BEFORE THE
STATE CORPORATION COMMISSION
OF THE STATE OF KANSAS

Before Commissioners: Pat Apple, Chair
Shari Feist Albrecht
Jay Scott Emler

In the Matter of the Complaint of Southern Pioneer Electric Company Against the Kansas Power Pool Regarding Bypass and Duplication of Service for 34.5 kV Delivery to the City of Kingman	))) Docket No. 17-KPPE-092-COM))

PREFILED TESTIMONY

OF

KENNETH A. KRIZ,
KANSAS REGENTS DISTINGUISHED PROFESSOR OF PUBLIC FINANCE

ON BEHALF OF
KANSAS POWER POOL

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1   **Q.**   **Please state your name and business address.**

2   A.   My name is Kenneth A. Kriz. My business address is Campus Box 155, 1845 Fairmount Street,

3   Wichita, KS 67260.

4   **Q.**   **By whom and in what capacity are you employed?**

5   A.   I am employed by Wichita State University. I am the Kansas Regents Distinguished Professor of

6   Public Finance.

7   **Q.**   **Please describe your educational background and professional experience.**

8   A.   I have a Ph.D. in Public Affairs with a minor in Financial Economics from Indiana University,

9   Bloomington. I also hold a Master's Degree in Public Administration from the University of

10   Colorado, Denver and a Bachelor's Degree in Business Administration, majoring in Economics

11   and minoring in Finance, from the University of Iowa. I have been a full-time faculty member at

12   the University of Minnesota and University of Nebraska, Omaha and a part-time faculty member

13   at the University of Oklahoma and Tartu University in Tartu, Estonia. I served as a Fulbright

14   scholar at Tartu University during academic year 2004-05 and a Fulbright Senior Specialist at

15   Tomas Bata University in Zlin, Czech Republic in 2008. I am a member of several academic

16   associations including the American Economic Association and Association for Budgeting and

17   Financial Management. I have previous professional experience working as a U.S. Navy Supply

18   Officer and in the financial sector as a stockbroker and as an officer at a commercial bank.

19   **Q.**   **Have you previously testified before the Commission?**

20   A.   No.

21   **Q.**   **What is the purpose of your testimony?**

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1   A.   My testimony will address the economic impacts of the interconnection to the SemCrude

2   substation on the Ninnescah 115kv line proposed by the Kansas Power Pool (KPP), as developed

3   in my study attached as **Exhibit 1**.

4   **Projected Economic Impacts of the Interconnection**

5   **Q.**   **What types of economic impacts would there be from completing the interconnection?**

6   A.   KPP has provided information on the reductions in costs that would be realized by the City of

7   Kingman incident to the interconnection. There would be two pathways for economic benefits

8   to accrue to the City from those cost reductions. The first is the attraction of new businesses

9   into the city and the retention and expansion of existing businesses. Kingman benefits from

10   attraction and expansion through the city having more income and spending within its borders.

11   This in turn provides income for residents of the city which they will also spend. The second is

12   comes from the reduced price of electricity for households and businesses. Part of this reduced

13   price will be able to be spent by residents and businesses, creating economic activities.

14   **Q.**   **For the first pathway, can we estimate directly the impact of cost reductions in business**

15   **attraction, retention, and expansion?**

16   A.   No, not directly. Though we have engaged in a search of the literature, we cannot find any

17   studies that directly address the issue of lower cost of electricity. However, we would point out

18   that most studies that rank areas based on what are known as "business location factors" state

19   that businesses do look at utility costs as one of the variables in their location decisions.

20   **Q.**   **Then how can you estimate the first economic effect?**

21   A.   We do so through analogy. There is a wealth of information on other cost items that are related

22   to utility costs. Take business taxes. There have been numerous studies, including some done by

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1   myself, that have addressed the issue of the responsiveness of employment, income, and

2   investment in areas to tax costs. In estimating the economic effect of the Kingman

3   interconnection, we used the responsiveness figure that we found in our study of states and

4   localities, which covered all 50 states over a 40-year period.

5   Q.   **Did you just take the tax responsiveness value and apply it directly to the cost savings data?**

6   A.   No. Taxes play a larger role in the cost structure of businesses, according to a study done by

7   KPMG. Therefore, businesses are likely to be less responsive to utility costs than tax costs. The

8   KPMG study indicated that utility costs constitute a share of overall business costs that is 4 times

9   smaller on average than taxes. Therefore, we used a figure for utility cost responsiveness that was

10   just slightly less than 4 times smaller than the tax responsiveness value.

11 Q.   **Do you have an estimate of the responsiveness of income in the City of Kingman to changes in**

12   **utility costs? If so, how do you apply that to come up with a figure for the economic impact of**

13   **new businesses and retained and expanded existing businesses?**

14 A.   It is a two-step analysis. In the first step, we calculated the percentage change in prices that would

15   accrue to businesses in the City from the project. To do that we made calculations of what

16   percentage of electrical load goes to residential, commercial, and industrial users and then

17   projected the usage and cost into the future when the project would be completed. Using the

18   data provided by KPP, we found that the project would produce business electric cost reductions

19   equal to just over 3.8% of pre-project costs in 2018. Applying the responsiveness value we

20   discussed above, we estimate that personal income will increase just over $800,000 in Kingman

21   over the course of the project.

22 Q.   **Is that the estimate of increased economic activity?**

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1   A.   No, that is an estimate of increased income. Let me explain why that is not economic activity.

2   Let's say that I magically give you $100. You will likely spend some of that money in the local

3   community, spend some on goods and services outside the local community, save some, or pay

4   off some debt. Not all of those represent increases in economic activity in your community, just

5   the first amount that you spend locally.

6   **Q.   How do you calculate the amount that is spent locally, thereby creating economic activity?**

7   A.   We use economic impact modeling software.

8   **Q.   What is economic impact modeling?**

9   A.   An economic impact model is a mathematical representation of the resource flows throughout an

10   economy. At its most basic, it can be portrayed as the figure below. In the figure, the sectors of a

11   local economy (lighter colored rectangular shapes) engage in transactions (arrows) in markets

12   (darker rectangles).

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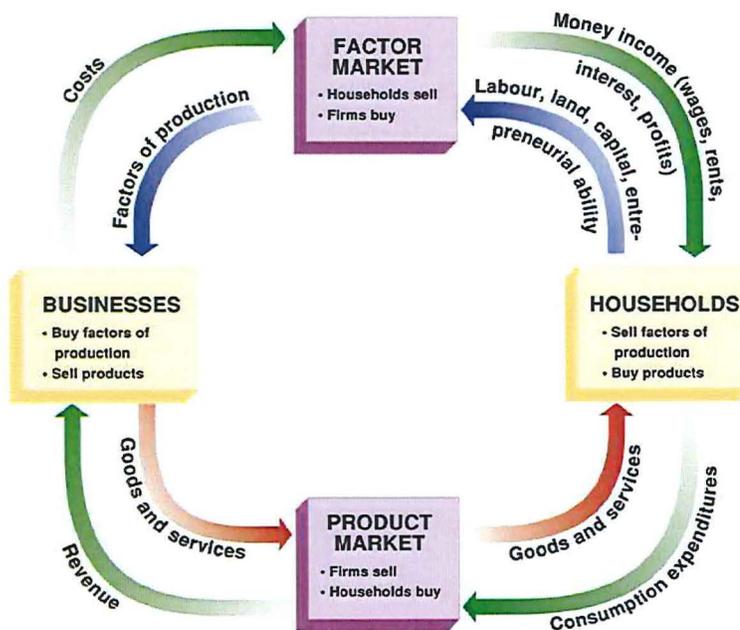
1   At the bottom of the flow model, to take one example, Businesses provide goods and services

2   through the Product market to Households. In return Households pay for the goods and services

3   (marked consumption expenditures), which becomes revenue for Businesses. In the Factor

4   Market at the top of the figure, Businesses buy factors of production (labor from workers, capital

5   and land from investors). In return, they pay Households with wages, rents on land, and interest

6   on capital investment. This becomes income for Households which they can use to make further

7   purchases (or save, which is not portrayed in this highly-simplified model although it is accounted

8   for in our economic impact model). Though not shown in this basic version of the model,

9   businesses also engage in many transactions with each other to buy inputs to the production

10   process. Those transactions also are costs for one business while being revenue for another, which

11   in turn can be used to compensate workers, landowners, and those who provide capital.

12   An economic impact model provides the mathematical framework to track these flows through

13   the economy. There are a few types of these models.

14   **Q.**   **What type did you use?**

15   A.   We used the model used most often in practice, which is called an input-output model. When you

16   read a study in a newspaper that concludes that a certain business moving into an area will create

17   X number of jobs and Y amount of economic activity, it most likely was done using an input-output

18   model. Input-output models consist of a series of mathematical matrices capturing sales among

19   businesses, sales to final consumers (households), demands for labor, capital, and land, and

20   imports of goods and services from outside of the area under study. One can conduct

21   "experiments" with the model, changing the model to represent, for example, the attraction of a

22   new business to the area. The outputs of the input-output model capture three types of economic

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1   effects, which are added to create an estimate of the increase in the value of economic activity in

2   the area:

3   1. **Direct Effects:** These effects directly result from the new investment. Economic activity in an

4   area will increase simply because there is more production happening in the area due to the new

5   business opening. Direct effects capture the value of these initial impacts in the economy.

6   2. **Indirect Effects:** These result from the new business making purchases of inputs (obvious items

7   like parts for production and less obvious items like food for meetings) from local businesses.

8   3. **Induced Effects:** These come from wage payments to labor, both in the new business and in

9   supplier businesses. Workers can then use those payments to buy goods and services in the local

10   economy.

11   Specifically, we used an input-output model called IMPLAN to analyze economic impacts of

12   various changes in the economy. IMPLAN's developer, the Minnesota IMPLAN Group, Inc.,

13   processes data from many different public and non-public sources to create a picture of the

14   economy down to the zip code level. The software that we used was first developed to analyze

15   projects for the U.S. Department of the Interior and now is used to do analyses of many large

16   federal projects, as well as being used often at the state and local level.

17   Q.   **Have you used the IMPLAN software prior to this project?**

18   A.   Yes, we have used the software on numerous occasions. Examples of projects we have used

19   IMPLAN as a part of include an analysis of all economic development incentives offered by the

20   state of Kansas, an analysis of the economic impact of Kansas Health Foundation spending, and a

21   benefit-cost analysis of a small city proposal to use an economic incentive to create an outlet

22   shopping mall development.

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1   Q.   **What were the results of the economic impact model for the KPP interconnect?**

2   A.   The table below lists the results. IMPLAN estimates that 4.6 jobs and $116,444 in labor income

3   will be generated by new or expanding businesses. To an economist, the measure of interest is

4   Total Value Added, a measure of the total increase in economic activity accruing to the area. We

5   estimate that new and expanding businesses in Kingman will increase economic activity by

6           $221,656 over the life of the project.

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	0.00	$0.00	$0.00	$0.00
Indirect Effect	0.00	0.00	0.00	0.00
Induced Effect	4.6	116,444.00	221,656.00	456,334.20
Total Effect	4.6	$116,444.00	$221,656.00	$456,334.20

7

8   Q.   **Why not use the estimates of Output as a measure of economic activity?**

9   A.   This figure includes the value of exported goods and services. So, there is some value in producing

10   the products, but the value of those products will be realized through value added. Value added

11   captures returns to workers in the form of wage income and business owners in the form of

12   returns on their capital investment. This is a gross oversimplification but it captures the essence

13   of the concept.

14   Q.   **Why are there no Direct or Indirect effects in the model results?**

15   A.   This goes back to the discussion earlier about the types of effects. Direct effects come from a

16   specific business locating in or expanding in an area. In this case we do not have information about

17   the exact type of businesses that will locate in Kingman. So all of the effects come from spending

18   of the increased income.

19   **But in theory will KPP's project have the real potential to attract new business to Kingman?**

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1   A   Yes.

2   Q.   **What is the second source of economic benefits to the City?**

3   A.   The second type of economic effect from the project comes from the reduced price of electricity

4   for households and businesses. To economists, there are two economic effects created by a price

5   change. The first is a substitution effect. This comes from the fact that electricity is now relatively

6   cheaper compared to all other goods than it was before the project. This will cause households

7   and businesses to consume more electricity than they did before as a percentage of their overall

8   spending. The amount of this response can be calculated if we have estimates of the price

9   elasticity of demand for electricity. Elasticity is a measure of responsiveness of one variable to

10   another changing. The second effect of a price change is the income effect. This effect comes from

11   the concept that a business or household will have relatively more disposable income to spend

12   on all other goods and services when the price of electricity falls. The two effects compose the

13   total effect of a price change. Therefore, to estimate the economic effects of the drop in electrical

14   rates, we can estimate the substitution effect and net that out from the estimates of the total

15   effect to find the increased income that households and businesses will realize as electricity prices

16   fall. We then can use our economic impact model (IMPLAN) to estimate what will happen in the

17   local economy as income effectively increases.

18   Q.   **Is this a responsiveness measure that measures the change in where price elasticity effects**

19   **demand for electricity in response to a change in price? Are there direct estimates of this, or**

20   **will you have to infer as with the first effect?**

21   A.   Luckily, there are several estimates that have been made of the price elasticity.

22   Q.   **What estimates did you use and why?**

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1 A.   We chose to use estimates from a study commissioned by the National Renewable Energy

2   Laboratory (NREL). This study is somewhat unique because it calculates not only national

3   estimates of price elasticities but also regional estimates. Households and businesses in different

4   regions behave differently due to price changes. We use estimates of the long-run price elasticity

5   of demand for the West North Central Census region, of which Kansas is a part.

6 Q.   **You mentioned that there are separate elasticities for businesses and households. How did you**

7   **treat these?**

8 A.   We use them directly. The City provided information on residential and commercial/industrial

9   electrical usage, so we were able to calculate the substitution effect – how much extra electricity

10   would be used in response to lower prices. After netting out the dollar value of that effect from

11   the total savings, we estimate that existing households and businesses in Kingman will realize an

12   additional $95,000 in income in 2018 from the reduced electrical prices. This effect is independent

13   of the increase in income coming from the new and expanded businesses.

14 Q.   **How did you treat that income effect?**

15 A.   As with the increased income coming from new and expanded businesses, some of it will be spent

16   locally with the other portions not resulting in increased economic activity. So we had to use

17   IMPLAN again to calculate the increase in economic activity generated from the increased income.

18 Q.   **What were the results of the economic impact analysis for this effect?**

19 A.   The results of the IMPLAN analysis for 2018 are shown in the table below. We estimate that the

20   cost reduction to existing businesses will cause an increase of 0.5 jobs and $14,285 in 2018 in

21   Kingman. We further estimate an increase of $23,457 in value added in Kingman in 2018. This is

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1   an annual figure, so for each year of the project, economic activity in Kingman is projected to be

2   nearly $24,000 higher than it would be without the project.

3

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	0.1	$5,866.31	$7,696.43	$22,407.66
Indirect Effect	0.1	1,371.00	2,312.70	5,196.00
Induced Effect	0.3	7,048.50	13,447.90	27,649.40
Total Effect	0.5	$14,285.85	$23,457.02	$55,253.04

4   **Q.   When you say annual benefit, that implies that these benefits will occur over time. How did you**

5   **treat them in your analysis?**

6   A.   We then projected out the results over time using the assumptions provided by KPP for the

7   growth in benefits. The figure below shows our projected time path of benefits. Then we

8   calculated the net present value of the economic value added increase over the 14-year project

9   period. We used the estimated cost of capital for a city to borrow over that term to finance a

10   project to reduce rates. We estimate that the net present value of the economic value added

11   increase would be $290,863 in 2017 dollars.

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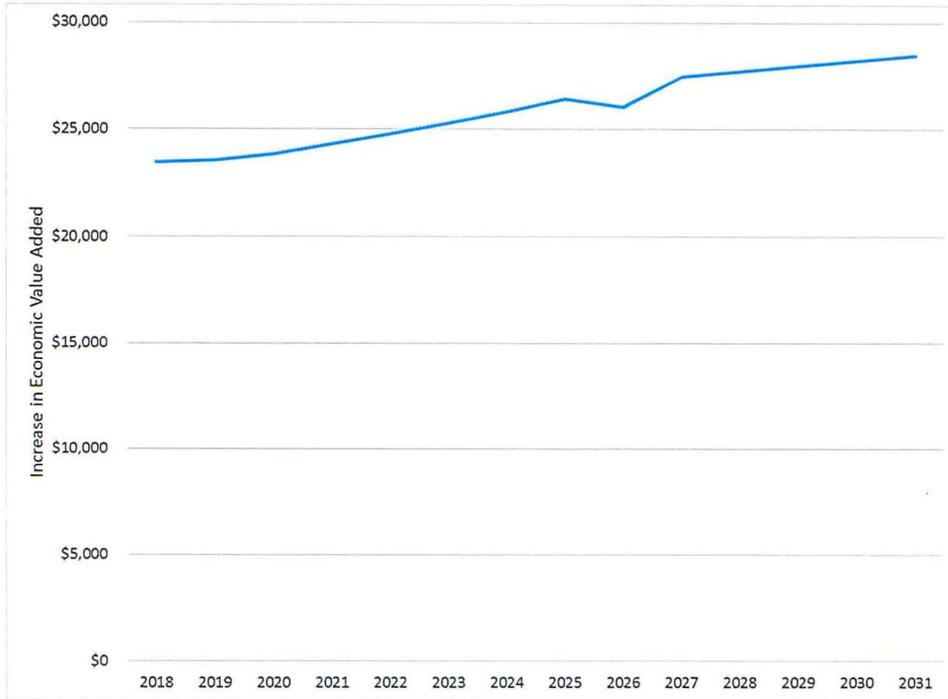
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2 **Q.** **It sounds like you have two sources of economic effects. Can they be added to arrive at a final**

3 **estimate of the economic impact of the proposed project?**

4 A. Yes, this is exactly what we did. The table below shows the cumulative economic benefits to the

5 City of Kingman from the KPP interconnection project proceeding. These results will be realized

6 over the life of the proposed project. We estimate that the City will realize over $500,000 in

7 economic benefits in 2017 dollars. Employment will increase by just over 5 full-time equivalent

8 positions, and labor income will be nearly $300,000 higher than before the project.

Benefit	Employment	Labor Income	Total Value Added
New and Retained Business	4.6	$116,444	$221,656
Reduced Cost for Existing Households and Businesses	0.5	177,132	290,863
Total Benefits	5.1	$293,576	$512,519

9

10 **Conclusions and Suggested Commission Response**

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1   **Q.**   **What conclusions have you reached regarding the proposed KPP project?**

2   A.   It would provide significant economic benefits to the City of Kingman and should be

3   allowed to proceed.

4   **Q.**   **Do you have any further recommendations for the Commission regarding the issues**

5   **discussed here?**

6   A.   Anything that can be done to reduce utility rates will be a positive for business

7   attraction, retention, and economic development in general. I am of the opinion that

8   the KPP project makes economic sense for the City and should be encouraged.

9   **Q.**   **Does this conclude your testimony?**

10   A.   Yes.

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VERIFICATION

STATE OF KANSAS)
) ss:
COUNTY OF SEDGWICK)

      Kenneth A. Kriz, of lawful age, being first duly sworn upon my oath, state that I am a Regents Distinguished Professor of Public Finance at Wichita State University; that I have read the above prefiled testimony; that I know the contents thereof and declare that the statements made therein are true and correct to the best of my knowledge and belief.
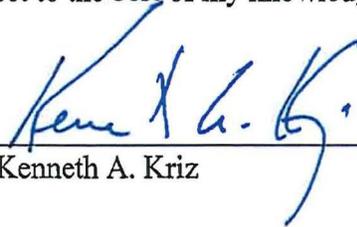
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Kenneth A. Kriz

SUBSCRIBED AND SWORN to before me this 7th day of August, 2017.
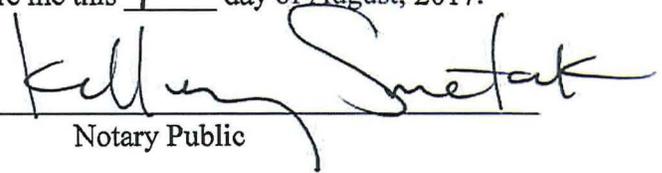
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Notary Public

My Appointment Expires:

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8-16-17

NOTARY PUBLIC - State of Kansas
KELLEY SMETAK
My Appt. Exp. 8-16-17
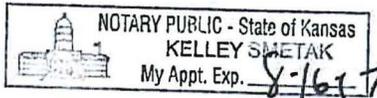
Kansas Power Pool

City of Kingman, KS 115kv Transmission Interconnection Economic Impact Analysis

August 7, 2017

Kenneth A. Kriz, Regents Distinguished Professor of Public Finance

1 BACKGROUND

The Kansas Power Pool (KPP) has proposed to build a new 115kv transmission interconnection between the city of Kingman, Kansas (who is a member of KPP) and the SemCrude substation on the Ninnescah Cooperative 115kv line owned by Mid-Kansas Electric Company (MKEC). Southern Pioneer Electric Company (SPEC), the current provider of grid access to Kingman through a 34.5kv line running from Cunningham, Kansas, has filed a complaint with the Kansas Corporation Commission, claiming that the proposed interconnection is in violation of an existing Global Service Agreement between SPEC and KPP and that the interconnection line (which would bypass the existing 34.5kv line they own) would constitute a duplication of services contrary to Kansas law and public policy. On the matter of the facts and the direct complaint, the Kansas Public Finance Center will offer no opinion or testimony. However, the Center was asked by KPP to perform an analysis of the economic impacts of cost savings caused by the project that will accrue to the city of Kingman and its ratepayers. In doing the analysis we have relied on estimates of cost savings provided by Mr. Larry Holloway, KPP Assistant General Manager-Operations.

2 ECONOMIC IMPACT MODELING

The economic effects of a project such as the one being analyzed generally fall into two categories. The first is the attraction of new businesses into the city and the retention and expansion of existing businesses. Kingman benefits from attraction and expansion through the city having more income and spending within its borders. This in turn provides income for residents of the city which they will also spend. The economic effects of attracting a business (or expanding one) can be modeled throughout an economic impact model. An economic impact model is a mathematical representation of the resource flows throughout an economy. At its most basic, it can be portrayed in Figure 1. In the figure, the sectors of a local economy (lighter colored rectangular shapes) engage in transactions (arrows) in markets (darker rectangles).

EXHIBIT

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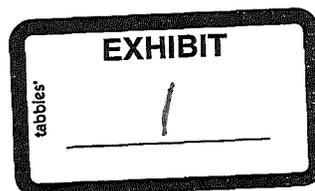
Figure 1. Circular Flow Model of the Economy.
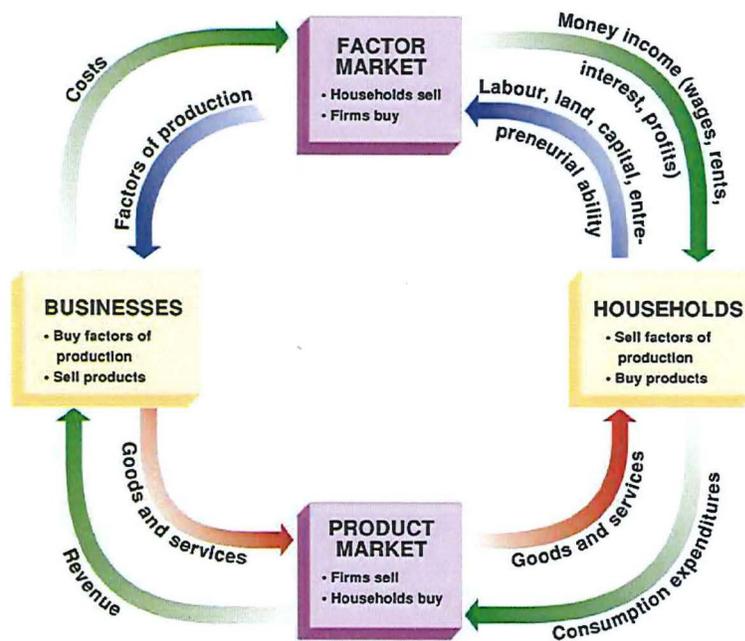
At the bottom of the flow model, to take one example, Businesses provide goods and services through the Product market to Households. In return Households pay for the goods and services (marked consumption expenditures), which becomes revenue for Businesses. In the Factor Market at the top of Figure 1, Businesses buy factors of production (labor from workers, capital and land from investors). In return, they pay Households with wages, rents on land, and interest on capital investment. This becomes income for Households which they can use to make further purchases (or save, which is not portrayed in this highly-simplified model although it is accounted for in our economic impact model). Though not shown in this basic version of the model, businesses also engage in many transactions with each other to buy inputs to the production process. Those transactions also are costs for one business while being revenue for another, which in turn can be used to compensate workers, landowners, and those who provide capital.

An economic impact model provides the mathematical framework to track these flows through the economy. There are a few types of these models. The most often used is called an input-output model. It consists of a series of matrices capturing sales among businesses, sales to final consumers (households), demands for labor, capital, and land, and imports of goods and services from outside of the area under study (Isard, et.al., 1998). One can conduct "experiments" with the model, changing the model to represent, for example, the attraction of a new business to the area. The outputs of the input-output model capture three types of economic effects, which are added to create an estimate of the increase in the value of economic activity in the area:

1. **Direct Effects:** These effects directly result from the new investment. Economic activity in an area will increase simply because there is more production happening in the area due to the new business opening. Direct effects capture the value of these initial impacts in the economy.
2. **Indirect Effects:** These result from the new business making purchases of inputs (obvious items like parts for production and less obvious items like food for meetings) from local businesses.
3. **Induced Effects:** These come from wage payments to labor, both in the new business and in supplier businesses. Workers can then use those payments to buy goods and services in the local economy.[1]

The KPFC uses an input-output model called IMPLAN to analyze economic impacts of various changes in the economy. IMPLAN's developer, the Minnesota IMPLAN Group, Inc., processes data from many different public and non-public sources to create a picture of the economy down to the zip code level. We used data on Kingman in our analysis. Getting back to the question of the economic effects of attracting a new business, we can create a hypothetical example of the economic impact of attracting a new business to Kingman using IMPLAN. For our estimates, we assumed that the new business would be a small manufacturer with 10 jobs. Even with that small of a business, IMPLAN estimates total economic value added (a measure of economic activity capturing increased labor income and returns to business owners) would increase by $1.05 million per year above what it would be without the business.

The second type of economic effect from the project comes from the reduced price of electricity for households and businesses. To economists, there are two economic effects created by a price change. The first is a substitution effect. This comes from the fact that electricity is now relatively cheaper compared to all other goods than it was before the project. This will cause households and businesses to consume more electricity than they did before as a percentage of their overall spending. The amount of this response can be calculated if we have estimates of the price elasticity of demand for electricity. Elasticity is a measure of responsiveness of one variable to another changing. The second effect of a price change is the income effect. This effect comes from the concept that a business or household will have relatively more disposable income to spend on all other goods and services when the price of electricity falls. The two effects compose the total effect of a price change. Therefore, to estimate the economic effects of the drop in electrical rates, we can estimate the substitution effect and net that out from the estimates of the total effect to find the increased income that households and businesses will realize as electricity prices fall. We then can use our economic model (IMPLAN) to estimate what will happen in the local economy as income increases.

3 IMPACT ESTIMATES OF INCREASED BUSINESS ATTRACTION AND RETENTION

We estimate the economic impact of increased business attraction and retention by first estimating the magnitude of the cost reductions due to the project that will accrue to the commercial and industrial sector. Data from the Kansas Power Pool estimates the value of cost savings that Kingman will realize

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[1] It may occur that not all purchases of business inputs and purchases by households occur within the area. Input-output models adjust for this through creating an import sector and estimating the value of transactions where income flows outside of the area.

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will be $179,622 in 2018. We first divide these benefits by sector based on usage data obtained from Energy Information Administration (EIA) form 826 reporting for 2016. That data suggests that Commercial and Industrial users consumed just under 65 percent of power generated by the city. Applying that percentage to the projected cost savings, we estimate that the commercial and industrial sector will realize $116,443 in cost savings in 2018. Using the same EIA data on commercial/industrial revenue and projecting it forward to 2018 using estimated growth rates provided by KPP, we estimate that this cost savings will be 3.87 percent of revenue.

Assuming that these savings will be passed onto businesses we can then calculate the increase in income that will be generated by new business activity by applying estimates of the elasticity of economic measures like personal income to changes in costs. Usually, when economists make these calculations they have a wealth of economic literature to back their estimates. Unfortunately, those estimates are not readily available for electric costs. We instead choose to analyze the effects of reductions in other costs, specifically tax costs, and draw an analogy with the likely effects of cost reductions in electric costs. We choose to use taxes as our analogy because businesses place a relatively similar importance to these items in surveys of business location factors (Gambale, 2016; Bohmeyer, 1996). Taxes do on average constitute a larger share of business expenses than utility costs (KPMG, 2016) and so our estimates will be reduced accordingly.

There is much academic literature on the impact of tax costs on business location decisions. Estimates of the tax elasticity of economic activity vary from nearly zero in some studies to nearly one in others. For reference, an elasticity value of one means that a one percent reduction in tax costs would increase economic activity by one percent. A recent comprehensive study performed by the author of this report and one of his colleagues found that over the long-term, a one percent reduction in tax costs would increase personal income by 0.45 percent (Srithongrung & Kriz, 2014). This is near the middle of most estimates of responsiveness. Since utility costs are just under one-fourth of tax costs according to a study by KPMG (2016), we estimate a responsiveness value of 0.10 for electrical costs. Multiplying this by the estimate of cost savings above, we arrive at an estimate that personal income in Kingman will increase over the long-term by 0.387 percent from business location and retention over what it otherwise would be. IMPLAN estimates taken from public sources estimate that total personal income in Kingman was just over $228 million in 2014. We therefore calculate that the long-run effect from new business attraction and existing business retention will be $882,495 in increased personal income.

This estimate was entered into the IMPLAN model as an increase in household income to estimate the economic effects of the increased personal income. IMPLAN contains 9 categories of household income, ranging from households with income less than $10,000 per year to those with incomes greater than or equal to $150,000 per year. Without prior knowledge of the distribution of the personal income increase, we assume that the increase will be realized equally across income groups. The results of the IMPLAN estimation are shown in Table 1. We estimate that 4.6 jobs and $116,444 in labor income will be generated by new or expanding businesses. In economic terms, the measure of interest is Total Value Added, a measure of the total increase in economic activity accruing to the area. We estimate that new

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and expanding businesses in Kingman will increase economic activity by $221,656 over the life of the project. [2]

Table 1. Estimates of the Economic Impact Arising from New Business Attraction and Existing Business Retention and Expansion.

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	0.00	$0.00	$0.00	$0.00
Indirect Effect	0.00	0.00	0.00	0.00
Induced Effect	4.6	116,444.00	221,656.00	456,334.20
Total Effect	4.6	$116,444.00	$221,656.00	$456,334.20

4 IMPACT ESTIMATES OF COST REDUCTIONS FOR EXISTING BUSINESSES AND HOUSEHOLDS

The second source of economic effects comes from existing businesses and households having lower electrical costs. We estimated these effects by starting with the percentage reduction in rates estimated in Section 3. We then calculated the substitution effect where households and businesses will increase their electrical usage in response to the reduced price of electricity. As discussed in Section 2, to do this we need estimates of the price elasticity of demand for electricity. There has been a wealth of economic research estimating these values for households and businesses. We chose to use estimates from a study commissioned by the National Renewable Energy Laboratory (NREL – Bernstein and Griffin, 2006). This study is somewhat unique because it calculates not only national estimates of price elasticities but also regional estimates. Households and businesses in different regions behave differently due to price changes. We use estimates of the long-run price elasticity of demand for the West North Central Census region, of which Kansas is a part.[3] For households, the long-run price elasticity of demand estimated in the study is -0.244, indicating that a one percent decrease in the price of electricity for households will cause a 0.244 percent increase of electrical consumption. Applying this to EIA data described in Section 3, we estimate that households will increase consumption by 109.1 MWh above what they would otherwise consume. Using the 2016 average rates, this translates to a substitution effect of $15,415.69 for households. The long-run estimated price elasticity for commercial and industrial businesses is -0.589. Applying this to the data from Section 2, we estimate that businesses will consume 574.31 MWh more electricity in response to the price reduction, creating a substitution effect of $68,584.78. Table 2 breaks out the estimated savings from the project in 2018.

Table 2. Estimated Project Savings, 2018.

Sector	Substitution Effect	Income Effect	Total Savings

[2] The estimates for output of businesses in Kingman is higher, but this figure includes the value of exported goods and services.

[3] The Bernstein-Griffin paper also includes estimates for Kansas separately, but there are not enough utilities in Kansas to produce consistent results in the analysis. We use the long-run price elasticity estimates as we will be analyzing a project with a long-term stream of benefits.

Residential	$15,415.69	$47,763.38	$63,179.07
Commercial/Industrial	$68,584.78	$47,857.97	$116,442.76
Total	$84,000.48	$95,621.35	$179,621.83

As discussed in Section 2, the $84,000 substitution effect is not relevant for the purposes of calculating economic impacts of the price reduction. Instead, it represents economic activity that is transferred from one type of consumption to another. For example, households could spend $15,415 on clothes, food, and other items, instead they spend on electricity after the price reduction. The $95,621 is an increase in income for the two sectors. These are the values that were entered into the IMPLAN software to calculate the economic effects. The results of the IMPLAN analysis for 2018 are shown in Table 3. We estimate that the cost reduction to existing businesses will cause an increase of 0.5 jobs and $14,285 in 2018 in Kingman. We estimate an increase of **$23,457 in value added** in Kingman in 2018. This is an annual figure, so for each year of the project, economic activity in Kingman is projected to be nearly $24,000 higher than it would be without the project.

Table 3. Results from Economic Impact Analysis of Cost Reductions to Existing Households and Businesses, 2018.

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	0.1	$5,866.31	$7,696.43	$22,407.66
Indirect Effect	0.1	1,371.00	2,312.70	5,196.00
Induced Effect	0.3	7,048.50	13,447.90	27,649.40
Total Effect	0.5	$14,285.85	$23,457.02	$55,253.04

We then projected out the results over time using the assumptions provided by KPP for the growth in benefits. Figure 2 shows the graph of the projected annual increase in economic value added.

Figure 2. Estimated Increase in Economic Value Added in Kingman Caused by Cost Reductions to Existing Households and Businesses, 2018-2031.
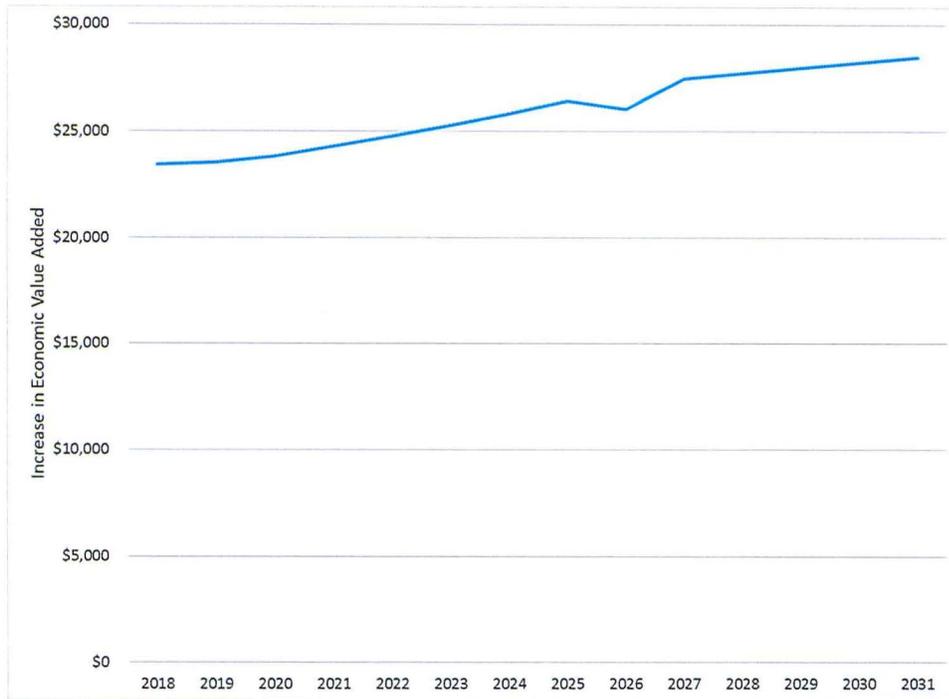
Finally, we calculated the net present value of the economic value added increase over the 14-year project period. We used the estimated cost of capital for a city to borrow over that term to finance a project to reduce rates (2.633% - Municipalbonds.com, 2017). We estimate that the **net present value of the economic value added increase would be $290,863**.

5 CONCLUSIONS

Using standard economic assumptions and a widely-used economic impact analysis model we estimate that over the life of the proposed interconnection project, the City of Kingman will realize over $500,000 in economic benefits in 2017 dollars (Table 4). Employment will increase by just over 5 full-time equivalent positions, and labor income will be nearly $300,000 higher than before the project.

Table 4. Total Economic Effects from Interconnection Project, City of Kingman, constant dollars (base=2017).

Benefit	Employment	Labor Income	Total Value Added
New and Retained Business	4.6	$116,444	$221,656
Reduced Cost for Existing Households and Businesses	0.5	177,132	290,863
Total Benefits	5.1	$293,576	$512,519

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6 REFERENCES

Bernstein, M. A., & Griffin, J. (2006). *Regional Differences in the Price-Elasticity of Demand for Energy.* National Renewable Energy Laboratory (NREL) Subcontract Report NREL/SR-620-39512. Golden, Colorado: NREL.

Bohmeyer, L. S. M. (1996). Electric Utilities and Retail Wheeling: The Effect on Economic Development. *Economic Development Review, 14*(2), 51-55.

Gambale, G. (February 29, 2016). 30th Annual Survey of Corporate Executives. *Area Development, Q1 2016.*

Isard, W., Azis, I. J., Drennan, M. P., Miller, R. E., Saltzman, S., & Thorbecke, E. (1998). *Methods of Interregional and Regional Analysis.* Aldershot, UK: Ashgate.

KPMG. (2016). *Competitive Alternatives: KPMG's Guide to International Business Locations Costs.* Toronto, Canada: KPMG, LLC.

MunicipalBonds.com. (2017). *Municipal Bonds - August 1, 2017: Yield Curve.* Retrieved from http://www.municipalbonds.com/bonds/yield_curve/

Srithongrung, A., & Kriz, K. A. (2014). The Impact of Subnational Fiscal Policies on Economic Growth: A Dynamic Analysis Approach. *Journal of Policy Analysis and Management, 33*(4), 912-925.