COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

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| APPLICATION OF LOUISVILLE GAS AND ELECTRIC COMPANY FOR APPROVAL OF AN ALTERNATIVE METHOD OF REGULATION OF ITS RATES AND SERVICES | ) ) ) ) | CASE NO. 98-426 |

In the Matter of:

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| APPLICATION OF KENTUCKY UTILITIES COMPANY FOR APPROVAL OF AN ALTERNATIVE METHOD OF REGULATION OF ITS RATES AND SERVICES | ) ) ) | CASE NO. 98-474 |

O R D E R

IT IS ORDERED that Louisville Gas and Electric Company ("LG&E") and Kentucky Utilities Company ("KU") shall file the original and 12 copies of the following information with the Commission, with a copy to all parties of record. Each copy of the data requested should be placed in a bound volume with each item tabbed. When a number of sheets are required for an item, each sheet should be appropriately indexed, for example, Item 1(a), Sheet 2 of 6. Include with each response the name of the witness who will be responsible for responding to questions relating to the information provided. Careful attention should be given to copied material to ensure that it is legible. Where information herein has been provided previously, in the format requested herein, reference may be made to the specific location of said information in responding to this information request. The information requested herein shall be filed no later than February 23, 1999.

1. Translog cost functions have been used extensively throughout economic literature. In general, such a cost function is given by:

$$LnC = \alpha_0 + \alpha_i lnY + \Sigma_i \beta_i lnP_i + (\tfrac{1}{2}) \alpha_{ii} (lnY)^2 + (\tfrac{1}{2}) \Sigma_i \Sigma_j \phi_{ij} lnP_i lnP_j + \Sigma_i \omega_{yi} lnY lnP_i$$

However, the cost function that appears in the working papers Dr. Lowry provided does not appear to be of this form since the variable list includes the ratios of the input prices. Given this,

a. Write out (in a similar fashion as the equation above) the cost function employed in the estimation that showed LG&E and KU to be superior performers. Provide the reference from which this functional form came (that is, the input price normalization).

b. Are the output variables (YTOT and N) also divided by the price of materials?

c. Write out the cost share equations associated with the equation referenced in (a).

2. Refer to page 8 of code2.txt, which was sent in response to the Commission's Order dated December 2, 1998.

a. Is B1 the estimated coefficient of PL or PLPM?

b. Is B2 the estimated coefficient of PK or PKPM?

c. Is B3 the estimated coefficient of PE or PEPM?

d. In response to the Commission's Order dated January 8, 1999, in Item PSC-45, Dr. Lowry explains that The number of model parameter estimates reported in testimony is greater than those in the model regression. This is because we imposed linear homogeneity restrictions on the input price parameters. These

restrictions permit the parameters for variables involving the prices of other inputs (materials) to be calculated from the parameter estimates from other input prices. In the case of the Translog cost function, linear homogeneity is imposed by the following restrictions:

$\Sigma_i \beta_i = 1$, and $\Sigma_i \phi_{ij} = \Sigma_j \phi_{ji} = \Sigma_i \omega_{iy} = 0$.

One way to ensure that the input price coefficients sum to 1 is to impose that one of the coefficients is equal to unity less the other input price coefficients. That is,

$B_M = 1 \quad B_1 \quad B_2 \quad B_3$ for input prices M, L, K, and E. When using this formula, it is not necessary to explicitly include the materials price in the equation in order to estimate its coefficient (even though its exclusion can lead to an omitted variable bias and other specification errors).

(1) Is this the method used to impose linear homogeneity? If so, then explain how the standard error of the estimated coefficient of the materials price is computed. What is the formula for the computation of the standard error of the estimated coefficient of the price of materials? Cite the reference from which the formula came to derive the standard error of this coefficient.

(2) If this was not the method used to impose linear homogeneity, then how was this condition imposed? How was the standard error of the estimated coefficient of the materials price computed? What is the formula for the computation of the standard error of the estimated coefficient of the price of materials? Cite the reference from which the formula came to derive the standard error of this coefficient.

3. In the Commission's Order dated January 8, 1999, Item 46 asked for a specific formula to calculate the standard error of the predicted difference between actual and predicted total cost. In addition, Dr. Lowry was asked to provide the reference (from the econometric literature) from which this formula came. This was not done. Therefore, provide the formula, the underlying economic rationale of why this is the appropriate formula, and the reference from which it came.

4. Submit the estimation results from the within estimation procedure.

5. Concerning the data file (Data.xls):

a. Why is there so little variation in the price of materials across observations?

b. Why is it that PK Mean > PK, PL Mean > PL, and PM Mean > PM across the 1992 observations for the first six utilities in the data set? If the relationships between these variables are correct, does this not imply that the mean input price values are negative? For example, Appalachian Power 1992:

PM = 100

PM Mean = 105.138

Which implies that the mean of PM = -5.138. Provide a detailed explanation of how an input price can be negative.

6. Dr. Lowry s supplemental response filed on February 3, 1999 includes a diskette with the PNDX.dbf database. Refer to Item 49:

a. The variables contained in PNDX.dbf include revenues from electricity sales by customer class, the quantities sold to each customer class, and some other variables which are not explained.

(1) How is the quantity of electricity measured (in kwhs, mwhs, or other)?

(2) What are EXPR1008 and EXPR1013? What is the purpose of these two variables?

(3) From the data in this file, it is straightforward to calculate the price paid per unit of electricity by each customer class. For example, in 1996, KU received $45.88 per mwh from its residential customers.[1] From this, how is the Retail Price Index calculated?

7. Refer to the response to the Commission's Order dated January 11, 1999, Item 51.

a. In the table Benchmark Results: Actual and Predicted Costs, Percentage Difference and Statistical Significance, Dr. Lowry claims that the percentage differences between the actual and predicted costs for both LG&E and KU (-17.05% and 21.64%) indicate that LG&E and KU are superior performers. Explain the logic of this claim since the divergence between the actual and predicted cost is really an estimate of the model s stochastic error term, the sum of the squares of which are to be minimized in any regression analysis. Is it true that Dr. Lowry is claiming that the higher the stochastic error (in absolute value), the more superior the performance of the utility?

This same logic would then be applied to Western Pennsylvania Power, whose predicted difference (or stochastic error term estimate) is 23.5%, indicating that Western Pennsylvania Power is a more superior performer according to

[1] $236,229,000.00 / 5,148,364 = $45.88

Dr. Lowry. However, upon examination of the average total costs of each of the firms, which was presented in KPSC 1G of the December 14th Data Response, Western Pennsylvania power ranked 18th with an average total cost of $54.90/mwh, well below both LG&E (11th) and KU (3rd), whose average costs are $44.53/mwh and $50.28/mwh.

Given this, explain how the greater the divergence between actual and predicted cost indicates a more superior performer.

b. Explain thoroughly how the standard errors of the predicted difference between the actual and the predicted total cost were obtained. In addition, cite the reference from which this formula came, the underlying econometric theory and assumptions, and its derivation.

c. Concerning the print out Policy_LGE.txt, which incorporates two binary variables into the model, there are some distinct differences between the results of this estimation and the previous estimation results (those that only included one binary variable and are contained in code2.txt of the December 14th filing).

(1) The sign of the B66, the parameter estimate of $(\ln V)^2$, was negative (-.047779) but is now positive (.009557). Explain thoroughly the reason for this, the interpretation of B66 in each of the regressions run, and whether this is cause for concern.

(2) Similarly, the sign of B68, the parameter estimate of ln V * ln N was positive in the first regression (.007425) but is negative in this second regression (-.053425). Explain thoroughly the reason for this, the interpretation of B68 in each of the regressions run, and whether this is cause for concern.

(3) The sign of B88, the coefficient estimate of (ln N) has more than doubled from the first regression (.049205) to the second (.113898). Explain thoroughly the reason for this and whether this changes any of the conclusions made thus far.

8. Provide copies of any bill inserts, pamphlets, or other information LG&E and KU have disseminated to their respective customers concerning the alternative regulation proposals. Copies of the newspaper notice published pursuant to Commission regulation need not be filed.

Done at Frankfort, Kentucky, this 12th day of February, 1999.

By the Commission

ATTEST:

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Executive Director