather, the overall trend in consumption per customer has been broadly flat (Column 7). In the 2004 Forecast, use per customer was projected to grow at around 1 % per year in this period.
- There are also significant forecast variances resulting from inaccuracies in the projection of average rates (“price”)¹⁸. The forecast incorporated a price projection which overstated real average rates in the summer period by 6-9%; the impacts of adjusting the observed variance for actual prices are shown in Column 9.
- After adjusting for actual differences in weather conditions and average unit rates – with respect to forecast assumptions – the residual variance (Column 11) is the result of unanticipated trends in the other drivers of the forecast, or of the influence of ‘new’ factors which were not recognized in the specification of the 2004 forecast model. For some key forecast drivers – particularly the trends in appliance efficiencies and saturation rates – no direct check on the accuracy of the forecast assumptions is available; and other, ‘new’ explanatory variables can only be captured after a ‘pattern’ has been established.

In recent years, a key uncertainty in forecasting residential electricity demand revolves around the complex interplay of changing housing characteristics, the proliferating stock of (new) electrical/electronic appliances, and accelerating diffusion of technologies to control energy use.

¹⁷ Represents the difference between the forecasted price and the actual (outturn) price, in real terms (the forecast over-stated average rates by this amount).

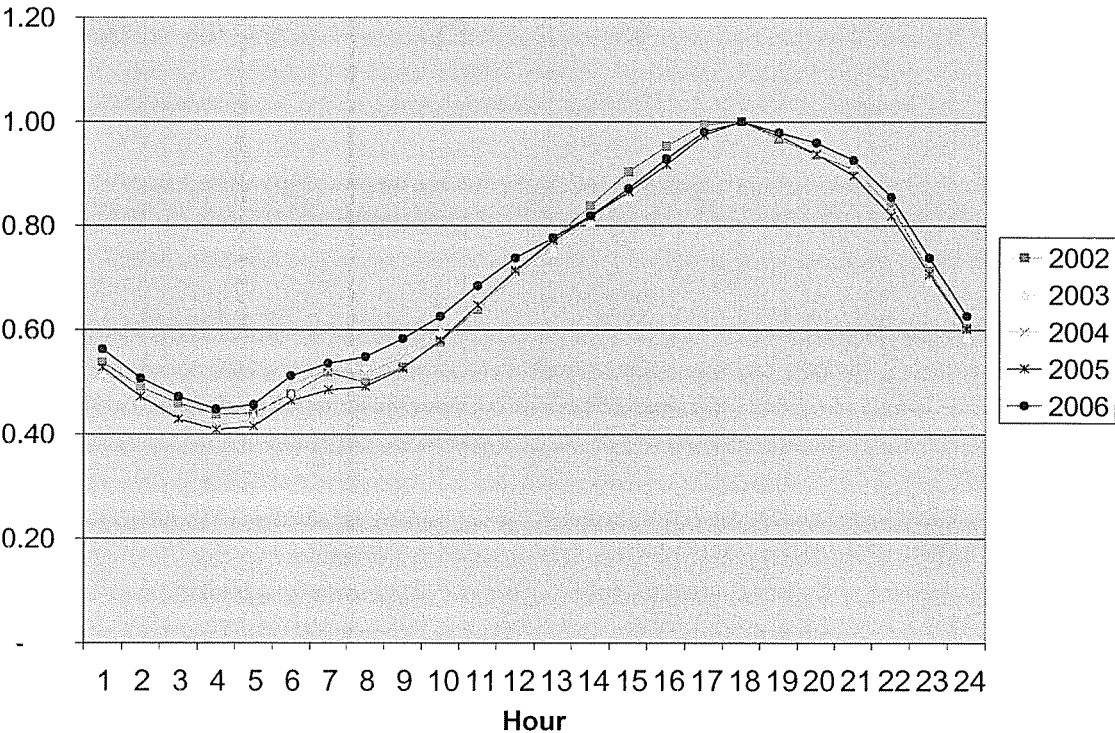
¹⁸ Details of the 2004 rate adjustments had not been finalized at the time of forecast preparation.

This uncertainty underlies the conservative projection of use-per-customer growth rates incorporated in the utility’s residential sales forecast – as well as contributing to ‘unexplained’ variance.

Impact of rate redesign on residential load profile

Since neither the previous rates nor the new rate include any time-of-use element (other than the distinction between summer and winter seasons, as in the previous rates), no significant shifts in consumption within the day or within the week are to be expected. Confirmation of this assumption can be obtained by analysis of residential load profile data from the company’s load research program. Figure 1 shows the averaged, normalized daily load profiles of a (random) sample of 110 residential customers included in the program. Each curve represents the average position for a weekday in summer, with each hourly load expressed as a percentage of the daily peak load for the group¹⁹. There is no significant difference in the profile of residential consumption since the date of the rate change.

Figure 1 – Normalized residential daily load curves (summer weekday): 2002-2006



¹⁹ ‘Normalizing’ the profile – by expressing each hourly value in relation to the daily peak value – removes the influence of factors – such as weather – which affect the *level* of consumption but which may not necessarily affect its hourly *distribution*.

Conclusion

The foregoing analysis reveals no ‘unanticipated growth’ in the summer-period consumption of residential customers as a result of the change in rate design in July 2004. In principle, a small increase in consumption might be expected as a result of the continuing decline – in real price terms - in average unit rates. This decline, however, is occasioned more by the underlying cycle of utility costs – which tend to remain broadly constant in nominal terms for extended periods – than by changes in rate structure.

On a weather-adjusted basis, however, summer use-per-customer has remained broadly flat. This indicates that neither price – nor any other explanatory variable – has played a particularly significant role in consumption trends over this period.

Among the reasons why the response to the 2004 adjustments to rates and to rate structure has been muted are:

- the rate adjustment was of limited magnitude relative to broader cyclical trends in electricity supply costs;
- pricing signals available to residential customers tend to be opaque, given the challenge in distinguishing between average and marginal costs, and between price and weather impacts in customer bills;
- historically – against a background of decades of declining real rates, at the low end of the national range – the price of electricity has not been a major driver of residential demand trends.

Appendix Table A.1

LG&E Residential Electricity Consumption and Average Rates

Year	Month	Consumption	Base Rate (\$/kWh)		Rate Adjustments (\$/kWh)		Bill adjustments (%)				Total Variable	Customer charge	Total bill**** (\$/mo)
			<= 600 kWh	> 600 kWh	FAC	DSM	ECR	Merger	ESM	VD			
2003	6	1235	0.0615	0.0632	0.0003	0.0007	0.33%	-2.62%	2.32%	-0.78%	0.0623	3.40	80.33
2003	7	1298	0.0615	0.0632	0.0012	0.0007	1.04%	-3.24%	2.32%	-0.78%	0.0639	3.40	86.30
2003	8	1322	0.0615	0.0632	0.0000	0.0007	1.01%	-3.21%	2.32%	-0.78%	0.0627	3.40	86.23
2003	9	839	0.0615	0.0632	0.0003	0.0007	2.81%	-3.21%	2.32%	-0.78%	0.0630	3.40	56.26
		4694	0.0615	0.0632	0.0002	0.0007	1.30%	-3.07%	2.32%	-0.78%	0.0630	3.40	77.28
2004	6	1158	0.0615	0.0632	0.0007	0.0009	2.41%	-2.91%	2.36%	-0.90%	0.0644	3.40	78.00
2004	7	1158	0.0589	0.0589	0.0005	0.0009	2.27%	-3.13%	2.36%	-0.90%	0.0606	5.00	75.16
2004	8	1286	0.0589	0.0589	0.0002	0.0009	0.83%	-3.26%	2.36%	-0.90%	0.0593	5.00	81.23
2004	9	1175	0.0589	0.0589	0.0001	0.0009	-0.51%	-3.26%	2.36%	-0.90%	0.0582	5.00	73.29
		4777	0.0595	0.0600	0.0003	0.0009	1.25%	-3.14%	2.36%	-0.90%	0.0606	4.60	76.92
2005	6	1365	0.0589	0.0589	0.0010	0.0008	1.47%	-3.26%	0.00%	-0.99%	0.0590	5.00	85.34
2005	7	1535	0.0600	0.0600	0.0001	0.0008	0.36%	-3.05%	0.00%	-0.99%	0.0584	5.00	94.49
2005	8	1441	0.0600	0.0600	0.0024	0.0008	1.80%	-2.94%	0.00%	-0.99%	0.0617	5.00	93.80
2005	9	1025	0.0600	0.0600	0.0037	0.0008	2.40%	-2.94%	0.00%	-0.99%	0.0634	5.00	69.91
		5365	0.0597	0.0597	0.0016	0.0008	1.51%	-3.05%	0.00%	-0.99%	0.0604	5.00	85.88
2006	6	1152	0.0600	0.0600	0.0027	0.0007	2.28%	-2.94%	0.00%	-1.00%	0.0623	5.00	76.70
2006	7	1473	0.0600	0.0600	0.0022	0.0007	0.84%	-3.00%	0.00%	-1.00%	0.0609	5.00	94.52
2006	8	1321	0.0600	0.0600	0.0028	0.0007	1.10%	-2.15%	0.00%	-1.00%	0.0621	5.00	86.94
2006	9	1003	0.0600	0.0600	0.0024	0.0007	0.79%	-2.15%	0.00%	-1.00%	0.0616	5.00	66.62
		4949	0.0600	0.0600	0.0025	0.0007	1.25%	-2.56%	0.00%	-1.00%	0.0617	5.00	81.20
Summer (Jun-Sept)													
2003		4694	0.0615	0.0632	0.0002	0.0007	1.30%	-3.07%	2.32%	-0.78%	0.0630	3.40	77.28
2004		4777	0.0595	0.0600	0.0003	0.0009	1.25%	-3.14%	2.36%	-0.90%	0.0606	4.60	76.92
2005		5365	0.0597	0.0600	0.0016	0.0008	1.51%	-3.05%	0.00%	-0.99%	0.0604	5.00	85.88
2006		4949	0.0600	0.0600	0.0025	0.0007	1.25%	-2.56%	0.00%	-1.00%	0.0617	5.00	81.20

* Where block rates apply (pre-July 2004), average 'Base Rate' is a function of the average consumption level of residential customers
 ** July 2004 base rate re-design
 *** July 2005 roll-in of Environmental Cost Recovery (ECR) mechanism costs
 **** Total bill includes (fixed) customer charge