Economic Impact Study of the Proposed KPL/KG&E Merger

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by

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APPENDIX A

THEORETICAL, TECHNICAL AND EMPIRICAL CONSIDERATIONS

Introduction

This first appendix is concerned with providing a general description of the mathematical model used to study the economic impact of the proposed merger on the Kansas economy. Specifically, this appendix will discuss in a non-mathematical manner input-output modelling, the construction of the input-output model used in this study, and the empirical results of the investigations. Appendix B will provide a more technical description of input-output modelling, the model used in this study and summary tables of the results of this study. If the reader is only concerned with the results of the research, summary tables can be found on pages 33, 45, and 46. Appendix C has more complete and detailed tables of the results of our investigations.

The Total Effect of an Economic Change

Primary and Secondary Effects of Economic Change

When a change occurs within an economy it causes other modifications within that economy. These secondary modifications of the economy are the result of the structural interdependence of most sectors of a modern economy. These two effects are generally referred to as the primary and secondary effects of an economic change. The initial change is the primary effect on the economy. This is the easily observed effect. For example, the laying off of

100 employees with combined annual wage and salary income of $4,000,000 would be a primary effect. As this primary effect reverberates through the economy, it causes further change in that economy: secondary effects. For example, the loss of $4,000,000 in personal income in an economy will result in less expenditures for retail sales and if a sales tax exists, less tax revenue from that tax. Other secondary effects would be a decline in demand in the automobile and housing markets and reduced tax revenue from an income tax. These secondary effects are not immediately or directly observable, but they penetrate into every sector of an economy.

Methods for Generating Multipliers

The magnitude of these secondary effects can be estimated through the use of multipliers. A multiplier gives a quantitative estimate of the secondary effects of an initial change in an economy, based on the source and the size of the initial change. Regional multipliers can be estimated using three basic methods. The first is the economic base method which in its simplest form is similar to a simple open Keynesian model for a region. Unfortunately, this type of model operates at an aggregate level and does not provide the ability to analyze the effects of changes at the industrial level. An econometric model is the second possible source for developing regional multipliers. The most detailed econometric model of the Kansas economy has been developed by IPPBR. Despite this model's complexity, it forecasts over 100 Kansas variables, it does not have the capability to generate

multipliers for the effect of price and employment changes in the electrical utilities industry on the rest of the Kansas econory. The third method of estimating multipliers, and the method we have chosen to use, is through an input-output model. This type of model provides detailed, inter-industry multipliers. Numerous papers have also documented that when the detailed estimates of an input-output model are aggregated, the aggregate multipliers are similar to the economic base multipliers [Pleeter 1980, p. 27].

Simple Input-Output Model

Explanation of Simple Input-Output Model

The simplest input-output model is a series of industrial supply and demand relations with only industries and consumers as economic agents in the model. Supply is the output of each industry. Demand for this output is separated into two major components: final demand and intermediate demand. Final demand is the demand for goods and services by individual consumers for their own use. Intermediate demand is the demand for goods and services by one industry for its production of other goods and services. For example, the use of steel by an aircraft firm to produce airplanes is an intermediate demand for steel. By the same token, the use of a company airplane by the sales staff of a steel firm for the generation of steel orders is another example of intermediate demand.

The assumption that all goods and services produced in this economy must be used creates the simple accounting identity: an industry's output is equal to the uses of that output as an input

to production plus the consumption of that output by individuals. In simpler economic terms, supply is equal to intermediate demand plus final demand for each industry. Thus, the identity yields a series of industrial supply and demand equations. Stack these industrial supply and demand relationship on top of each other, number each industry, and use this numbering system to sequence, in each supply and demand equation, the individual intermediate demands for output. For example, let the electrical utility industry's supply and demand equation be fifth from the top in the stack of supply and demand equations. Then in each supply and demand equation, the electrical utility's intermediate demand is the fifth intermediate demand from the beginning of the intermediate demands.

By maintaining the industrial order, the stack of industrial supply and demand equations can compactly be depicted by a matrix equation. In terms of matrix algebra, a vector of outputs (the stack of industrial outputs) is equal to a square matrix of intermediate demands (the stack of intermediate demands) plus a vector of final demands (the stack of final demands). This matrix relationship is the heart of any input-output model. The column vectors both have the same height (the same number of entries) as the number of industries within the model. The square matrix's dimensions are also determined by the number of industries within the model. If the model has ten industries, then the column vectors are ten entries high and the square matrix has ten columns and ten rows.

The matrix of intermediate demands makes input-output the model unique (and gives it its name). This matrix is a matrix of inputs to production which captures the inter-industry flow of goods and services necessary for production: a matrix of inputs to produce a vectors of outputs. A column in this matrix represents the various inputs to production used by one particular industry. In the example of the electrical industry used above, the fifth column represents the inputs necessary for the production of electricity. These inputs are generated by the production of the other industries in the economy. A row of this matrix represents the uses of one industry's production in the production processes of all the industries in the economy. Again using the example above, the fifth row represents the use of electricity generated by the electric utility industry in the production of all other industries. Obviously, in a real economy, some of the cells in the matrix will be zero; that is, some industries will not use the production of other industries in their own production process.

Making the Model Operational

This description of the simple input-output model captures the basic concept of the model. However, to make the model operational, a couple of alterations are necessary. The variables in the model above were described in physical terms which implies measurement in physical units such as number of hamburgers and tons of steel. In order for the input-output model to be flexible, the output, inputs and final demand for all industries need to be measured in the same units. This is accomplished by substituting

the monetary value of the goods and services produced and used for their physical units. Instead of tons of steel produced, the model now has the dollar value of all the steel produced, and instead of the number of hamburgers eaten, the model has the dollar value of hamburgers eaten.

A second alteration in the model is necessary to generate multipliers. Each column in the matrix of inputs to production represents the monetary value of inputs to the production of an industry. If each of the inputs to the production of a particular industry (each column entry) is divided by that industry's dollar value of output, a column of input coefficients is created. If this process is followed for all industries, then a matrix of production coefficients (or input coefficients) is created. The assumption made by economists who work with input-output models is that these production coefficients are an adequate description of the production process, except for labor, at all relevant levels of production. At this point of development, the contribution of labor to the production process is being ignored. These production coefficients are not going to adequately describe the production process at all levels of production, but if the band of expected change is relatively small (less than a 25 percent change in output), then these coefficients are an adequate representation of the production process [Miller and Bl[illegible] 1985, pp 266-316.]

A second important assumption implied by the use of the matrix of production coefficients is that prices are constant. This assumption is necessary because these coefficients are derived from

the value, in dollars, of inputs to production. If prices change, then the production coefficients would change even if the production process still required the same physical amounts of all goods and services. In addition, if relative prices change, then probably some substitution among the goods and services used as inputs would take place. All of the above means that if the assumption of constant prices is violated, then the production coefficient matrix must be adjusted.

The construction of the matrix of production coefficients by dividing all the industrial columns by their industrial output creates an imbalance in the basic supply and demand relationships. To rectify this imbalance, the coefficient matrix must be multiplied by the column vector of outputs. The analogy with a single equation supply and demand model should help explain why this manipulation is necessary. Suppose one has an equation such that output is equal to intermediate demand plus final demand. If intermediate demand is divided by output, then in order to maintain the equality relationship, intermediate demand must also be multiplied by output. This is the old Algebra trick of multiplying by 1; that is, multiplying by output divided by output.

Derivation of Multipliers

The substituting of the intermediate demand matrix (the matrix of inputs to production) with the production coefficient matrix multiplied by the vector of industrial outputs creates in the simple input-output model the opportunity to generate a matrix of multipliers by algebraically solving the model. Appendix B

provides the procedure for solving the model and generating the matrix of multipliers. The algebraic result of solving the model is that the column vector of industrial outputs is equal to a matrix of multipliers multiplied by a column vector of final demands. (Matrix multiplication must be used in the above relationship.) The matrix of multipliers is the result of subtracting the matrix of production coefficients from the identity matrix and then inverting the result.

The matrix equation: the column of outputs is equal to the matrix of multipliers multiplied by the column of final demands, is the basis for our impact analysis. This equation links final demand to output. If this relationship holds true at levels of economic activity near the equilibrium level of output and final demand, then changes in final demand are linked to changes in output. The simple mathematical equation does not establish a cause and effect relationship between final demand and output, it only establishes that these variables are related. The cause and effect relationship can only be established in the construction of the mathematical model. Economists distinguish between variables that are exogenous to a model and variables which are endogenous to a model. The values of the exogenous variables are determined outside of the model and are commonly referred to as the parameters of the model. The values of the endogenous variables are determined within the model. The relationship between the exogenous and endogenous variables in an economic model reveals the assumed cause and effect relationship within the model.

In the case of this simple input-output model, the equation described above is interpreted as operationally meaning that a change in the column vector of final demands multiplied by the matrix of multipliers yields the change in industrial output. Because the multipliers are derived from the matrix of production coefficients, which in turn were derived from the matrix of inter-industry flows of goods and services, these multipliers take the initial, primary effect on final demand and create an estimate of the primary and secondary effects on industrial output due to an exogenous change in the economy. Traditionally, these multipliers are described as capturing the direct effect of an impact on final demand and the indirect effect of this direct effect as it moves through the production side of the economy.

The Input-Output Models Used for this Study

Addition of more Realism

The simple input-output model with the matrix of production coefficients can be made more complex and realistic in several different ways. For the purposes of this investigation, two refinements were added to the simple input-output model to construct the basic input-output model used in this study. First, the final demand sector was expanded beyond merely household consumption to include imports, exports, and other exogenous final demand such as income from transfer payments. Second, household consumption from wage and salary income was "endogenized" in the model: rather than having household consumption as given, it now is determined within the model. The expanding of the final demand

sectors merely required the addition of vectors representing each of the new final demand sectors added to the model. The "endogenizing" of household consumption from wage and salary income requires more explanation.

In addition to the basic input-output model, a separate price change model was developed. One of the phenomena investigated in this study is the effect on the economy of a possible change in the price of electricity. The development of a separate price change model was necessary because, as noted above, the matrix of production coefficients assumes constant prices. If prices change, then an adjustment of the production coefficient matrix is necessary. The price change model is a series of techniques used to adjust the basic input-output model to account for a change in the price of electricity. After the discussion of the construction of the basic input-output model, an outline of the techniques assembled to produce the price change model will be provided along with an outline of the structure of the price change model.

"Endogenizing Households"

To "endogenize" households in the model, both the labor income to households and the consumption of goods and services by households need to be "endogenized". The production coefficient matrix created above does not include labor costs or other value added costs of production. To add labor cost to the model, consider the dollar value of all labor needed in each sector. Each sector's labor requirement can be converted into a coefficient as the other production inputs were before by dividing the dollar

value of labor needed for production by the value of output in each respective industry. Multiplying these coefficients by any change in output produces the resulting change in labor income due to the change in output. This increase in labor income is an increase in income to households.

How households spend this income depends upon the pattern of household expenditures on goods and services. The vector of consumer demand for goods and services provides this pattern. By dividing each element in this vector by personal income, a vector of coefficients is constructed which represents the share of personal income spent on each sector's output. This vector of coefficients is a vector of consumption shares. Tying together labor income and household consumption adds a new facet to the model: the effect of a change in output on household consumption can now be determined. The change in output causes a change in labor income which then causes a change in household consumption. The result of incorporating labor requirements for production and household consumption in the model is the "endogenizing" of households. The process is sometimes referred to as closing the model with respect to households.

The Effect on the Multipliers

A qualitative result of "endogenizing" households is to alter the multipliers. The multipliers derived before only took account of the indirect effect on output as the direct effect moves through the production process. The new multipliers include the influence of the indirect effect on household consumption through changes in

wages and salaries which affect household income, or in other words, these new multipliers capture the feedback affect on households of a change in exogenous final demand. These effects are called the induced effects because they result from the additional income for households induced by the direct effect. The multipliers which are derived from a model where households are "endogenized" capture three effects: direct, indirect, and induced. The quantitative effect on multipliers of "endogenizing" households is to make them larger [Miller and Blair 1985, pp. 100-105]

A detailed mathematical description of our model, its solution, and the generation of its multipliers is provided in the appendix. The matrix techniques necessary for the solution of our model and the generation of the multipliers are similar to the techniques used to solve the simple input-output model and generate its multipliers. The result is the same: a matrix of multipliers which links a change in final demand to a change in industrial output.

Data Sources

The data which was used to generate the actual numbers for our model came from the U.S. Input-Output Tables for 1977 and 1985 developed by the U.S. Department of Commerce, Bureau of Economic Analysis (BEA); personal income, farm income, and crop and livestock cash receipts for the state and various counties developed by BEA; employment and payroll estimates for the state and various counties from the U.S. Department of Commerce, Bureau

of the Census (CB), County Business Patterns; population estimates for the state and various counties (CB); and publicly available data from Kansas City Power and Light, Kansas Power and Light, and Kansas Gas and Electric supplied by the Kansas Corporation Commission.

The Structure of the Basic Input-Output Model

The input-output model used in this study is based on the input-output tables which are part of the larger Kansas Long Term Model: a hybrid, dynamic, multi-sector model of Kansas. The model is based on 1985 data which meant that all analysis required the deflating of current estimates to 1985 figures and then the inflating of the results back to current figures. The original input-output model has 48 sectors. The number of sectors was expanded to 49 so that the electrical utilities industry could be an independent sector. This was done by using the location quotient method in conjunction with the U.S. input-output tables for 1977 (the last year that the electrical utilities industry was a separate sector).

The Price Change Model

In the explanation of the simple input-output model, it was noted that if prices change, then the matrix of production coefficients needs to be adjusted. Developing a technique for adjusting the matrix of production coefficients is the first step in developing an input-output approach to estimating the effect of a price change. How this adjustment was made will be briefly explained in this section. A fuller explanation of the price

change model is provided in the appendix.

A change in the price of some good or service will affect the costs of all other sectors which use the initial good or service as an input to production. For the purposes of this study, the sector assumed to have a price change is the electrical utilities sector. A change in the price of electricity will affect the costs of almost every other sector of the economy, but the sectors which use relatively more electricity will have their costs affected more than the sectors which use relatively less electricity. For all but a few sectors we assumed that these changes in cost would be incorporated in the sectors new price of its output. In some sectors which face national markets for their output, we assumed that the price of the output was determined nationally. In these sectors, the changes in costs due to the price change altered sectorial profits, not the sector price.

A change in the price of electricity will affect more than the costs of production. It will also affect consumer demand, export demand, and intermediate demand. To estimate the effect of a price change on consumer and export demand requires estimates of price elasticities for all goods and services. Having these elasticities allowed for the estimation of a new consumption vector for households and a new export vector. The affect of an electricity price change on intermediate demand for electricity depends upon the amount of substitution of other goods and services for electricity. Estimates of the amount of substitution for electricity were taken from other studies and a new matrix of

intermediate demands was constructed.

The new consumption and export vectors and the new intermediate demand matrix can be used to create a new input-output model parallel to the original input-output model. This new model is then solved and the results for industrial output, wages and salaries, employment, and tax revenues for this new model are then compared with the original model's industrial output, wages and salaries, employment, and tax revenues. The difference in the results of the two models provides an estimate of the effect of an electricity price change on the economy.

Structure of the Price Change Model

The price change model has the same 49 sectors that the basic input-output model had. It was constructed in the same fashion using the same techniques. However, the area covered by the price change model is different because of the nature of the price change. The basic input-output model is a Kansas model. However, the price change will not be statewide, the price change will only occur in the service area of the firm changing its price. Consequently, the price change model must be adapted to the service area of the electrical utility being studied.

For this study, two price change models were developed: a KPL model and a KG&E model. The service areas for each utility were estimated by using the publically available reports which list the number of residential hookups in each county by the particular utility and comparing that number with the number of separate households in each county. If one is interested in investigating

a combination of price changes simultaneously happening in both service areas, then the results of the individual changes in each service area can be added together to capture more complex price change scenarios.

EMPIRICAL RESULTS

Questions for Investigation

The first basic question to be investigated in this study is how will changes in employment for KPL and KG&E as a result of a merger affect the Kansas economy. The basic input-output model described above will be used to answer this question. The second question to be investigated is how will changes in the price of electricity affect the Kansas economy. This will require the use of a separate price change model for each service area. The effect of employment and price changes on the Kansas economy as a result of the possible merger will be measured in terms of the changes caused in industrial output, wages and salaries, tax revenues from the state retail sales and use tax and the state personal income tax, and total employment.

Changes in Employment

Both KCP&L and KPL indicated in their testimony that one of their reasons for wanting to merge with KG&E is the increase in efficiency and ensuing cost reduction that is possible. Part of the expected cost reduction is the elimination of certain employment positions in the merged company. The basic input-output

model was used to investigate the possible effects on the state economy of a reduction in employment by the newly formed electrical utility. The expected reduction in wages and salary was first deflated from an 1991 estimate to 1985 dollars, base year of the input-output model. The 1985 wages and salary figure was then converted from personal income to disposable personal income and then to final demand. The matrix of multipliers was then used to estimate the impact of the initial change in final demand, as a result of the reduction in wages and salary, on the whole Kansas economy. The total impact on the Kansas economy of the initial change was measured by estimating the changes in output, wages and salaries, state retail and use tax revenue, state personal income tax revenue, and employment.

Seven different scenarios of reduced employment and lost wage and salaries due to the merger were investigated. The scenarios range from a loss of $4,800,000 in wages and salaries coupled with a loss of 100 jobs to a loss of $30,000,000 in wages and salaries coupled with a loss of 600 jobs. Table 1 in Appendix B summarizes the aggregated results of these different scenarios. A series of seven tables, one for each scenario, provides full sector level detail of the results of each scenario for all 49 sectors is provided in Appendix C.

One of these scenarios is based upon the estimated wage and salary and employment reductions that would be made by KCP&L if it took over KG&E, and another scenario is based on KPL's estimate of what their reduction in wages and salaries and employment would be

if they took over KG&E. KCP&L estimated, if they took over KG&E, they would reduce wages and salaries by about $8,500,000 and employment by 176 jobs.[1] We estimate, in 1991 dollars, that this initial reduction would result in a total decline in Kansas output of $11,200,000, a total reduction in Kansas wages and salaries of $10,800,000, a loss to the state government of $200,000 in retail sales and use tax revenue and $200,000 in lost revenue from the state personal income tax, and a total decline in employment of 336 jobs.

KPL estimated that if they merged with KG&E that they could reduce wages and salaries $20,379,000 in 1991 dollars and reduce employment by 403 jobs. The estimated reduction of Kansas output of this initial change is $33,500,000 and the reduction of Kansas wages and salaries by $27,400,000. The state is estimated to lose $1,000,000 in tax revenue, $500,000 from both the state retail sales and use tax and the state personal income tax. The total loss of jobs in the economy would be 781.

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[1]KCP&L estimated that it would reduce wages and salaries by $8,286,000 in 1990 dollars over four years. This figure was inflated to 1991 dollars and rounded. As with the case of KPL, we have assumed that the change will take place in one time period.

The Empirical Implementation of the Price Change Model

The KG&E service area has slightly more than 20% of the civilian labor force in Kansas and slightly higher proportions of Kansas personal income and wages and salaries. The KPL service area has more than 25% of Kansas's civilian labor force and has slightly lower proportions of Kansas's personal income and wage and salary income. Six different possibilities for the price of electricity were used to investigate the impact of a change in the price of electricity on the economy of each service area. The pricing possibilities were a 1%, 5%, and 10% increase and decrease in the price of electricity.

Changes in Prices: The KPL Service Area

Table 2 in Appendix B summarizes the aggregate results of the six pricing scenarios investigated. Only the cases of a 5% increase and decrease in the price of electricity will be discussed. The 5% increase in the price of electricity results in a decline in output of $42,700,000, in wages and salaries of $14,900,000, in tax revenue of $300,000 for both the state retail sales and use tax, and the state personal income tax. Employment would be expected to decline 436. In comparison with the impact of an employment reduction and wage and salary loss discussed just above, the price change seems to affect output more than wages and salaries. This is because the direct effect of changes in wages and salary income pushes up the total impact on wage and salary income. The 5% percent decline in the price of electricity is estimated to increase output by $44,700,000, increase wage and

salary income by $15,200,000, increase tax revenues of both the state (and local) sales and use tax and personal income tax by $300,000. Employment would be expected to increase by 446.

The results of a 5% increase and decrease in the price of electricity are not symmetrical: the increase is slightly greater in absolute value than the decrease. Because an input-output model is traditionally a linear model, this result is somewhat counter-intuitive. This outcome is due to the introduction of nonlinearities into the model. The adjustment mechanisms used to alter the model because of the price change are the sources of the non-symmetric results.

Changes in Prices: The KG&E Service Area

Table 3 in Appendix B summarizes the aggregate results of the six price change scenarios used to investigate the KG&E price change model. Because the KG&E service area is slightly smaller in terms of number of hookups, personal income and civilian labor force, the price change scenarios have slightly less impact in this service area than in the KPL service area. The 5% increase in the price of electricity results in a loss of $37,800,000 in output, $13,500,000 in wages and salary income, $300,000 in tax revenue each from retail sales, use tax and personal income tax. Employment falls 297. The 5% decrease in the price of electricity results in an increase in output of $40,300,000, an increase in wage and salary income of $13,800,000, an increase in tax revenue of $300,000 from both the state retail sales and use tax and the state personal income tax, and an increase in employment of 309.

APPENDIX B

A Generic Input-Output Model

The construction of an input-output model begins with a series of individual industry supply and demand equations. For example, consider industry i,

$$\phi_i = \xi_{i1} + \xi_{i2} + \ldots + \xi_{ij} + \ldots + \xi_{in} + \gamma_i \tag{1}$$

where ϕ_i *is the output for industry i in physical units*
ξ_{ij} *is the intermediate quantity demand for industry i's output by industry j*
γ_i *is the final demand for industry i's output*

These equations assume that all output is used as an input to further production or is consumed as final demand. The quantities in these supply and demand equations are measured in physical terms rather than by monetary values. For example, the number of planes used or the tons of steel produced.

Stacking all the industrial supply and demand equations in order provides the following configuration of equations:

$$\begin{aligned} \phi_1 &= \xi_{11} + \ldots + \xi_{1j} + \ldots + \xi_{1n} + \gamma_1 \\ &\vdots \\ \phi_i &= \xi_{i1} + \ldots + \xi_{ij} + \ldots + \xi_{in} + \gamma_i \\ &\vdots \\ \phi_n &= \xi_{n1} + \ldots + \xi_{nj} + \ldots + \xi_{nn} + \gamma_n \end{aligned} \tag{2}$$

These industrial supply and demand equations can be converted to a single matrix equation which describes this simple economy:

$$(3) \qquad \begin{bmatrix} \Phi_1 \\ \cdot \\ \cdot \\ \Phi_i \\ \cdot \\ \cdot \\ \Phi_n \end{bmatrix} = \begin{bmatrix} \xi_{11} & \cdot & \cdot & \xi_{1j} & \cdot & \cdot & \xi_{1n} \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \xi_{i1} & \cdot & \cdot & \xi_{ij} & \cdot & \cdot & \xi_{in} \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \xi_{n1} & \cdot & \cdot & \xi_{nj} & \cdot & \cdot & \xi_{nn} \end{bmatrix} + \begin{bmatrix} \gamma_1 \\ \cdot \\ \cdot \\ \gamma_i \\ \cdot \\ \cdot \\ \gamma_n \end{bmatrix}$$

A more compact method of writing these relationships is.

$$\Phi = \Xi + \Gamma$$

(4) *where* Φ *is the vector of industrial output*
Ξ *is the matrix of intermediate demands*
Γ *is the vector of final demand*

Equation (4) describes the production relationships in this simple economy in terms of physical units: numbers of planes, tons of steel, etc. To proceed with economic analysis, these production relationships need to be expressed in monetary terms.

Changing from measurements in physical units to units of monetary value requires the addition of prices to the model. Let p_i be the market price of the output of the ith industry. Then equation (1) becomes:

$$(5) \qquad p_i \cdot \Phi_i = p_i \cdot \xi_{i1} + p_i \cdot \xi_{i2} + \cdot \cdot \cdot + p_i \cdot \xi_{in} + p_i \cdot \gamma_i$$

This equation establishes the relationship that the monetary value of output is equal to the intermediate demand for the output plus the final demand for the output, with all variables measured in monetary units. The following new variables make the notation for the model easier to follow:

$$p_i' \phi_i = x_i , \qquad p_i' \xi_{ij} = z_{ij} , \qquad \text{and} \qquad p_i' \gamma_i = y_i$$

Using these new variables, equation (5) now becomes:

$$x_i = z_{i1} + z_{i2} + \ldots + z_{in} + y_i \tag{6}$$

where x_i *is the output for industry* i
z_{ij} *is the intermediate demand for industry* i*'s output by industry* j
y_i *is the final demand for industry* i*'s output*

Stacking all industrial equations in order, as was done with equation set (2), and converting the result to matrix form, as was done with equation (3) gives:

$$\begin{bmatrix} x_1 \\ \cdot \\ \cdot \\ x_i \\ \cdot \\ \cdot \\ x_n \end{bmatrix} = \begin{bmatrix} z_{11} & \cdot & \cdot & z_{1j} & \cdot & \cdot & z_{1n} \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ z_{i1} & \cdot & \cdot & z_{ij} & \cdot & \cdot & z_{in} \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ z_{ni} & \cdot & \cdot & z_{nj} & \cdot & \cdot & z_{nn} \end{bmatrix} + \begin{bmatrix} y_1 \\ \cdot \\ \cdot \\ y_i \\ \cdot \\ \cdot \\ y_n \end{bmatrix} \tag{7}$$

which can be written more compactly as:

$$X = Z + Y \tag{8}$$

The rows of the Z matrix in equation (8) represent input demand for industry i's output while the columns of the matrix represent industry i's input demand for all other output.

Unlike the Σ matrix from equation (4), the Z matrix is a description of the production process of the economy in monetary units. If prices in the economy change, then the Z matrix will change even if the underlying physical production process is

unchanged. Put another way, if relative prices change, but the productive structure of the economy remains the same, then the $\bar{Z}$ matrix will not change, but the Z matrix will change.

The Z matrix can be converted into a matrix of coefficients which describe the economy's production process. The production coefficients are created by dividing each column entry by the output of that industry. For example, consider the use of industry ith's output as an input by industry j:

$$\frac{p_i \cdot \xi_{ij}}{p_j \cdot \Phi_j} = \frac{z_{ij}}{x_j} = a_{ij} \tag{9}$$

This procedure can be followed for all the entries in Z matrix in equation (7) creating a matrix of production coefficients which is commonly referred to as the A matrix.

$$\begin{bmatrix} \frac{z_{11}}{x_1} & \frac{z_{12}}{x_2} & \cdots & \frac{z_{1n}}{x_n} \\ \frac{z_{21}}{x_1} & \frac{z_{22}}{x_2} & \cdots & \frac{z_{2n}}{x_n} \\ \cdot & \cdot & \cdots & \cdot \\ \cdot & \cdot & \cdots & \cdot \\ \cdot & & \cdots & \cdot \\ \frac{z_{n1}}{x_1} & \frac{z_{n2}}{x_2} & \cdots & \frac{z_{nn}}{x_n} \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \cdot & \cdot & \cdots & \cdot \\ \cdot & \cdot & \cdots & \cdot \\ \cdot & \cdot & \cdots & \cdot \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix} = A \tag{10}$$

The Z matrix in equations (7) and (8) can not be replaced by the A matrix just created above without some adjustments. Because the A matrix was created by dividing each column by that industry's output, each entry needs to also be multiplied by that industry's output to maintain the equality in equations (7) and (8). The first part of equation (10) now becomes:

$$
(11) \quad \begin{bmatrix} \frac{z_{11}}{x_1}x_1 & \frac{z_{12}}{x_2}x_2 & \cdots & \frac{z_{1n}}{x_n}x_n \\ \frac{z_{21}}{x_1}x_1 & \frac{z_{22}}{x_2}x_2 & \cdots & \frac{z_{2n}}{x_n}x_n \\ \vdots & \vdots & \cdots & \vdots \\ \frac{z_{n1}}{x_1}x_1 & \frac{z_{n2}}{x_2}x_2 & \cdots & \frac{z_{nn}}{x_n}x_n \end{bmatrix} = \begin{bmatrix} a_{11}x_1 & a_{12}x_2 & \cdots & a_{1n}x_n \\ a_{21}x_2 & a_{22}x_2 & \cdots & a_{2n}x_n \\ \vdots & \vdots & \cdots & \vdots \\ a_{n1}x_1 & a_{n2}x_2 & \cdots & a_{nn}x_n \end{bmatrix}
$$

Notice that the right hand side of equation (11) is identical to the A matrix having been post-multiplied by the column vector of outputs. Making this substitution gives:

$$
(12) \quad \begin{bmatrix} a_{11}x_1 & a_{12}x_1 & \cdots & a_{1n}x_n \\ a_{21}x_1 & a_{22}x_2 & \cdots & a_{2n}x_n \\ \vdots & \vdots & \cdots & \vdots \\ a_{n1}x_1 & a_{n2}x_n & \cdots & a_{nn}x_n \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix}
$$

The right hand side of equation (12) can now be substituted for the Z matrix in equation (7).

$$
(13) \quad \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} + \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix}
$$

Equation (13) can be written more compactly by substituting the A matrix post-multiplied by the column vector of outputs into equation (8).

(14) $$X = A \cdot X + Y$$

Solving the above equation for the column vector of outputs generates the multipliers for the model.

$$X - A \cdot X = Y$$

$$(I - A)X = Y$$

$$X = (I - A)^{-1} Y$$

The usefulness of the multipliers depends upon whether around this solution (or equilibrium point), a change in final demand will alter output by the same proportion that is established at the equilibrium point. Given this assumption, the solution can be interpreted as:

(15) $$\Delta X = (I - A)^{-1} \Delta Y$$

where ΔX *is the change in output*
ΔY *is the change in final demand*
$(I - A)^{-1}$ *is the matrix of multipliers for a change in final demand*

Endogenous Consumption from Wages and Salary Income

The simple model discussed in the previous section does not explicitly have any income creation. The model consists solely of output, a production process, and exogenous final demand. The matrix of production coefficients in the model only includes the use of goods and services in the production process. This neglects the contribution of labor to production and the income that labor earns from participating in production. This section is concerned with the inclusion of labor income and the consumption from labor

income into the input-output model.[2]

Labor is incorporated into the production process by adding a row at the bottom of the Z matrix which represents labor's contribution to the production of each good and service in the economy. Let w_j represent labor's contribution to the production of the jth product. In terms of cost, w_j is the cost of labor to the jth industry; in terms of income, w_j is labor income from the jth industry. With the addition of labor, Z matrix becomes:

---

[2]The endogenizing of consumption from labor income not only makes the input-output model more complex, it also necessitates the using of more exact notation in the matrix algebra used to describe the model. The problem is basically one of keeping the dimensions of the scalers, vectors, and matrices compatible. To facilitate this process, several conventions will be used:

A matrix will be indicated by a captial letter and a vector will be indicated by an arrow over it:

$$\vec{Y} = \begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix}$$

A vector turned into a diagonal matrix will have a hat over it:

$$\hat{Y} = \begin{bmatrix} y_{11} & 0 & 0 \\ 0 & y_{22} & 0 \\ 0 & 0 & y_{33} \end{bmatrix}$$

A vector or a matrix multiplied by a scaler will be interpreted as:

$$\alpha \cdot \vec{Y} = \begin{bmatrix} \alpha y_1 \\ \alpha y_2 \\ \alpha y_3 \end{bmatrix} \qquad \alpha \cdot Y = \begin{bmatrix} \alpha y_{11} & \alpha y_{12} & \alpha y_{13} \\ \alpha y_{21} & \alpha y_{22} & \alpha y_{23} \\ \alpha y_{31} & \alpha y_{32} & \alpha y_{33} \end{bmatrix}$$

$$\begin{bmatrix} z_{11} & \cdot & \cdot & z_{1j} & \cdot & \cdot & z_{1n} \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ z_{i1} & \cdot & \cdot & z_{ij} & \cdot & \cdot & z_{in} \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ z_{n1} & \cdot & \cdot & z_{nj} & \cdot & \cdot & z_{nn} \\ \hline \omega_1 & \cdot & \cdot & \omega_j & \cdot & \cdot & \omega_n \end{bmatrix}$$

Labor cost or income can also be converted to a coefficient using the same technique as used in equation (9) to create production coefficients. Again, to maintain the same value within the matrix, the coefficient must be multiplied by output for that industry.

$$\frac{\omega_j}{x_j} \cdot x_j = w_j \cdot x_j \tag{17}$$

where w_j is the labor coefficient of production

When the technique in equation (17) is applied to all labor costs in the expanded Z matrix, the result is similar to equation (11). Removing labor costs, in their coefficient form, from the production matrix leaves a row vector of labor coefficients multiplied by output.

$$[w_1 \ \cdot \ \cdot \ w_j \ \cdot \ \cdot \ w_n] \cdot \begin{bmatrix} x_1 \\ \cdot \\ \cdot \\ x_j \\ \cdot \\ \cdot \\ x_n \end{bmatrix} \tag{18}$$

This can again be written more compactly as:

$$\vec{W}^T \vec{X} = \textit{Wage and Salary Income Production} \tag{19}$$

where $\vec{W}^T$ *is the transpose of the column vector of labor production coefficients*

Equations (18) and (19) make wage and salary income from production endogenous to the model. In addition, equation (19) creates a scalar, not a vector.

To fit consumption from wage and salary income into the model, the final demand vector must be separated into final demand from consumption dependent on wage and salary income and final demand which is exogenous to the model, such as exports. The final demand that remains exogenous to the model will be treated as final demand has been treated before. The treatment of endogenous final demand will now be explained.

First, not all wage and salary income is spent on the consumption of goods and services, some of the income is lost to taxes. Transforming wages and salary income from something like gross personal income into disposable personal income is done by multiplying the wages and salary income by one minus the tax rate.

$$(1 - \tau) \cdot \vec{W}^T \vec{X} = \textit{Wage and Salary Income after Taxes}$$

where τ *is the tax rate*

Second, not all of disposable income is spent on consumption, some of the income is saved. Reducing disposable income to income used for consumption is done by multiplying disposable income by the percentage of disposable income spent on consumption of goods and services in the economy.

$$C_1 \cdot (1 - \tau) \cdot \vec{W}^T \cdot \vec{X}$$

where C_1 *is the percentage of disposable income spent on consumption*

Third, the income which is spent on consumption is not spent as a lump sum, but is distributed among most of the goods and services produced in the economy. The distribution of consumption is accounted for by multiplying disposable income spent on consumption by the marginal propensity to consume each of the goods and services in the economy.

$$C_1 \cdot (1 - \tau) \cdot (M\vec{P}C) \cdot \vec{W}^T \cdot \vec{X}$$

where $(M\vec{P}C)$ *is the Marginal Propensity to Consume each good and service $\in$ the economy*

The result of taking all of these matters into consideration is the creation of a more complex expression for final demand which incorporates both exogenous and endogenous elements.

$$\vec{Y} = \vec{C}_{ex} + C_1 \cdot (1 - \tau) \cdot (M\vec{P}C) \cdot \vec{W}^T \cdot \vec{X} \tag{20}$$

where $\vec{C}_{ex}$ *is exogenous consumption*

The dimensions of equation (20) are somewhat confusing, so a list of the vector and matrix dimensions is provided below.

$\vec{Y}$ and $\vec{C}_{ex}$	are	$n \times 1$
$C_1 \cdot (1 - \tau)$	is	a scaler
$(M\vec{P}C)$ and $\vec{X}$	are	$n \times 1$
$\vec{W}^T$	is	$1 \times n$
$(M\vec{P}C) \cdot \vec{W}^T$	is	$n \times n$
$(M\vec{P}C) \cdot \vec{W}^T \cdot \vec{X}$	is	$n \times 1$

Substituting equation (20) into equation (14) for final demand

yields:

(21) $$\vec{X} = A \cdot \vec{X} + \vec{C}_{ex} + C_1 \cdot (1 - \tau) \cdot (M\vec{P}C) \cdot \vec{W}^T \cdot \vec{X}$$

As with equation (14), solving equation (21) generates the multipliers for this model. The basic technique is the same:

$$\vec{X} - A \cdot \vec{X} - C_1 \cdot (1 - \tau) \cdot (M\vec{P}C) \cdot \vec{W}^T \cdot \vec{X} = \vec{C}_{ex}$$

$$\left(1 - A - C_1 \cdot (1 - \tau) \cdot (M\vec{P}C) \cdot \vec{W}^T\right) \cdot \vec{X} = \vec{C}_{ex}$$

$$\vec{X} = \left(1 - A - C_1 \cdot (1 - \tau) \cdot (M\vec{P}C) \cdot \vec{W}^T\right)^{-1} \vec{C}_{ex}$$

(22) *where* $\left(1 - A - C_1 \cdot (1 - \tau) \cdot (M\vec{P}C) \cdot \vec{W}^T\right)^{-1}$ *is the matrix of multipliers*

As with equation (15), equation (22) can be interpreted as an expression true not just at equilibrium, but near equilibrium. Thus, equation (22) can be used to estimate the effect of a change in final demand on the economy's output.

(23) $$\Delta\vec{X} = \left(1 - A - (1 - \tau) \cdot (M\hat{P}C) \cdot \hat{C}_{sh} \cdot \hat{W}\right)^{-1} \Delta\vec{C}_{ex}$$

The difference between equation (15) and equation (22) is the existence of endogenous final demand in the matrix of multipliers. The secondary effect of an initial change in final demand now contains both an indirect effect on intermediate demand and an induced effect on final demand.

This completes the generic explanation of the structure of input-output models and the methods used to derive multipliers from these input-output models. The remainder of this appendix is concerned with explaining the actual models used in this study.

The Input-Output Model Used

The basic input-output model used in this study is the following:

$$(24) \qquad \vec{X} = (I - \hat{m})\cdot A\cdot\vec{X} + (I - \hat{m})\cdot(C_h)\cdot(1 - \tau)\cdot(M\vec{P}C)\cdot(\vec{W}^T)\cdot\vec{X} + \{ \text{expörts} + (I - \hat{m})\cdot\vec{C}_{ex} \}$$

where m *is Import Coefficients Vector*
$(I - \hat{m})\cdot A$ *is The Regional Input-Output Matrix*
expörts is Sales to Out-of-State Firms and Consumers

The last term in brackets is exogenous final demand. The following substitutions simplify the notation:

$$A^R = (I - \hat{m})\cdot A$$
$$C_{sh} = (C_h)(1 - \tau)$$
$$= \textit{Total Consumption as a Share of Endogenous Income}$$

As with the other models, this model can be solved for the equilibrium output level:

$$(25) \qquad \vec{X} = \{I - A^R - (I - \hat{m})\cdot C_{sh}\cdot(M\vec{P}C)\cdot(\vec{W}^T)\}^{-1} \{ \text{expörts} + (I - \hat{m})\vec{C}_{ex} \}$$

The first expression in brackets is the matrix of multipliers.

The seven different scenarios of changes in employment and wages and salary income were investigated using the above model. The initial changes in wages and salary income were translated into changes in disposable income and then changes in consumption from disposable income. They were then substituted into equation (25) as a change in exogenous income. The results of these investigations can be found in Table 1. Some perspective on these

TABLE 1

The Impact on the Kansas Economy
of Reductions in Employment and Wages and Salaries
as a Result of the Merger of KPL and KG&E
(Estimated in 1991 dollars)

Scenarios: Loss of Jobs and Loss of Wages & Salaries in millions of $	Change in Variables as a Result of Loss of Jobs and Loss of Wages & Salaries				
	Output ($ mil.)	Wages & Salaries ($ mil.)	Retail Sales & Use Tax ($ mil.)	State Income Tax ($ mil.)	Employ-ment
100 Jobs $4.8 W & S	-$7.9	-$6.5	-$0.1	-$0.1	-189
178 Jobs $8.5 W & S	-11.2	-10.8	-0.2	-0.2	-336
220 Jobs $11.0 W & S	-18.1	-14.8	-0.3	-0.3	-430
300 Jobs $15.0 W & S	-24.7	-20.2	-0.4	-0.4	-579
330 Jobs $15.419 W & S	-25.4	-20.8	-0.4	-0.4	-617
403 Jobs $20.379 W & S	-33.5	-27.4	-0.5	-0.5	-782
500 Jobs $25.0 W & S	-41.1	-33.6	-0.6	-0.6	-965
600 Jobs $30.0 W & S	-49.3	-40.3	-0.7	-0.8	-1158

results can be gained by looking at the relative size of the Kansas economy during the base year of the model: 1985. Kansas 1985 personal income, when inflated to the expected 1991 price level, is almost $37.8 billion, 1985 wage and salary income when inflated to 1991 is almost $20.3 billion, and the total civilian labor force for Kansas in 1985 was about 1.3 million.

Price Change in an Input-Output Model

This section analyzes the impact of an exogenous change in the electricity price on the economy of the electrical utility service area. Considering a change in the price of electricity exogenous is reasonable since rate schedules of electrical utilities must be approved by a government agency.

Background

Although input-output models are more frequently used to analyze employment changes and multiplier effects, their usefulness in price analysis has become increasingly clear within the last 15 years. Moses [1974] presents one of the first clear theoretical presentations of the use of input-output models for analyzing price changes. His approach was a basis of later work in this area.

Blakeslee, and Butcher [1977] use an approach similar to Moses to analyze the impacts of changes in price of wheat, electricity, petroleum, and natural gas on a regional economy. Their primary reason for choosing an input-output methodology is that "I/O analysis allows the researcher to consider explicitly the complex interrelationships that characterize modern economic systems." The model they developed is capable of estimating output

and income effects occurring simultaneously in several sectors.

Melvin [1976] uses an input-output approach to investigate the energy sector in Canada. He points out that the traditional input-output approach does not allow for substitution among inputs in the response to price changes. Although he maintains the "no substitution" framework, he is careful to point out its weaknesses and to suggest improvements.

Cray [1986] looks at energy price changes in Kansas as part of his doctoral dissertation. The Melvin model forms the basis of his analysis with substitution effects not directly incorporated into Cray's model. However, he suggests the lack of substitution creates biases in the analysis. Together, Melvin and Cray provide guidelines for a model which accounts for substitution effects.

Our analysis has relied heavily on the research cited above. We have complemented this research by incorporating substitution among inputs along the lines suggested by earlier researchers.

Prices and Costs

The initial impact of an exogenous change in the price for electricity will fall on the costs of production for all goods and services using electricity as an input. First, an equilibrium vector of cost changes are found within the input-output framework:

$$\{dp_1 \ldots dp_n\} = \{dp_1 \ldots dp_n\}\{A^R\} + \{dp_1^E \ldots dp_n^E\} \tag{26}$$

where
A^R = *matrix of regional I/O coefficients*
dp_i = *equilibrium cost change for good i*
dp_i^E = *exogenous price change for good i*

Hence:

$$\{dp_1 \ldots dp_n\} = \{dp_1^E \ldots dp_n^E\}(I-A)^{-1} \tag{27}$$

The impact of an electricity price change on costs of production of an industry depends on the size of the industry's input-output coefficient for electricity use.

Changes in equilibrium costs are generally assumed, within an input-output framework, to be passed on as changes in equilibrium prices. However, we felt this assumption was unreasonable for a few industries where prices are determined in national markets. Prices for agricultural goods and for oil and gas are assumed to be constant; thus, changes in cost affect profits rather than prices.

Impact of Price Changes on Demand

After the impact of an electricity price change on the prices of other goods and services was determined, the implications for the demand for regionally produced goods and services was explored. In our model, demand is of three types:

1. Consumer demand (Purchases by households): Consumer demand is shared between goods produced within the region and imports.

2. Export demand: Demand originating outside the region for goods and services produced within the region.

3. Intermediate goods demand: Demand for the goods and services used in the production processes. As with consumer goods, demand is split between regionally produced goods and imports.

Most input-output models also include capital goods demand (machinery and equipment) and government demand. The exclusion of capital goods demand from the price change model will have few consequences since electricity is not itself a capital good. The

exclusion of the government sector is potentially more troubling. Omission of this sector is equivalent to assuming that government expenditures on electricity remains constant in the face of a price change.

Consumer Demand

The marginal propensity to consume vector (MPC) indicates the distribution of household consumption among the various types of goods and services. Changes in consumer demand because of the changes in prices were estimated using elasticities of demand. An elasticity of demand is a measure designed to show how quantity demanded changes when price changes. Technically, the elasticity, η, is the percentage change in quantity divided by the percentage change in price. η is a negative number since price increases give consumers incentives to cut back on their purchases. The elasticity of demand can be used to estimate how total expenditures (dollars as opposed to physical quantities) change as price changes. Using Δ to indicate a change, the formula is:

$$(\% \Delta \, expend) = (1+\eta)(\% \Delta \, price)$$

Estimates of demand elasticities for the electrical utilities have been provided by KCC, and those for other goods were taken from a survey by Mansur and Whalley [1984]. For most goods and services, elasticities were between -1 and zero, commonly referred to as the inelastic range. The elasticity estimates were used to estimate changes in consumption and a set of new consumption shares (a new MPC vector).

Export demand

Purchases from consumers outside the region will also respond to price changes of regionally produced goods. Unfortunately, no published data on the degree of this responsiveness exists. We made the conservative estimate that export elasticities averaged -.5. This means that a 10 percent increase in the price of a regionally produced product will result in a 5 percent reduction in the physical amount of goods sold to customers outside the region.

Intermediate demand

Our assumption, standard for input-output modeling, is that production is for the most part described by a "fixed proportion" technology. The assumption simply states that to produce a unit of a good, for example, an gallon of paint, you need fixed physical quantities of material and services, for example, 1/2 gallon of latex and 2 oz. of dye. The fixed proportion assumption does not allow any substitution among material inputs. However, we relaxed this assumption to allow substitution in the use of electricity. The elasticities of electricity demand for industrial and commercial users provided by KCC indicate that substitution indeed takes place. We assume that industrial and commercial consumers can substitute other energy sources such as natural gas for electricity. Additionally, they can substitute labor for electricity by changing production approaches and technology.

While the exact nature of energy-labor substitution varies by industry, most empirical studies show it to be significant. For example, Garafalo and Malhotra [1987] find strong evidence of

substitutability, with the cross-price elasticity averaging .09 for the U.S. as a whole, but varying across regions. Fuss (1977) finds similar evidence of substitution for Canadian manufacturing. The Fuss study finds two levels of substitution, first between electricity and other energy inputs, and second, between energy and non-energy inputs such as labor. The Fuss study shows that about 2/3 of a change in quantity demanded due to a change in the price of electricity can be accounted for by substitution of other energy sources. We have used this result in our numerical simulations.

The end result of substitution in input demand is that the A matrix, the matrix of production coefficients, is changed. An increase in the price of electricity is expected to trigger increased demand for and expenditures on labor and other utilities. The physical amount of electricity used to produce a unit of industrial or commercial output will fall. However, expenditures on electricity per unit of output will actually rise when elasticities are in the inelastic range (-1 to 0), which is the case with the data provided by KCC.

The results of changes in demand for consumer, export, and intermediate goods are used to construct a new input-output model parallel to the original. The following substitutions are made: mpc^{new} for the original consumption share vector, A^{new} for the original A matrix, $exports^{new}$ for the original export vector. The model is solved with the new data, and the results for output, payroll, and employment are compared with the original values in order to assess the impact.

Real versus Nominal Impacts

The initial results of the price change model are stated in nominal terms: the flows of goods and services are measured at their current dollar prices, incorporating all results of the price changes. However, policy makers are generally more interested in real impacts rather than nominal impacts. They are interested in changes in the physical quantities of goods and services produced and consumed, rather than in just their dollar values.

The contrast between nominal and real amounts commonly occurs in discussions of inflation. For example, suppose that a worker's wages, measured in dollar terms, have gone up by 5% this year, from $20,000 to $21,000. To evaluate whether the worker has become better or worse off, the behavior of the prices of the goods and services which the worker consumes needs to be known. Suppose, to continue the example, that inflation in the price of each of the goods and services the worker buys has been 10%. The worker is clearly worse off. His nominal income has gone up, but his real income, or purchasing power, has gone down.

For this example, calculating an index of price changes and an indicator of real income is straightforward. The common practice is to fix the initial year price index at 100. Since all prices have gone up by 10%, the second year price index is 110. Real income is found by dividing nominal income by the ratio of the first and second year price indexes:

$$Real = Nominal \times \left(\frac{Initial\ Price\ Index}{Final\ Price\ Index}\right)$$

The example leaves the worker with real income of $19,090, clearly less than he received initially.

In the example above, all prices rise by the same rate, 10%. Calculations of price indexes are more difficult when each price changes by a different rate. In this case, weighted averages of price changes need to calculated. But the goal is the same. Price indexes convert from nominal amounts to real amounts.

Measuring Real Output

One of the most important results of the price change model is the impact on output. As stated earlier, the initial results are measured in nominal terms. A price index to convert to real terms can easily be calculated. We know the equilibrium price changes in each sector from Equation (26). The largest price change is in the electric utilities sector, but there are repercussions in almost every other sector of the economy. For each sector, a weight is calculated by dividing that sector's output by total output. Each price change is then multiplied by the appropriate weight. The weighted average price change is found by summing together the weighted price changes for the individual sectors.

A simple example makes the procedure clearer. Suppose the economy consists only of utilities and manufacturing. Utilities rise in price from a base level of 100 by 10%, and manufacturing rises in price by 3%. The weights in the problem are based on the share of each specific output in total output, as evaluated in the base year prices. The price index rises from 100 to 104.75, showing a 4.75 percent increase in prices. The example shows

nominal output of 2095 and real output of 2000.

Sector	Nominal Output	Base Year Price	Current Year Price	Output in Base Year Prices	Weights	Weighted Prices	Real Output
Manufacturing	1545	100	103	1500	0.75	77.25	
Utilities	550	100	110	500	0.25	27.50	
Total	2095	100		2000	1.00	104.75	2000

The procedure just described is similar to that used by the U.S. Department of Commerce in calculating the GNP Deflator.

Real Wages and Salaries

In the U.S., over 90 percent of disposable personal income (income after taxes) is used for consumption purposes. Thus it is appropriate that the price index used to adjust income flows such as wages and salaries should be a price index based on consumption weights. Procedures for calculating a consumer price index are similar to those described for the output price index. However, the weights used to calculate the index are traditionally based on the initial consumption quantities.

Again, a simple example illustrates the point. Suppose that the economy has only two goods, utilities and manufactured products. Personal consumption is generally not the same as

output, since some goods are exported and other goods are used as intermediate products. So the weights for the consumer price index will generally differ from those used for the GNP deflator. In the example, nominal consumption rises by 7 percent, from 1200 to 1288. However, real consumption rises only by about 2 percent. On average, the prices of goods purchased by consumers rise by about 5.3 percent.

Sector	Base Year Cons.	Current Year Cons.	Base Year Price	Current Year Price	Weights	Weighted Prices	Real Cons.
Manufacturing	800	848	100	103	0.67	68.67	
Utilities	400	440	100	110	0.33	36.67	
Total	1200	1288	100		1.00	105.33	1223

The procedure above is similar to that used by the U.S. Bureau of Labor Statistics in calculating the Consumer Price Index.

The Results of the Price Change Model

The results of the price change model are summarized in Table 2 for KPL service area and Table 3 for KG&E service area. To give some perspective on the relative size of the impact of electricity price changes in each of these service areas, the table below illustrates the size of the economies of the KPL service area, the KG&E service area and the Kansas economy. The data in the table are for 1985, but are inflated to the 1991 expected price

level. One additional qualitative comparison between the two service areas and Kansas is their per capita personal income. The KG&E service area has a slightly higher per capita personal income than the state of Kansas and significantly higher than KPL's service area.

Relative Size of the KPL and KG&E Service Areas

REGION	1985 Estimates Inflated to 1991 Value Where Appropriate		
	Personal Income	Wage & Salary Income	Civilian Labor Force
Kansas	$33,819 mil.	$18,058 mil.	1,354 thous.
KPL Service Area	8,274 mil.	4,619 mil.	284 thous.
% of Kansas	24.5%	25.6%	26.0%
KG&E Service Area	7,236 mil.	4,543 mil.	352 thous.
% of Kansas	21.4%	25.2%	20.9%

TABLE 2

The Impact on the Economy

of the KPL Service Area

of a Change in the Price of Electricity

(Estimated in 1991 dollars)

Scenarios: Percentage Change in the Price of Electricity in the KPL Service Area	Change in Variables as a Result of an Electricity Price Change				
	Output ($ mil.)	Wages & Salaries ($ mil.)	Retail Sales & Use Tax ($ mil.)	State Income Tax ($ mil.)	Employ-ment
1% Decrease	$8.8	$3.0	$0.1	$0.1	88
5% Decrease	44.7	15.2	0.3	0.3	446
10% Decrease	91.7	30.8	0.6	0.6	903
1% Increase	-8.7	-3.0	-0.1	-0.1	-88
5% Increase	-42.7	-14.9	-0.3	-0.3	-436
10% Increase	-83.7	-29.6	-0.6	-0.6	-862

TABLE 3

The Impact on the Economy

of the KG&E Service Area

of a Change in the Price of Electricity

(Estimated in 1991 dollars)

Scenarios: Percentage Change in the Price of Electricity in the KG&E Service Area	Change in Variables as a Result of an Electricity Price Change				
	Output ($ mil.)	Wages & Salaries ($ mil.)	Retail Sales & Use Tax ($ mil.)	State Income Tax ($ mil.)	Employ-ment
1% Decrease	$7.8	$2.7	$0.1	$0.1	61
1.189% Decrease	$9.4	$3.3	$0.1	$0.1	72
5% Decrease	40.3	13.8	0.3	0.3	309
10% Decrease	83.5	28.1	0.5	0.5	634
1% Increase	-7.8	-2.7	-0.1	-0.1	-60
5% Increase	-37.8	-13.5	-0.3	-0.3	-297
10% Increase	-73.4	-26.6	-0.5	-0.5	-583

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APPENDIX C

DETAILED RESULTS OF THE ANALYSIS

This final appendix contains the results of our simulations at the sector level. Each table has a brief description of the scenario simulated, the results of the simulation for each of the 49 sectors in our models, and an estimation of the effect of the scenario on the revenue from the Kansas sales and use tax and the Kansas personal income tax.

The first four tables in this appendix (Tables 4 through 7) are the detailed results of the scenario suggested by the KCC staff of both a change in employment and wages and salaries and a rate change. The next seven tables (Tables 8 through 14) contain the results of seven different scenarios concerned with employment and wage and salary changes. The last twelve tables are estimates of the effect of price changes: the first six are for the KPL service area economy (Tables 15 through 20) and the next six are for the KG&E service area economy (Tables 21 through 26).

TABLE 4

AFFECT ON INDIVIDUAL SECTORS OF A LOSS OF 330 JOBS
AND $15,419,000 IN WAGES AND SALARIES

STATE

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($0.45)	($0.08)	-5
Crops	-0.38	-0.06	-3
Forestry, Commercial fisheries	-0.02	0.00	0
Agricultural Services	0.00	0.00	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	-0.01	0.00	0
Oil and Gas Extraction	-0.68	-0.03	-1
Stone, Clay, Gravel	-0.01	0.00	0
Construction	-0.32	-0.07	-3
Food Processing	-1.77	-0.17	-7
Tobacco Processing	-0.09	-0.01	0
Fabrics and Apparel	0.50	-0.10	-6
Lumber and Wood	-0.04	-0.01	-1
Furniture and Fixtures	-0.09	-0.02	-1
Paper Products	-0.30	-0.05	-2
Printing and Publishing	-0.43	-0.11	-5
Chemicals	-0.17	-0.02	-1
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	-0.32	-0.04	-1
Paints	-0.01	0.00	0
Petroleum refining	-0.80	-0.02	-1
Rubber and Plastic Products	-0.26	-0.06	-2
Leather and Leather Products	-0.06	-0.01	-1
Glass, Stone, Clay Products	-0.12	-0.03	-1
Iron, Steel, Metal	-0.09	-0.02	-1
Metal Products, Ordnance, Structural Metal	-0.17	-0.04	-2
Engines and Machinery	-0.15	-0.05	-2
Computers and Computing Equipment	-0.02	0.00	0
Electrical Equipment and Appliances	-0.19	-0.04	-1
Electric Components and Parts	-0.12	-0.03	-2
Motor Vehicles and Equipment	-0.80	-0.10	-3
Aircraft and Parts	-0.02	0.00	0
Other Transportation Equipment	-0.07	-0.02	-1
Scientific and Photographic Equipment	-0.06	-0.02	-1
Misc. Manufacturing	-0.14	-0.03	-2
Transportation and Warehousing	-0.71	-0.17	-6
Communications, Except Radio and TV	-0.49	-0.14	-4
Business Sservices, Radio and TV	-1.16	-0.35	-16
Utilities Excluding Electricity	-0.79	-0.05	-2
Wholesale and Retail trade	-3.29	-1.13	-64
Finance and Insurance	-1.50	-0.52	-21
Real Estate and Rental	-3.39	-0.12	-7
Hotels, Personal Services	-0.47	-0.14	-12
Eating and Drinking Places	-0.99	-0.20	-29
Automobile Repair and Services	-0.48	-0.05	-3
Amusements	-0.21	-0.06	-6
Health, Education, Social Services	-2.41	-0.97	-60
Federal Government Enterprises	-0.17	-0.09	-2
Electrical Utilities	-0.63	-15.47	-332
TOTAL	($25.36)	($20.71)	-617

Change in State Tax Revenue ($million)

State Income Tax	($0.39)
State Retail Sales and Use Tax	-0.38
TOTAL	($0.77)

TABLE 5

AFFECT ON INDIVIDUAL SECTORS OF 1.189%
DECREASE IN THE PRICE OF ELECTRICITY

KG&E SERVICE AREA

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	$0.06	$0.03	2
Crops	0.03	0.02	1
Forestry, Commercial Fisheries	0.00	0.00	0
Agricultural Services	0.00	0.00	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	0.11	0.03	1
Oil and Gas Extraction	0.53	0.07	1
Stone, Clay, Gravel	0.00	0.00	0
Construction	0.23	0.08	2
Food Processing	0.20	0.05	1
Tobacco Processing	0.00	0.00	0
Fabrics and Apparel	0.03	0.02	0
Lumber and Wood	0.01	0.00	0
Furniture and Fixtures	0.01	0.01	0
Paper Products	0.02	0.01	0
Printing and Publishing	0.07	0.04	1
Chemicals	0.08	0.03	0
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	0.01	0.00	0
Paints	0.01	0.00	0
Petroleum refining	0.65	0.04	1
Rubber and Plastic Products	0.04	0.02	1
Leather and Leather Products	0.00	0.00	0
Glass, Stone, Clay Products	0.02	0.01	0
Iron, Steel, Metal	0.01	0.01	0
Metal Products, Ordnance, Structural Metal	0.03	0.02	0
Engines and Machinery	0.10	0.08	1
Computers and Computing Equipment	0.00	0.00	0
Electrical Equipment and Appliances	0.04	0.02	0
Electric Components and Parts	0.00	0.00	0
Motor Vehicles and Equipment	0.04	0.01	0
Aircraft and Parts	0.29	0.72	3
Other Transportation Equipment	0.00	0.00	0
Scientific and Photographic Equipment	0.01	0.01	0
Misc. Manufacturing	0.01	0.01	0
Transportation and Warehousing	0.21	0.12	2
Communications, Except Radio and TV	0.06	0.04	1
Business Sservices, Radio and TV	0.19	0.14	3
Utilities Excluding Electricity	0.65	0.05	2
Wholesale and Retail trade	0.59	0.43	13
Finance and Insurance	0.17	0.13	3
Real Estate and Rental	0.48	0.05	1
Hotels, Personal Services	0.07	0.05	3
Eating and Drinking Places	0.15	0.08	6
Automobile Repair and Services	0.08	0.02	1
Amusements	0.03	0.02	1
Health, Education, Social Services	0.38	0.33	9
Federal Government Enterprises	0.00	0.02	0
Electrical Utilities	3.61	0.43	12
TOTAL	$9.34	$3.25	72

Change in State Tax Revenue ($million)	
State Income Tax	$0.06
State Retail Sales and Use Tax	0.06
TOTAL	$0.12

TABLE 6

THE NET AFFECT ON INDIVIDUAL SECTORS OF A LOSS OF 330 JOBS, $15,419,000 IN WAGES AND SALARIES, AND A PRICE DECREASE OF 1.189%
(UPPER BOUND)

STATE

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($0.39)	($0.06)	-3
Crops	-0.35	-0.04	-2
Forestry, Commercial Fisheries	-0.02	0.00	0
Agricultural Services	0.00	0.00	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	0.10	0.02	1
Oil and Gas Extraction	-0.14	0.04	0
Stone, Clay, Gravel	-0.01	0.00	0
Construction	-0.09	0.02	-1
Food Processing	-1.55	-0.13	-6
Tobacco Processing	-0.09	0.00	0
Fabrics and Apparel	-0.47	-0.09	-5
Lumber and Wood	-0.04	-0.01	0
Furniture and Fixtures	-0.08	-0.02	-1
Paper Products	-0.28	-0.04	-2
Printing and Publishing	-0.37	-0.07	-4
Chemicals	-0.09	0.01	0
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	-0.31	-0.04	-1
Paints	-0.01	0.00	0
Petroleum refining	-0.15	0.02	0
Rubber and Plastic Products	-0.22	-0.03	-1
Leather and Leather Products	-0.06	-0.01	-1
Glass, Stone, Clay Products	-0.10	-0.02	-1
Iron, Steel, Metal	-0.09	-0.01	-1
Metal Products, Ordnance, Structural Metal	-0.14	-0.03	-1
Engines and Machinery	-0.05	0.04	0
Computers and Computing Equipment	-0.01	0.00	0
Electrical Equipment and Appliances	-0.15	-0.02	-1
Electric Components and Parts	-0.11	-0.03	-1
Motor Vehicles and Equipment	-0.76	-0.09	-2
Aircraft and Parts	0.28	0.72	3
Other Transportation Equipment	-0.07	-0.01	-1
Scientific and Photographic Equipment	-0.05	-0.01	-1
Misc. Manufacturing	-0.13	-0.03	-1
Transportation and Warehousing	-0.50	-0.05	-4
Communications, Except Radio and TV	-0.43	-0.10	-3
Business Sservices, Radio and TV	-0.97	-0.22	-14
Utilities Excluding Electricity	-0.14	0.00	0
Wholesale and Retail trade	-2.70	-0.70	-51
Finance and Insurance	-1.33	-0.38	-19
Real Estate and Rental	-2.91	-0.07	-6
Hotels, Personal Services	-0.40	-0.08	-10
Eating and Drinking Places	-0.84	-0.12	-23
Automobile Repair and Services	-0.39	-0.03	-2
Amusements	-0.18	-0.04	-5
Health, Education, Social Services	-2.04	-0.64	-50
Federal Government Enterprises	-0.17	-0.08	-2
Electrical Utilities	2.97	-15.04	-319
TOTAL	($16.02)	($17.46)	-544

Change in State Tax Revenue ($million)	
State Income Tax	($0.31)
State Retail Sales and Use Tax	-0.30
TOTAL	($0.61)

TABLE 7

THE NET AFFECT ON INDIVIDUAL SECTORS OF A LOSS OF 330 JOBS, $15,419,000 IN WAGES AND SALARIES, AND A PRICE DECREASE OF 1.189%
(LOWER BOUND)

STATE

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($0.30)	($0.04)	-2
Crops	-0.27	-0.03	-2
Forestry, Commercial Fisheries	-0.02	0.00	0
Agricultural Services	0.00	0.00	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	0.10	0.02	1
Oil and Gas Extraction	0.00	0.04	0
Stone, Clay, Gravel	-0.01	0.00	0
Construction	-0.02	0.03	0
Food Processing	-1.19	-0.09	-5
Tobacco Processing	-0.07	0.00	0
Fabrics and Apparel	-0.37	-0.06	-4
Lumber and Wood	-0.03	0.00	0
Furniture and Fixtures	-0.06	-0.01	-1
Paper Products	-0.22	-0.03	-1
Printing and Publishing	-0.27	-0.05	-3
Chemicals	-0.05	0.02	0
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	-0.24	-0.03	-1
Paints	0.00	0.00	0
Petroleum refining	0.02	0.02	0
Rubber and Plastic Products	-0.16	-0.02	-1
Leather and Leather Products	-0.05	-0.01	-1
Glass, Stone, Clay Products	-0.07	-0.01	0
Iron, Steel, Metal	-0.07	-0.01	0
Metal Products, Ordnance, Structural Metal	-0.11	-0.02	-1
Engines and Machinery	-0.01	0.05	0
Computers and Computing Equipment	-0.01	0.00	0
Electrical Equipment and Appliances	-0.11	-0.01	-1
Electric Components and Parts	-0.09	-0.02	-1
Motor Vehicles and Equipment	-0.59	-0.07	-2
Aircraft and Parts	0.28	0.72	3
Other Transportation Equipment	-0.05	-0.01	-1
Scientific and Photographic Equipment	-0.04	-0.01	0
Misc. Manufacturing	-0.10	-0.02	-1
Transportation and Warehousing	-0.35	-0.01	-3
Communications, Except Radio and TV	-0.32	-0.07	-3
Business Sservices, Radio and TV	-0.73	-0.14	-10
Utilities Excluding Electricity	0.03	0.01	0
Wholesale and Retail trade	-2.01	-0.46	-37
Finance and Insurance	-1.02	-0.28	-14
Real Estate and Rental	-2.20	-0.05	-4
Hotels, Personal Services	-0.30	-0.06	-7
Eating and Drinking Places	-0.63	-0.08	-17
Automobile Repair and Services	-0.29	-0.02	-2
Amusements	-0.13	-0.03	-4
Health, Education, Social Services	-1.53	-0.44	-38
Federal Government Enterprises	-0.13	-0.06	-2
Electrical Utilities	3.11	-15.03	-319
TOTAL	($10.68)	($16.34)	-484

Change in State Tax Revenue ($million)	
State Income Tax	($0.31)
State Retail Sales and Use Tax	-0.30
TOTAL	($0.61)

TABLE 8

AFFECT ON INDIVIDUAL SECTORS OF A LOSS OF 100 JOBS
AND $4,800,000 IN WAGES AND SALARIES

STATE

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($0.14)	($0.03)	-2
Crops	-0.12	-0.02	-1
Forestry, Commercial Fisheries	-0.01	0.00	0
Agricultural Services	0.00	0.00	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	0.00	0.00	0
Oil and Gas Extraction	-0.21	-0.01	0
Stone, Clay, Gravel	0.00	0.00	0
Construction	-0.10	-0.12	-1
Food Processing	-0.55	[illegible]	-2
Tobacco Processing	-0.03	0.00	0
Fabrics and Apparel	-0.16	-0.03	-2
Lumber and Wood	-0.01	0.00	0
Furniture and Fixtures	-0.03	-0.01	0
Paper Products	-0.09	-0.02	-1
Printing and Publishing	-0.14	-0.04	-2
Chemicals	-0.05	-0.01	0
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	-0.10	-0.01	0
Paints	0.00	0.00	0
Petroleum refining	-0.25	-0.01	0
Rubber and Plastic Products	-0.08	-0.02	-1
Leather and Leather Products	-0.02	0.00	0
Glass, Stone, Clay Products	-0.04	-0.01	0
Iron, Steel, Metal	-0.03	-0.01	0
Metal Products, Ordnance, Structural Metal	-0.05	-0.01	-1
Engines and Machinery	-0.05	-0.01	-1
Computers and Computing Equipment	0.00	0.00	0
Electrical Equipment and Appliances	-0.06	-0.01	0
Electric Components and Parts	-0.04	-0.01	0
Motor Vehicles and Equipment	-0.25	-0.03	-1
Aircraft and Parts	0.00	0.00	0
Other Transportation Equipment	-0.02	-0.01	0
Scientific and Photographic Equipment	-0.02	0.00	0
Misc. Manufacturing	-0.04	-0.01	-1
Transportation and Warehousing	-0.22	-0.05	-2
Communications, Except Radio and TV	-0.15	-0.04	-1
Business Sservices, Radio and TV	-0.36	-0.11	-5
Utilities Excluding Electricity	-0.25	-0.02	-1
Wholesale and Retail trade	-1.02	-0.35	-20
Finance and Insurance	-0.47	-0.16	-7
Real Estate and Rental	-1.06	-0.04	-2
Hotels, Personal Services	-0.15	-0.04	-4
Eating and Drinking Places	-0.31	-0.06	-9
Automobile Repair and Services	-0.15	-0.02	-1
Amusements	-0.06	-0.02	-2
Health, Education, Social Services	-0.75	-0.30	-19
Federal Government Enterprises	-0.05	-0.03	-1
Electrical Utilities	-0.20	-4.82	-100
TOTAL	($7.89)	($6.45)	-189

Change in State Tax Revenue ($million)	
State Income Tax	($0.12)
State Retail Sales and Use Tax	-0.12
TOTAL	($0.24)

TABLE 9

AFFECT ON INDIVIDUAL SECTORS OF A LOSS OF 178 JOBS
AND $8,500,000 IN WAGES AND SALARIES

STATE

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($0.20)	($0.04)	-3
Crops	-0.17	-0.03	-2
Forestry, Commercial Fisheries	-0.01	0.00	0
Agricultural Services	0.00	0.00	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	-0.01	0.00	0
Oil and Gas Extraction	-0.30	-0.01	0
Stone, Clay, Gravel	0.00	0.00	0
Construction	-0.14	-0.03	-1
Food Processing	-0.78	-0.08	-4
Tobacco Processing	-0.04	0.00	0
Fabrics and Apparel	-0.22	-0.04	-3
Lumber and Wood	-0.02	0.00	0
Furniture and Fixtures	-0.04	-0.01	-1
Paper Products	-0.13	-0.02	-1
Printing and Publishing	-0.19	-0.05	-3
Chemicals	-0.07	-0.01	0
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	-0.14	-0.02	-1
Paints	0.00	0.00	0
Petroleum refining	-0.35	-0.01	0
Rubber and Plastic Products	-0.12	-0.03	-1
Leather and Leather Products	-0.03	-0.01	-1
Glass, Stone, Clay Products	-0.05	-0.01	-1
Iron, Steel, Metal	-0.04	-0.01	0
Metal Products, Ordnance, Structural Metal	-0.08	-0.02	-1
Engines and Machinery	-0.07	-0.02	-1
Computers and Computing Equipment	-0.01	0.00	0
Electrical Equipment and Appliances	-0.08	-0.02	-1
Electric Components and Parts	-0.05	-0.02	-1
Motor Vehicles and Equipment	-0.36	-0.04	-1
Aircraft and Parts	-0.01	0.00	0
Other Transportation Equipment	-0.03	-0.01	0
Scientific and Photographic Equipment	-0.03	-0.01	0
Misc. Manufacturing	-0.06	-0.02	-1
Transportation and Warehousing	-0.32	-0.07	-4
Communications, Except Radio and TV	-0.21	-0.06	-2
Business Sservices, Radio and TV	-0.51	-0.16	-9
Utilities Excluding Electricity	-0.35	-0.02	-1
Wholesale and Retail trade	-1.46	-0.50	-35
Finance and Insurance	-0.67	-0.23	-12
Real Estate and Rental	-1.50	-0.05	-4
Hotels, Personal Services	-0.21	-0.06	-7
Eating and Drinking Places	-0.44	-0.09	-16
Automobile Repair and Services	-0.21	-0.02	-2
Amusements	-0.09	-0.03	-3
Health, Education, Social Services	-1.07	-0.43	-33
Federal Government Enterprises	-0.08	-0.04	-1
Electrical Utilities	-0.28	-8.52	-179
TOTAL	($11.23)	($10.84)	-336

Change in State Tax Revenue ($million)	
State Income Tax	($0.21)
State Retail Sales and Use Tax	-0.20
TOTAL	($0.40)

TABLE 10

AFFECT ON INDIVIDUAL SECTORS OF A LOSS OF 220 JOBS
AND $11,000,000 IN WAGES AND SALARIES

STATE

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($0.32)	($0.06)	-4
Crops	-0.27	-0.04	-2
Forestry, Commercial Fisheries	-0.02	0.00	0
Agricultural Services	0.00	0.00	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	-0.01	0.00	0
Oil and Gas Extraction	-0.48	-0.02	-1
Stone, Clay, Gravel	-0.01	0.00	0
Construction	-0.23	-0.05	-2
Food Processing	-1.26	-0.12	-5
Tobacco Processing	-0.06	0.00	0
Fabrics and Apparel	-0.36	-0.07	-4
Lumber and Wood	-0.03	-0.01	0
Furniture and Fixtures	-0.06	-0.02	-1
Paper Products	-0.22	-0.04	-2
Printing and Publishing	-0.31	-0.08	-4
Chemicals	-0.12	-0.01	0
Plastic Material and Synthetic.	0.00	0.00	0
Drugs and Preparations	-0.23	-0.03	-1
Paints	-0.01	0.00	0
Petroleum refining	-0.57	-0.01	0
Rubber and Plastic Products	-0.19	-0.04	-1
Leather and Leather Products	-0.04	-0.01	-1
Glass, Stone, Clay Products	-0.08	-0.02	-1
Iron, Steel, Metal	-0.07	-0.01	-1
Metal Products, Ordnance, Structural Metal	-0.12	-0.03	-1
Engines and Machinery	-0.11	-0.03	-1
Computers and Computing Equipment	-0.01	0.00	0
Electrical Equipment and Appliances	-0.13	-0.03	-1
Electric Components and Parts	-0.08	-0.02	-1
Motor Vehicles and Equipment	-0.57	-0.07	-2
Aircraft and Parts	-0.01	0.00	0
Other Transportation Equipment	-0.05	-0.01	-1
Scientific and Photographic Equipment	-0.04	-0.01	0
Misc. Manufacturing	-0.10	-0.02	-1
Transportation and Warehousing	-0.51	-0.12	-5
Communications, Except Radio and TV	-0.35	-0.10	-3
Business Services, Radio and TV	-0.83	-0.25	-12
Utilities Excluding Electricity	-0.57	-0.04	-1
Wholesale and Retail trade	-2.34	-0.80	-45
Finance and Insurance	-1.07	-0.37	-15
Real Estate and Rental	-2.42	-0.09	-5
Hotels, Personal Services	-0.33	-0.10	-9
Eating and Drinking Places	-0.71	-0.14	-20
Automobile Repair and Services	-0.34	-0.04	-2
Amusements	-0.15	-0.04	-4
Health, Education, Social Services	-1.72	-0.69	-42
Federal Government Enterprises	-0.12	-0.07	-2
Electrical Utilities	-0.45	-11.04	-226
TOTAL	($18.09)	($14.78)	-430

Change in State Tax Revenue ($million)	
State Income Tax	($0.28)
State Retail Sales and Use Tax	-0.27
TOTAL	($0.55)

TABLE 11

AFFECT ON INDIVIDUAL SECTORS OF A LOSS OF 300 JOBS
AND $15,000,000 IN WAGES AND SALARIES

STATE

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($0.44)	($0.08)	-5
Crops	-0.37	-0.06	-3
Forestry, Commercial Fisheries	-0.02	0.00	0
Agricultural Services	0.00	0.00	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	0.00	0.00	0
Oil and Gas Extraction	+0.01	0.00	0
Stone, Clay, Gravel	-0.66	-0.03	-1
Construction	-0.01	0.00	0
Food Processing	-0.31	-0.06	-2
Tobacco Processing	-1.72	-0.17	-7
Fabrics and Apparel	-0.09	0.00	0
Lumber and Wood	-0.49	-0.10	-6
Furniture and Fixtures	-0.04	-0.01	0
Paper Products	-0.09	-0.02	-1
Printing and Publishing	-0.29	-0.05	-2
Chemicals	-0.42	-0.11	-5
Plastic Material and Synthetics	-0.16	-0.02	-1
Drugs and Preparations	0.00	0.00	0
Paints	-0.31	-0.04	-1
Petroleum refining	-0.01	0.00	0
Rubber and Plastic Products	-0.77	-0.02	-1
Leather and Leather Products	-0.25	-0.06	-2
Glass, Stone, Clay Products	-0.06	-0.01	-1
Iron, Steel, Metal	-0.12	-0.03	-1
Metal Products, Ordnance, Structural Metal	-0.09	-0.02	-1
Engines and Machinery	-0.16	-0.04	-2
Computers and Computing Equipment	-0.14	-0.05	-2
Electrical Equipment and Appliances	-0.02	0.00	0
Electric Components and Parts	-0.18	-0.03	-1
Motor Vehicles and Equipment	-0.11	-0.03	-1
Aircraft and Parts	-0.78	-0.10	-3
Other Transportation Equipment	-0.01	0.00	0
Scientific and Photographic Equipment	-0.07	-0.02	-1
Misc. Manufacturing	-0.06	-0.02	-1
Transportation and Warehousing	-0.14	-0.03	-2
Communications, Except Radio and TV	-0.70	-0.16	-6
Business Sservices, Radio and TV	-0.47	-0.13	-4
Utilities Excluding Electricity	-1.13	-0.34	-16
Wholesale and Retail trade	-0.77	-0.05	-2
Finance and Insurance	-3.20	-1.10	-62
Real Estate and Rental	-1.46	-0.50	-21
Hotels, Personal Services	-3.30	-0.12	-7
Eating and Drinking Places	-0.45	-0.14	-12
Automobile Repair and Services	-0.97	-0.20	-28
Amusements	-0.46	-0.05	-3
Health, Education, Social Services	-0.20	-0.06	-6
Federal Government Enterprises	-2.35	-0.94	-58
Electrical Utilities	-0.16	-0.09	-2
	-0.62	-15.05	-301
TOTAL	($24.67)	($20.15)	-579

Change in State Tax Revenue	($million)
State Income Tax	($0.38)
State Retail Sales and Use Tax	-0.37
TOTAL	($0.75)

TABLE 12

AFFECT ON INDIVIDUAL SECTORS OF A LOSS OF 403 JOBS
AND $20,379,000 IN WAGES AND SALARIES

STATE

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($0.60)	($0.11)	-7
Crops	-0.50	-0.08	-5
Forestry, Commercial Fisheries	-0.03	0.00	0
Agricultural Services	-0.01	0.00	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	-0.02	0.00	0
Oil and Gas Extraction	-0.90	-0.04	-1
Stone, Clay, Gravel	-0.01	0.00	0
Construction	-0.42	-0.09	-3
Food Processing	-2.33	-0.23	-10
Tobacco Processing	-0.12	-0.01	0
Fabrics and Apparel	-0.56	-0.13	-8
Lumber and Wood	-0.06	-0.01	-1
Furniture and Fixtures	-0.12	-0.03	-1
Paper Products	-0.40	-0.07	-3
Printing and Publishing	-0.57	-0.15	-7
Chemicals	-0.22	-0.03	-1
Plastic Material and Synthetics	-0.01	0.00	0
Drugs and Preparations	-0.43	-0.06	-2
Paints	-0.01	0.00	0
Petroleum refining	-1.05	-0.02	-1
Rubber and Plastic Products	-0.35	-0.08	-3
Leather and Leather Products	-0.08	-0.02	-1
Glass, Stone, Clay Products	-0.16	-0.04	-1
Iron, Steel, Metal	-0.12	-0.02	-1
Metal Products, Ordnance, Structural Metal	-0.22	-0.06	-2
Engines and Machinery	-0.20	-0.06	-2
Computers and Computing Equipment	-0.02	0.00	0
Electrical Equipment and Appliances	-0.25	-0.05	-2
Electric Components and Parts	-0.15	-0.05	-2
Motor Vehicles and Equipment	-1.06	-0.13	-4
Aircraft and Parts	-0.02	-0.01	0
Other Transportation Equipment	-0.09	-0.02	-1
Scientific and Photographic Equipment	-0.08	-0.02	-1
Misc. Manufacturing	-0.19	-0.05	-2
Transportation and Warehousing	-0.94	-0.22	-9
Communications, Except Radio and TV	-0.64	-0.18	-5
Business Sservices, Radio and TV	-1.53	-0.46	-22
Utilities Excluding Electricity	-1.05	-0.07	-2
Wholesale and Retail trade	-4.34	-1.49	-84
Finance and Insurance	-1.99	-0.68	-28
Real Estate and Rental	-4.48	-0.15	-9
Hotels, Personal Services	-0.62	-0.18	-16
Eating and Drinking Places	-1.31	-0.27	-38
Automobile Repair and Services	-0.63	-0.07	-4
Amusements	-0.27	-0.07	-7
Health, Education, Social Services	-3.19	-1.28	-79
Federal Government Enterprises	-0.22	-0.12	-3
Electrical Utilities	-0.84	-20.45	-405
TOTAL	($33.52)	($27.37)	-782

Change in State Tax Revenue ($million)	
State Income Tax	($0.52)
State Retail Sales and Use Tax	-0.50
TOTAL	($1.02)

TABLE 13

AFFECT ON INDIVIDUAL SECTORS OF A LOSS OF 500 JOBS
AND $25,000,000 IN WAGES AND SALARIES

STATE

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($0.73)	($0.14)	-8
Crops	-0.62	-0.09	-6
Forestry, Commercial Fisheries	-0.04	0.00	0
Agricultural Services	-0.01	0.00	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	-0.02	0.00	0
Oil and Gas Extraction	-1.10	-0.04	-1
Stone, Clay, Gravel	-0.02	0.00	0
Construction	-0.51	-0.11	-4
Food Processing	-2.86	-0.28	-12
Tobacco Processing	-0.14	-0.01	0
Fabrics and Apparel	-0.81	-0.16	-10
Lumber and Wood	-0.07	-0.02	-1
Furniture and Fixtures	-0.14	-0.04	-2
Paper Products	-0.49	-0.08	-3
Printing and Publishing	-0.70	-0.19	-8
Chemicals	-0.27	-0.03	-1
Plastic Material and Synthetics	-0.01	0.00	0
Drugs and Preparations	-0.52	-0.07	-2
Paints	-0.02	0.00	0
Petroleum refining	-1.29	-0.03	-1
Rubber and Plastic Products	-0.42	-0.09	-3
Leather and Leather Products	-0.10	-0.02	-2
Glass, Stone, Clay Products	-0.19	-0.04	-2
Iron, Steel, Metal	-0.15	-0.03	-1
Metal Products, Ordnance, Structural Metal	-0.27	-0.07	-3
Engines and Machinery	-0.24	-0.08	-3
Computers and Computing Equipment	-0.03	-0.01	0
Electrical Equipment and Appliances	-0.31	-0.06	-2
Electric Components and Parts	-0.19	-0.06	-2
Motor Vehicles and Equipment	-1.30	-0.16	-4
Aircraft and Parts	-0.02	-0.01	0
Other Transportation Equipment	-0.11	-0.03	-1
Scientific and Photographic Equipment	-0.10	-0.03	-1
Misc. Manufacturing	-0.23	-0.06	-3
Transportation and Warehousing	-1.16	-0.27	-10
Communications, Except Radio and TV	-0.79	-0.22	-6
Business Sservices, Radio and TV	-1.88	-0.57	-27
Utilities Excluding Electricity	-1.29	-0.08	-3
Wholesale and Retail trade	-5.33	-1.83	-103
Finance and Insurance	-2.44	-0.84	-35
Real Estate and Rental	-5.50	-0.20	-11
Hotels, Personal Services	-0.76	-0.23	-20
Eating and Drinking Places	-1.61	-0.33	-46
Automobile Repair and Services	-0.77	-0.08	-4
Amusements	-0.33	-0.09	-9
Health, Education, Social Services	-3.91	-1.57	-96
Federal Government Enterprises	-0.27	-0.15	-4
Electrical Utilities	-1.03	-25.09	-502
TOTAL	($41.12)	($33.58)	-965

Change in State Tax Revenue	($million)
State Income Tax	($0.64)
State Retail Sales and Use Tax	-0.61
TOTAL	($1.25)

TABLE 14

AFFECT ON INDIVIDUAL SECTORS OF A LOSS OF 600 JOBS
AND $30,000,000 IN WAGES AND SALARIES

STATE

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($0.88)	($0.16)	-10
Crops	-0.74	-0.11	-7
Forestry, Commercial Fisheries	-0.04	0.00	0
Agricultural Services	-0.01	0.00	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	-0.03	-0.01	0
Oil and Gas Extraction	-1.32	-0.05	-2
Stone, Clay, Gravel	-0.02	-0.01	0
Construction	-0.62	-0.13	-5
Food Processing	-3.44	-0.33	-14
Tobacco Processing	-0.17	-0.01	0
Fabrics and Apparel	-0.98	-0.20	-11
Lumber and Wood	-0.09	-0.02	-1
Furniture and Fixtures	-0.17	-0.05	-2
Paper Products	-0.59	-0.10	-4
Printing and Publishing	-0.84	-0.22	-10
Chemicals	-0.32	-0.04	-1
Plastic Material and Synthetics	-0.01	0 00	0
Drugs and Preparations	-0.63	-0.09	-3
Paints	-0.02	0.00	0
Petroleum refining	-1.55	-0.04	-1
Rubber and Plastic Products	-0.51	-0.11	-4
Leather and Leather Products	-0.12	-0.03	-2
Glass, Stone, Clay Products	-0.23	-0.05	-2
Iron, Steel, Metal	-0.18	-0.03	-1
Metal Products, Ordnance, Structural Metal	-0.33	-0.08	-3
Engines and Machinery	-0.29	-0.09	-3
Computers and Computing Equipment	-0.03	-0.01	0
Electrical Equipment and Appliances	-0.37	-0.07	-3
Electric Components and Parts	-0.23	-0.07	-3
Motor Vehicles and Equipment	-1.56	-0.20	-5
Aircraft and Parts	-0.03	-0.01	0
Other Transportation Equipment	-0.14	-0.03	-2
Scientific and Photographic Equipment	-0.12	-0.03	-1
Misc. Manufacturing	-0.27	-0.07	-3
Transportation and Warehousing	-1.39	-0.32	-13
Communications, Except Radio and TV	-0.94	-0.26	-8
Business Sservices, Radio and TV	-2.25	-0.68	-32
Utilities Excluding Electricity	-1.55	-0.10	-3
Wholesale and Retail trade	-6.39	-2.19	-124
Finance and Insurance	-2.92	-1.01	-41
Real Estate and Rental	-6.60	-0.24	-13
Hotels, Personal Services	-0.91	-0.27	-24
Eating and Drinking Places	-1.93	-0.39	-56
Automobile Repair and Services	-0.93	-0.10	-5
Amusements	-0.40	-0.11	-11
Health, Education, Social Services	-4.69	-1.89	-116
Federal Government Enterprises	-0.33	-0.18	-4
Electrical Utilities	-1.23	-30.10	-603
TOTAL	($49.34)	($40.30)	-1158

Change in State Tax Revenue ($million)	
State Income Tax	($0.77)
State Retail Sales and Use Tax	-0.73
TOTAL	($1.50)

TABLE 15

AFFECT ON INDIVIDUAL SECTORS OF 1% DECREASE IN THE PRICE OF ELECTRICITY

KPL SERVICE AREA

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	$0.13	$0.10	3
Crops	0.08	0.08	3
Forestry, Commercial Fisheries	0.00	0.00	0
Agricultural Services	0.01	0.00	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	0.01	0.00	0
Oil and Gas Extraction	0.26	0.02	0
Stone, Clay, Gravel	0.01	0.00	0
Construction	0.25	0.08	2
Food Processing	0.46	0.14	2
Tobacco Processing	0.00	0.00	0
Fabrics and Apparel	0.05	0.03	1
Lumber and Wood	0.01	0.01	0
Furniture and Fixtures	0.01	0.01	0
Paper Products	0.06	0.03	1
Printing and Publishing	0.11	0.09	1
Chemicals	0.08	0.03	1
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	0.04	0.01	0
Paints	0.00	0.00	0
Petroleum refining	0.18	0.01	0
Rubber and Plastic Products	0.10	0.07	1
Leather and Leather Products	0.01	0.01	0
Glass, Stone, Clay Products	0.03	0.02	0
Iron, Steel, Metal	0.05	0.03	1
Metal Products, Ordnance, Structural Metal	0.06	0.03	1
Engines and Machinery	0.08	0.05	1
Computers and Computing Equipment	0.00	0.00	0
Electrical Equipment and Appliances	0.05	0.02	0
Electric Components and Parts	0.01	0.01	0
Motor Vehicles and Equipment	0.03	0.03	0
Aircraft and Parts	0.00	0.00	0
Other Transportation Equipment	0.02	0.01	0
Scientific and Photographic Equipment	0.03	0.00	0
Misc. Manufacturing	0.02	0.01	0
Transportation and Warehousing	0.16	0.07	2
Communications, Except Radio and TV	0.10	0.07	1
Business Sservices, Radio and TV	0.26	0.17	4
Utilities Excluding Electricity	1.05	0.09	2
Wholesale and Retail trade	0.72	0.55	19
Finance and Insurance	0.26	0.21	4
Real Estate and Rental	0.52	0.05	2
Hotels, Personal Services	0.09	0.07	4
Eating and Drinking Places	0.20	0.11	9
Automobile Repair and Services	0.09	0.02	1
Amusements	0.04	0.02	1
Health, Education, Social Services	0.46	0.43	13
Federal Government Enterprises	0.05	0.05	1
Electrical Utilities	2.48	0.19	5
TOTAL	$8.77	$3.02	88

Change in State Tax Revenue ($million)	
State Income Tax	$0.06
State Retail Sales and Use Tax	0.06
TOTAL	$0.11

TABLE 16

AFFECT ON INDIVIDUAL SECTORS OF 5% DECREASE IN THE PRICE OF ELECTRICITY

KPL SERVICE AREA

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Changes in Employment
Livestock	$0.64	$0.49	16
Crops	0.43	0.39	15
Forestry, Commercial Fisheries	0.00	0.00	0
Agricultural Services	0.03	0.02	1
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	0.04	0.01	0
Oil and Gas Extraction	1.31	0.09	2
Stone, Clay, Gravel	0.04	0.02	1
Construction	1.26	0.41	11
Food Processing	2.33	0.71	11
Tobacco Processing	0.02	0.01	0
Fabrics and Apparel	0.25	0.13	4
Lumber and Wood	0.07	0.03	1
Furniture and Fixtures	0.06	0.03	1
Paper Products	0.32	0.16	3
Printing and Publishing	0.56	0.46	7
Chemicals	0.40	0.16	3
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	0.18	0.05	1
Paints	0.00	0.00	0
Petroleum refining	0.90	0.04	1
Rubber and Plastic Products	0.48	0.34	4
Leather and Leather Products	0.05	0.03	1
Glass, Stone, Clay Products	0.17	0.08	2
Iron, Steel, Metal	0.28	0.13	3
Metal Products, Ordnance, Structural Metal	0.28	0.15	3
Engines and Machinery	0.41	0.25	5
Computers and Computing Equipment	0.00	0.00	0
Electrical Equipment and Appliances	0.24	0.08	2
Electric Components and Parts	0.06	0.04	1
Motor Vehicles and Equipment	0.67	0.17	3
Aircraft and Parts	0.01	0.00	0
Other Transportation Equipment	0.08	0.06	1
Scientific and Photographic Equipment	0.03	0.02	0
Misc. Manufacturing	0.08	0.05	1
Transportation and Warehousing	0.76	0.37	9
Communications, Except Radio and TV	0.	0.34	4
Business Sservices, Radio and TV	1.32	0.84	21
Utilities Excluding Electricity	5.31	0.47	12
Wholesale and Retail trade	3.62	2.77	95
Finance and Insurance	1.32	1.06	22
Real Estate and Rental	2.60	0.26	9
Hotels, Personal Services	0.46	0.35	18
Eating and Drinking Places	1.02	0.53	44
Automobile Repair and Services	0.47	0.12	4
Amusements	0.18	0.11	7
Health, Education, Social Services	2.30	2.14	65
Federal Government Enterprises	0.24	0.24	5
Electrical Utilities	12.92	0.98	27
TOTAL	$44.69	$15.22	446

Change in State Tax Revenue ($million)	
State Income Tax	$0.29
State Retail Sales and Use Tax	0.28
TOTAL	$0.57

TABLE 17

AFFECT ON INDIVIDUAL SECTORS OF 10%
DECREASE IN THE PRICE OF ELECTRICITY

KPL SERVICE AREA

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livcstock	$1.29	$0.98	32
Crops	0.86	0.79	30
Forestry, Commercial Fisheries	0.01	0.00	0
Agricultural Services	0.05	0.04	1
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	0.08	0.02	1
Oil and Gas Extraction	2.67	0.18	4
Stone, Clay, Gravel	0.07	0.05	1
Construction	2.61	0.83	23
Food Processing	4.69	1.43	23
Tobacco Processing	0.04	0.01	0
Fabrics and Apparel	0.50	0.27	8
Lumber and Wood	0.13	0.05	2
Furniture and Fixtures	0.11	0.07	1
Paper Products	0.65	0.32	6
Printing and Publishing	1.13	0.93	14
Chemicals	0.82	0.32	6
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	0.36	0.12	2
Paints	0.01	0.00	0
Petroleum refining	1.86	0.08	2
Rubber and Plastic Products	0.98	0.69	9
Leather and Leather Products	0.11	0.06	2
Glass, Stone, Clay Products	0.34	0.17	4
Iron, Steel, Metal	0.57	0.26	6
Metal Products, Ordnance, Structural Metal	0.57	0.30	6
Engines and Machinery	0.84	0.50	11
Computers and Computing Equipment	0.01	0.01	0
Electrical Equipment and Appliances	0.49	0.17	5
Electric Components and Parts	0.12	0.09	2
Motor Vehicles and Equipment	1.36	0.34	5
Aircraft and Parts	0.02	0.01	0
Other Transportation Equipment	0.16	0.12	2
Scientific and Photographic Equipment	0.05	0.03	1
Misc. Manufacturing	0.16	0.10	2
Transportation and Warehousing	1.62	0.74	19
Communications, Except Radio and TV	0.98	0.69	9
Business Sservices, Radio and TV	2.68	1.70	43
Utilities Excluding Electricity	10.77	0.96	27
Wholesale and Retail trade	7.32	5.58	192
Finance and Insurance	2.67	2.15	44
Real Estate and Rental	5.26	0.52	18
Hotels, Personal Services	0.93	0.71	36
Eating and Drinking Places	2.07	1.07	89
Automobile Repair and Services	0.96	0.24	8
Amusements	0.35	0.22	13
Health, Education, Social Services	4.64	4.30	131
Federal Government Enterprises	0.49	0.49	10
Electrical Utilities	27.27	2.07	57
TOTAL	$91.69	$30.76	903

Change in State Tax Revenue ($million)	
State Income Tax	$0.59
State Retail Sales and Use Tax	0.56
TOTAL	$1.15

TABLE 18

AFFECT ON INDIVIDUAL SECTORS OF 1%
INCREASE IN THE PRICE OF ELECTRICITY

KPL SERVICE AREA

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($0.13)	($0.10)	-3
Crops	-0.08	-0.08	-3
Forestry, Commercial Fisheries	0.00	0.00	0
Agricultural Services	0.00	0.00	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	-0.01	0.00	0
Oil and Gas Extraction	-0.26	-0.02	0
Stone, Clay, Gravel	-0.01	0.00	0
Construction	-0.24	-0.08	-2
Food Processing	-0.46	-0.14	-2
Tobacco Processing	0.00	0.00	0
Fabrics and Apparel	-0.05	-0.03	-1
Lumber and Wood	-0.01	-0.01	0
Furniture and Fixtures	-0.01	-0.01	0
Paper Products	-0.06	-0.03	-1
Printing and Publishing	-0.11	-0.09	-1
Chemicals	-0.08	-0.03	-1
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	-0.04	-0.01	0
Paints	0.00	0.00	0
Petroleum refining	-0.17	-0.01	0
Rubber and Plastic Products	-0.10	-0.07	-1
Leather and Leather Products	-0.01	-0.01	0
Glass, Stone, Clay Products	-0.03	-0.02	0
Iron, Steel, Metal	-0.05	-0.03	-1
Metal Products, Ordnance, Structural Metal	-0.06	-0.03	-1
Engines and Machinery	-0.08	-0.05	-1
Computers and Computing Equipment	0.00	0.00	0
Electrical Equipment and Appliances	-0.05	-0.02	0
Electric Components and Parts	-0.01	-0.01	0
Motor Vehicles and Equipment	-0.13	-0.03	0
Aircraft and Parts	0.00	0.00	0
Other Transportation Equipment	-0.02	-0.01	0
Scientific and Photographic Equipment	-0.01	0.00	0
Misc. Manufacturing	-0.02	-0.01	0
Transportation and Warehousing	-0.15	-0.07	-2
Communications, Except Radio and TV	-0.09	-0.07	-1
Business Sservices, Radio and TV	-0.26	-0.17	-4
Utilities Excluding Electricity	-1.05	-0.09	-2
Wholesale and Retail trade	-0.71	-0.55	-19
Finance and Insurance	-0.26	-0.21	-4
Real Estate and Rental	-0.51	-0.05	-2
Hotels, Personal Services	-0.09	-0.07	-4
Eating and Drinking Places	-0.20	-0.11	-9
Automobile Repair and Services	-0.09	-0.02	-1
Amusements	-0.03	-0.02	-1
Health, Education, Social Services	-0.46	-0.42	-13
Federal Government Enterprises	-0.05	-0.05	-1
Electrical Utilities	-2.43	-0.18	-5
TOTAL	($8.69)	($3.01)	-88

Change in State Tax Revenue ($million)	
State Income Tax	($0.06)
State Retail Sales and Use Tax	-0.05
TOTAL	($0.11)

TABLE 19

AFFECT ON INDIVIDUAL SECTORS OF 5% INCREASE IN THE PRICE OF ELECTRICITY

KPL SERVICE AREA

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($0.63)	($0.48)	-16
Crops	-0.42	-0.39	-15
Forestry, Commercial Fisheries	0.00	0.00	0
Agricultural Services	-0.02	-0.02	-1
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	-0.03	-0.01	0
Oil and Gas Extraction	-1.26	-0.09	-2
Stone, Clay, Gravel	-0.03	-0.02	-1
Construction	-1.20	-0.39	-10
Food Processing	-2.30	-0.71	-11
Tobacco Processing	-0.02	-0.01	0
Fabrics and Apparel	-0.24	-0.13	-4
Lumber and Wood	-0.06	-0.03	-1
Furniture and Fixtures	-0.05	-0.03	-1
Paper Products	-0.32	-0.16	-3
Printing and Publishing	-0.55	-0.46	-7
Chemicals	-0.40	-0.16	-3
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	-0.18	-0.06	-1
Paints	0.00	0.00	0
Petroleum refining	-0.85	-0.04	-1
Rubber and Plastic Products	-0.48	-0.34	-4
Leather and Leather Products	-0.05	-0.03	-1
Glass, Stone, Clay Products	-0.16	-0.08	-2
Iron, Steel, Metal	-0.27	-0.12	-3
Metal Products, Ordnance, Structural Metal	-0.27	-0.15	-3
Engines and Machinery	-0.39	-0.24	-5
Computers and Computing Equipment	0.00	0.00	0
Electrical Equipment and Appliances	-0.23	-0.08	-2
Electric Components and Parts	-0.06	-0.04	-1
Motor Vehicles and Equipment	-0.66	-0.17	-2
Aircraft and Parts	-0.01	0.00	0
Other Transportation Equipment	-0.08	-0.06	-1
Scientific and Photographic Equipment	-0.03	-0.02	0
Misc. Manufacturing	-0.08	-0.05	-1
Transportation and Warehousing	-0.76	-0.36	-9
Communications, Except Radio and TV	-0.47	-0.34	-4
Business Sservices, Radio and TV	-1.28	-0.83	-20
Utilities Excluding Electricity	-5.18	-0.46	-12
Wholesale and Retail trade	-3.55	-2.74	-93
Finance and Insurance	-1.28	-1.05	-21
Real Estate and Rental	-2.55	-0.25	-9
Hotels, Personal Services	-0.45	-0.35	-18
Eating and Drinking Places	-1.01	-0.53	-44
Automobile Repair and Services	-0.46	-0.12	-4
Amusements	-0.17	-0.11	-6
Health, Education, Social Services	-2.27	-2.11	-64
Federal Government Enterprises	-0.23	-0.24	-5
Electrical Utilities	-11.70	-0.89	-24
TOTAL	($42.71)	($14.93)	-436

Change in State Tax Revenue ($million)	
State Income Tax	($0.28)
State Retail Sales and Use Tax	-0.27
TOTAL	($0.56)

TABLE 20

AFFECT ON INDIVIDUAL SECTORS OF 10%
INCREASE IN THE PRICE OF ELECTRICITY

KPL SERVICE AREA

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($1.26)	($0.97)	-32
Crops	-0.84	-0.78	-30
Forestry, Commercial Fisheries	-0.01	0.00	0
Agricultural Services	-0.05	-0.04	-1
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	-0.07	-0.02	0
Oil and Gas Extraction	-2.48	-0.17	-4
Stone, Clay, Gravel	-0.07	-0.05	-1
Construction	-2.33	-0.77	-20
Food Processing	-4.59	-1.41	-22
Tobacco Processing	-0.04	-0.01	0
Fabrics and Apparel	-0.49	-0.26	-8
Lumber and Wood	-0.12	-0.05	-2
Furniture and Fixtures	-0.11	-0.07	-1
Paper Products	-0.63	-0.31	-6
Printing and Publishing	-1.09	-0.91	-13
Chemicals	-0.79	-0.32	-6
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	-0.35	-0.11	-2
Paints	-0.01	0.00	0
Petroleum refining	-1.65	-0.07	-2
Rubber and Plastic Products	-0.95	-0.68	-9
Leather and Leather Products	-0.10	-0.06	-2
Glass, Stone, Clay Products	-0.32	-0.16	-3
Iron, Steel, Metal	-0.53	-0.25	-6
Metal Products, Ordnance, Structural Metal	-0.54	-0.29	-6
Engines and Machinery	-0.75	-0.47	-10
Computers and Computing Equipment	-0.01	-0.01	0
Electrical Equipment and Appliances	-0.46	-0.16	-4
Electric Components and Parts	-0.11	-0.09	-2
Motor Vehicles and Equipment	-1.32	-0.33	-5
Aircraft and Parts	-0.02	-0.01	0
Other Transportation Equipment	-0.15	-0.12	-2
Scientific and Photographic Equipment	-0.05	-0.03	-1
Misc. Manufacturing	-0.16	-0.09	-2
Transportation and Warehousing	-1.49	-0.71	-18
Communications, Except Radio and TV	-0.93	-0.67	-8
Business Sservices, Radio and TV	-2.52	-1.64	-40
Utilities Excluding Electricity	-10.25	-0.91	-24
Wholesale and Retail trade	-7.03	-5.44	-186
Finance and Insurance	-2.54	-2.08	-42
Real Estate and Rental	-5.04	-0.51	-17
Hotels, Personal Services	-0.90	-0.69	-35
Eating and Drinking Places	-2.00	-1.05	-87
Automobile Repair and Services	-0.92	-0.23	-7
Amusements	-0.35	-0.22	-13
Health, Education, Social Services	-4.51	-4.21	-128
Federal Government Enterprises	-0.45	-0.47	-9
Electrical Utilities	-22.35	-1.70	-46
TOTAL	($83.70)	($29.59)	-862

Change in State Tax Revenue ($million)	
State Income Tax	($0.56)
State Retail Sales and Use Tax	-0.54
TOTAL	($1.10)

TABLE 21

AFFECT ON INDIVIDUAL SECTORS OF 1% DECREASE IN THE PRICE OF ELECTRICITY

KG&E SERVICE AREA

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	$0.05	$0.02	1
Crops	0.03	0.01	1
Forestry, Commercial Fisheries	0.00	0.00	0
Agricultural Services	0.00	0.00	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	0.10	0.02	1
Oil and Gas Extraction	0.45	0.06	1
Stone, Clay, Gravel	0.00	0.00	0
Construction	0.19	0.07	2
Food Processing	0.17	0.04	1
Tobacco Processing	0.00	0.00	0
Fabrics and Apparel	0.02	0.01	0
Lumber and Wood	0.01	0.00	0
Furniture and Fixtures	0.01	0.00	0
Paper Products	0.02	0.01	0
Printing and Publishing	0.06	0.03	1
Chemicals	0.06	0.03	0
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	0.01	0.00	0
Paints	0.00	0.00	0
Petroleum refining	0.55	0.03	1
Rubber and Plastic Products	0.04	0.02	0
Leather and Leather Products	0.00	0.00	0
Glass, Stone, Clay Products	0.02	0.01	0
Iron, Steel, Metal	0.01	0.01	0
Metal Products, Ordnance, Structural Metal	0.02	0.01	0
Engines and Machinery	0.09	0.07	1
Computers and Computing Equipment	0.00	0.00	0
Electrical Equipment and Appliances	0.03	0.01	0
Electric Components and Parts	0.00	0.00	0
Motor Vehicles and Equipment	0.04	0.01	0
Aircraft and Parts	0.25	0.61	2
Other Transportation Equipment	0.00	0.00	0
Scientific and Photographic Equipment	0.01	0.01	0
Misc. Manufacturing	0.01	0.01	0
Transportation and Warehousing	0.18	0.10	2
Communications, Except Radio and TV	0.05	0.03	0
Business Sservices, Radio and TV	0.16	0.11	2
Utilities Excluding Electricity	0.55	0.05	1
Wholesale and Retail trade	0.49	0.36	11
Finance and Insurance	0.14	0.11	2
Real Estate and Rental	0.40	0.04	1
Hotels, Personal Services	0.06	0.05	2
Eating and Drinking Places	0.13	0.07	5
Automobile Repair and Services	0.07	0.02	1
Amusements	0.02	0.01	1
Health, Education, Social Services	0.32	0.28	8
Federal Government Enterprises	0.00	0.01	0
Electrical Utilities	3.03	0.36	10
TOTAL	$7.84	$2.74	61

Change in State Tax Revenue ($million)	
State Income Tax	$0.05
State Retail Sales and Use Tax	0.05
TOTAL	$0.10

TABLE 22

AFFECT ON INDIVIDUAL SECTORS OF 5%
DECREASE IN THE PRICE OF ELECTRICITY

KG&E SERVICE AREA

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	$0.24	$0.12	7
Crops	0.15	0.07	4
Forestry, Commercial Fisheries	0.00	0.00	0
Agricultural Services	0.02	0.01	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	0.50	0.12	3
Oil and Gas Extraction	2.29	0.28	4
Stone, Clay, Gravel	0.01	0.01	0
Construction	0.98	0.36	8
Food Processing	0.87	0.19	4
Tobacco Processing	0.01	0.00	0
Fabrics and Apparel	0.12	0.07	2
Lumber and Wood	0.03	0.01	0
Furniture and Fixtures	0.03	0.02	0
Paper Products	0.10	0.04	1
Printing and Publishing	0.29	0.17	3
Chemicals	0.32	0.13	2
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	0.04	0.02	0
Paints	0.02	0.01	0
Petroleum refining	2.80	0.17	3
Rubber and Plastic Products	0.18	0.10	2
Leather and Leather Products	0.01	0.01	0
Glass, Stone, Clay Products	0.10	0.05	1
Iron, Steel, Metal	0.04	0.04	1
Metal Products, Ordnance, Structural Metal	0.11	0.08	1
Engines and Machinery	0.44	0.35	6
Computers and Computing Equipment	0.02	0.01	0
Electrical Equipment and Appliances	0.17	0.07	1
Electric Components and Parts	0.02	0.02	0
Motor Vehicles and Equipment	0.18	0.06	1
Aircraft and Parts	1.23	3.04	12
Other Transportation Equipment	0.02	0.01	0
Scientific and Photographic Equipment	0.04	0.03	0
Misc. Manufacturing	0.05	0.03	1
Transportation and Warehousing	0.92	0.51	10
Communications, Except Radio and TV	0.25	0.16	2
Business Services, Radio and TV	0.80	0.57	12
Utilities Excluding Electricity	2.78	0.23	7
Wholesale and Retail trade	2.50	1.80	56
Finance and Insurance	0.72	0.57	11
Real Estate and Rental	2.05	0.20	5
Hotels, Personal Services	0.29	0.23	11
Eating and Drinking Places	0.66	0.34	24
Automobile Repair and Services	0.36	0.10	3
Amusements	0.12	0.07	4
Health, Education, Social Services	1.59	1.39	40
Federal Government Enterprises	0.01	0.07	0
Electrical Utilities	15.78	1.89	53
TOTAL	$40.28	$13.84	309

Change in State Tax Revenue ($million)	
State Income Tax	$0.26
State Retail Sales and Use Tax	0.25
TOTAL	$0.52

TABLE 23

AFFECT ON INDIVIDUAL SECTORS OF 10% DECREASE IN THE PRICE OF ELECTRICITY

KG&E SERVICE AREA

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	$0.50	$0.25	13
Crops	0.30	0.14	9
Forestry, Commercial Fisheries	0.00	0.00	0
Agricultural Services	0.03	0.02	1
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	1.06	0.25	7
Oil and Gas Extraction	4.74	0.57	9
Stone, Clay, Gravel	0.03	0.02	1
Construction	2.04	0.73	17
Food Processing	1.77	0.39	8
Tobacco Processing	0.02	0.01	0
Fabrics and Apparel	0.23	0.13	4
Lumber and Wood	0.06	0.02	1
Furniture and Fixtures	0.07	0.04	1
Paper Products	0.20	0.08	2
Printing and Publishing	0.60	0.35	7
Chemicals	0.66	0.27	4
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	0.08	0.03	0
Paints	0.05	0.02	0
Petroleum refining	5.83	0.35	6
Rubber and Plastic Products	0.37	0.20	4
Leather and Leather Products	0.02	0.02	0
Glass, Stone, Clay Products	0.21	0.11	2
Iron, Steel, Metal	0.07	0.07	2
Metal Products, Ordnance, Structural Metal	0.23	0.15	3
Engines and Machinery	0.92	0.72	12
Computers and Computing Equipment	0.04	0.02	0
Electrical Equipment and Appliances	0.36	0.14	3
Electric Components and Parts	0.03	0.04	0
Motor Vehicles and Equipment	0.36	0.11	1
Aircraft and Parts	2.45	6.09	24
Other Transportation Equipment	0.04	0.03	1
Scientific and Photographic Equipment	0.07	0.05	1
Misc. Manufacturing	0.11	0.06	1
Transportation and Warehousing	1.90	1.04	21
Communications, Except Radio and TV	0.52	0.32	5
Business Sservices, Radio and TV	1.65	1.16	25
Utilities Excluding Electricity	5.63	0.47	14
Wholesale and Retail trade	5.10	3.65	114
Finance and Insurance	1.47	1.15	22
Real Estate and Rental	4.19	0.40	11
Hotels, Personal Services	0.58	0.47	22
Eating and Drinking Places	1.34	0.69	49
Automobile Repair and Services	0.73	0.21	5
Amusements	0.23	0.15	7
Health, Education, Social Services	3.23	2.81	81
Federal Government Enterprises	0.03	0.13	1
Electrical Utilities	33.32	3.98	112
TOTAL	$83.47	$28.12	634

Change in State Tax Revenue ($million)	
State Income Tax	$0.54
State Retail Sales and Use Tax	0.51
TOTAL	$1.05

TABLE 24

AFFECT ON INDIVIDUAL SECTORS OF 1%
INCREASE IN THE PRICE OF ELECTRICITY

KG&E SERVICE AREA

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($0.05)	($0.02)	-1
Crops	-0.03	-0.01	-1
Forestry, Commercial Fisheries	0.00	0.00	0
Agricultural Services	0.00	0.00	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	-0.09	-0.02	-1
Oil and Gas Extraction	-0.44	-0.05	-1
Stone, Clay, Gravel	0.00	0.00	0
Construction	-0.19	-0.07	-2
Food Processing	-0.17	-0.04	-1
Tobacco Processing	0.00	0.00	0
Fabrics and Apparel	-0.02	-0.01	0
Lumber and Wood	-0.01	0.00	0
Furniture and Fixtures	-0.01	0.00	0
Paper Products	-0.02	-0.01	0
Printing and Publishing	-0.06	-0.03	-1
Chemicals	-0.06	-0.03	0
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	-0.01	0.00	0
Paints	0.00	0.00	0
Petroleum refining	-0.54	-0.03	-1
Rubber and Plastic Products	-0.04	-0.02	0
Leather and Leather Products	0.00	0.00	0
Glass, Stone, Clay Products	-0.02	-0.01	0
Iron, Steel, Metal	-0.01	-0.01	0
Metal Products, Ordnance, Structural Metal	-0.02	-0.01	0
Engines and Machinery	-0.08	-0.07	-1
Computers and Computing Equipment	0.00	0.00	0
Electrical Equipment and Appliances	-0.03	-0.01	0
Electric Components and Parts	0.00	0.00	0
Motor Vehicles and Equipment	-0.04	-0.01	0
Aircraft and Parts	-0.24	-0.61	-2
Other Transportation Equipment	0.00	0.00	0
Scientific and Photographic Equipment	-0.01	-0.01	0
Misc. Manufacturing	-0.01	-0.01	0
Transportation and Warehousing	-0.18	-0.10	-2
Communications, Except Radio and TV	-0.05	-0.03	0
Business Sservices, Radio and TV	-0.16	-0.11	-2
Utilities Excluding Electricity	-0.55	-0.05	-1
Wholesale and Retail trade	-0.49	-0.36	-11
Finance and Insurance	-0.14	-0.11	-2
Real Estate and Rental	-0.40	-0.04	-1
Hotels, Personal Services	-0.06	-0.05	-2
Eating and Drinking Places	-0.13	-0.07	-5
Automobile Repair and Services	-0.07	-0.02	-1
Amusements	-0.02	-0.01	-1
Health, Education, Social Services	-0.31	-0.28	-8
Federal Government Enterprises	0.00	-0.01	0
Electrical Utilities	-2.97	-0.35	-10
TOTAL	($7.75)	($2.72)	-60

Change in State Tax Revenue	($million)
State Income Tax	($0.05)
State Retail Sales and Use Tax	-0.05
TOTAL	($0.10)

TABLE 25

AFFECT ON INDIVIDUAL SECTORS OF 5% INCREASE IN THE PRICE OF ELECTRICITY

KG&E SERVICE AREA

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($0.24)	($0.12)	-6
Crops	-0.14	-0.07	-4
Forestry, Commercial Fisheries	0.00	0.00	0
Agricultural Services	-0.02	-0.01	0
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	-0.45	-0.11	-3
Oil and Gas Extraction	-2.16	-0.27	-4
Stone, Clay, Gravel	-0.01	-0.01	0
Construction	-0.91	-0.34	-8
Food Processing	-0.85	-0.19	-4
Tobacco Processing	-0.01	0.00	0
Fabrics and Apparel	-0.11	-0.07	-2
Lumber and Wood	-0.03	-0.01	0
Furniture and Fixtures	-0.03	-0.02	0
Paper Products	-0.10	-0.04	-1
Printing and Publishing	-0.28	-0.17	-3
Chemicals	-0.32	-0.13	-2
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	-0.04	-0.02	0
Paints	-0.02	-0.01	0
Petroleum refining	-2.62	-0.17	-3
Rubber and Plastic Products	-0.18	-0.10	-2
Leather and Leather Products	-0.01	-0.01	0
Glass, Stone, Clay Products	-0.10	-0.05	-1
Iron, Steel, Metal	-0.03	-0.04	-1
Metal Products, Ordnance, Structural Metal	-0.11	-0.07	-1
Engines and Machinery	-0.41	-0.34	-6
Computers and Computing Equipment	-0.02	-0.01	0
Electrical Equipment and Appliances	-0.17	-0.07	-1
Electric Components and Parts	-0.02	-0.02	0
Motor Vehicles and Equipment	-0.18	-0.06	-1
Aircraft and Parts	-1.22	-3.03	-12
Other Transportation Equipment	-0.02	-0.01	0
Scientific and Photographic Equipment	-0.03	-0.03	0
Misc. Manufacturing	-0.05	-0.03	-1
Transportation and Warehousing	-0.87	-0.50	-10
Communications, Except Radio and TV	-0.24	-0.15	-2
Business Sservices, Radio and TV	-0.77	-0.56	-12
Utilities Excluding Electricity	-2.71	-0.23	-7
Wholesale and Retail trade	-2.42	-1.77	-54
Finance and Insurance	-0.69	-0.55	-10
Real Estate and Rental	-1.98	-0.19	-5
Hotels, Personal Services	-0.28	-0.23	-10
Eating and Drinking Places	-0.64	-0.34	-24
Automobile Repair and Services	-0.35	-0.10	-3
Amusements	-0.11	-0.07	-3
Health, Education, Social Services	-1.55	-1.37	-39
Federal Government Enterprises	-0.01	-0.07	0
Electrical Utilities	-14.28	-1.71	-48
TOTAL	($37.79)	($13.45)	-297

Change in State Tax Revenue	($million)
State Income Tax	($0.26)
State Retail Sales and Use Tax	-0.25
TOTAL	($0.50)

TABLE 26

AFFECT ON INDIVIDUAL SECTORS OF 10% INCREASE IN THE PRICE OF ELECTRICITY

KG&E SERVICE AREA

Sector	Change in Output ($million)	Change in Wages & Salaries ($million)	Change in Employment
Livestock	($0.47)	($0.24)	-13
Crops	-0.29	-0.14	-9
Forestry, Commercial Fisheries	0.00	0.00	0
Agricultural Services	-0.03	-0.02	-1
Metal and Nonferrous Mineral Mining	0.00	0.00	0
Coal Mining	-0.87	-0.20	-6
Oil and Gas Extraction	-4.21	-0.54	-8
Stone, Clay, Gravel	-0.03	-0.02	0
Construction	-1.77	-0.67	-15
Food Processing	-1.67	-0.38	-8
Tobacco Processing	-0.02	-0.01	0
Fabrics and Apparel	-0.22	-0.13	-4
Lumber and Wood	-0.05	-0.02	-1
Furniture and Fixtures	-0.07	-0.04	-1
Paper Products	-0.19	-0.08	-2
Printing and Publishing	-0.55	-0.33	-7
Chemicals	-0.63	-0.26	-4
Plastic Material and Synthetics	0.00	0.00	0
Drugs and Preparations	-0.08	-0.03	0
Paints	-0.05	-0.02	0
Petroleum refining	-5.08	-0.33	-5
Rubber and Plastic Products	-0.34	-0.19	-4
Leather and Leather Products	-0.02	-0.02	0
Glass, Stone, Clay Products	-0.19	-0.10	-2
Iron, Steel, Metal	-0.07	-0.07	-1
Metal Products, Ordnance, Structural Metal	-0.21	-0.15	-3
Engines and Machinery	-0.80	-0.57	-11
Computers and Computing Equipment	-0.03	-0.02	0
Electrical Equipment and Appliances	-0.32	-0.14	-3
Electric Components and Parts	-0.03	-0.04	0
Motor Vehicles and Equipment	-0.35	-0.11	-1
Aircraft and Parts	-2.45	-6.04	-24
Other Transportation Equipment	-0.03	-0.03	-1
Scientific and Photographic Equipment	-0.07	-0.05	-1
Misc. Manufacturing	-0.10	-0.06	-1
Transportation and Warehousing	-1.70	-0.99	-19
Communications, Except Radio and TV	-0.48	-0.30	-4
Business Sservices, Radio and TV	-1.50	-1.11	-23
Utilities Excluding Electricity	-5.36	-0.45	-14
Wholesale and Retail trade	-4.77	-3.50	-107
Finance and Insurance	-1.35	-1.10	-20
Real Estate and Rental	-3.89	-0.38	-10
Hotels, Personal Services	-0.55	-0.45	-21
Eating and Drinking Places	-1.26	-0.67	-47
Automobile Repair and Services	-0.68	-0.20	-5
Amusements	-0.22	-0.14	-7
Health, Education, Social Services	-3.07	-2.72	-77
Federal Government Enterprises	-0.03	-0.13	-1
Electrical Utilities	-27.25	-3.26	-91
TOTAL	($73.42)	($26.57)	-583

Change in State Tax Revenue ($million)	
State Income Tax	($0.51)
State Retail Sales and Use Tax	-0.48
TOTAL	($0.99)