

**COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION**

In the Matter of the Electronic Application of Kentucky Power :
Company for (1) A General Adjustment of Its Rates for :
Electric Service; (2) An Order Approving Its 2017 : **Case No 2017-00179**
Environmental Compliance Plan; (3) An Order Approving Its :
Tariffs and Riders; (4) An Order Approving Accounting :
Practices to Establish Regulatory Assets and Liabilities; and :
(5) An Order Granting All Other Required Approvals and :
Relief.

**DIRECT TESTIMONY OF BARRY KORNSTEIN
ON BEHALF OF
KENTUCKY INDUSTRIAL UTILITY CUSTOMERS**

I. INTRODUCTION AND QUALIFICATIONS

1
2 **Q. PLEASE STATE YOUR NAME, OCCUPATION, AND BUSINESS ADDRESS.**

3 **A.** My name is Barry J. Kornstein. I am a self-employed Economic Development Data
4 Research Consultant. My current business address is 1365 S. 1st St., Louisville, KY
5 40208.

6
7 **Q. PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL**
8 **BACKGROUND.**

9 **A.** I graduated from the Massachusetts Institute of Technology in 1984 with Bachelor of
10 Science degrees in Mathematics (Applied) and Humanities (Literature). In 1986, I
11 received a Masters of International Studies from Claremont Graduate University. I was a
12 Ph.D. candidate in Political Science through the University of Minnesota-Twin Cities.

1 For 23 years, I worked as a Research Manager focusing on economic impact analysis at
2 the University of Louisville. I assumed my current position in 2016.

3
4 **Q. ON WHOSE BEHALF ARE YOU APPEARING IN THIS PROCEEDING?**

5 **A.** I am appearing on behalf of Kentucky Industrial Utility Customers, Inc. (“KIUC”)
6 members who take electric service from Kentucky Power Company (“Kentucky Power”).

7
8 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

9 **A.** I am sponsoring a report that I have prepared on the economic importance of various
10 industries in Kentucky, including the manufacturing industry, and the typical electric
11 usage observed among those industries. *See* Exhibit BJK-1.

12
13 **Q. WOULD YOU PLEASE SUMMARIZE THE PURPOSE AND STRUCTURE OF**
14 **YOUR REPORT?**

15 **A.** Yes. My report looks at the relative economic importance of various industries in terms
16 of the jobs created elsewhere in a regional economy through their inter-industry
17 (supplier) linkages. The most important industries, in terms of economic growth, are
18 those that export their goods and services to customers around the US and the world, such
19 as the operations of most manufacturing plants. Firms in these industries bring new
20 dollars into a region and thereby lift firms in other linked industries, as well as the
21 incomes of regional households. As household incomes grow, so do sales and
22 employment in retail and service industries that provide goods and services to

1 households. By contrast, most retail and service industries merely absorb local dollars
2 that would have been spent regionally if not at a particular merchant in question.

3
4 **Q. DOES THE KENTUCKY CABINET FOR ECONOMIC DEVELOPMENT**
5 **RECOGNIZE THE IMPORTANCE OF MANUFACTURING TO THE LOCAL**
6 **ECONOMY?**

7 **A.** Yes. It is issues like these that guide the approach taken by the Kentucky Cabinet for
8 Economic Development (KCED) in its efforts at business attraction and retention. The
9 state's new and expanding business incentive programs, such as the Kentucky Business
10 Investment (KBI) program, are specifically open only to manufacturing, agribusiness,
11 regional or national headquarters, and non-retail service and technology companies, and
12 the job retention programs are targeted towards manufacturing. The Commonwealth's
13 workforce training initiatives are similarly oriented, with recipients of the largest grant
14 program required to provide training related to manufacturing, technology (life sciences,
15 data centers), transportation (logistics and distribution), healthcare, or related
16 construction trades.

17
18 **Q. IS YOUR REPORT FOCUSED ON THE KENTUCKY POWER SERVICE**
19 **TERRITORY?**

20 **A.** Yes. My report focuses on the twenty counties served in whole or in part by Kentucky
21 Power. In general, the industries that create the most spin-off economic activity from
22 their operations are largely manufacturing or related to power generation and distribution
23 or water transportation. Many of them are also among the industries that use the most

1 electricity per facility and per employee. I utilize the IMPLAN economic modeling
2 program to estimate all of the spending effects in the report.

3
4 **Q. WHAT IS IMPLAN?**

5 A. IMPLAN is one of the most widely used regional input-output modeling systems in the
6 world, used in thousands of studies. Input-output models are based upon detailed data
7 describing how much each industry buys from every other industry in order to produce
8 their output, in addition to the compensation they pay their employees and the taxes they
9 pay. IMPLAN also includes a county-to-county trade model so that it can predict how
10 much each industry buys from every other industry in the state, as well as how much
11 must be imported from outside the state to support a given level of production. IMPLAN
12 produces economic multipliers, which are measures of the amount of economic spinoff
13 arising from the business-to-business and household spending of an industry, its
14 suppliers, and all the employees involved. I focus on what are called "Type I
15 employment multipliers," which measure how much total employment in the Kentucky
16 Power service area would rise per new job in the reference industry, just due to the
17 vendor linkages among industries. A multiplier of 1.75 indicates we would expect that
18 for every 100 additional jobs in the industry a further 75 jobs would be supported by all
19 the spin-off activity, for a total of 175 new jobs.

20
21 **Q. WHAT DID YOUR IMPLAN STUDY CONCLUDE?**

22 A. I found that there are only 40 industries in the 20-county service area of Kentucky Power
23 with an inter-industry employment multiplier at least as large as that of coal mining

1 (1.65). Twenty-one of the 40 industries are manufacturing. Specific industries include
2 chemicals, both human and animal food manufacturing, sawmills, and iron and steel
3 plants. But the petroleum refining facilities in Boyd County represent by far the most
4 impactful industry. Each of the approximately 450 petroleum refinery jobs in the area
5 supports an additional 5.5 jobs elsewhere (job multiplier of 6.5) in the region just from its
6 supplier linkages. That is almost two jobs more than any other industry's business-to-
7 business spending impact. Jobs in petroleum are also extremely highly paid, averaging
8 \$216,806 annually. Annual compensation is so high because refineries employ highly
9 trained chemical, mechanical engineers, scientists, and production workers.

10 By contrast the retail service sector has a very low job multiplier. For every one retail
11 job, only 0.1 additional jobs are created (job multiplier of 1.1). Jobs in the retail sector
12 are generally low paid and include many part-time workers with few benefits. Retail
13 sector businesses are not nearly as sensitive to electric rates as manufacturers. Retail
14 sector businesses generally compete locally against other retailers and need to be located
15 close to their customers regardless of electricity costs.

16
17 **Q. HOW HAVE LOW ELECTRICITY RATES BENEFITED KENTUCKY'S**
18 **MANUFACTURING ECONOMY?**

19 A. Kentucky ranks higher among the states than one might imagine in terms of
20 manufacturing employment given our overall population. While we are 26th in
21 population, in 2012 Kentucky ranked 21st highest for manufacturing employment, and
22 17th for production workers. This impressive performance is related to the relatively low-
23 cost electricity in the Commonwealth. In 2012, Kentucky had the 7th lowest industrial

1 electricity costs of any state. The Economic Development Cabinet touts Kentucky's low
2 industrial electric utility rates (and low overall rates) prominently in all of its marketing
3 materials. Kentucky has the lowest cost of electricity in the industrial sector among
4 states east of the Mississippi River, with average rates nearly 20 percent lower than the
5 national average.

6 This plays out in the mix of manufacturing firms that choose to operate in the state, with
7 Kentucky doing especially well in attracting manufacturing activities that require high
8 levels of electricity usage. The Commonwealth ranks 2nd in terms of electricity
9 consumed per dollar of manufacturing shipments. Clearly, Kentucky has an extremely
10 energy-intensive portfolio of manufacturing industries, and the states that rank above us
11 have far fewer manufacturing employees.

12 I matched across the databases to see what particular industries stand out in the 20-county
13 Kentucky Power service area. That is, what detailed industries have (a) significant
14 employment in the region, (b) high employment multipliers, and (c) high national
15 electricity purchases per employee. The top thirteen industries are shown in a table in the
16 report. The list includes petroleum and chemical manufacturing, food processing, wood
17 product processing, tire manufacturing, and metal production. Nearly all of the products
18 of these industries are exported from the 20-county region. In addition, for nearly all of
19 them the average labor income per employee is significantly above the state and region
20 averages.

21 Kentucky has a competitive advantage in electricity costs, and the Commonwealth's
22 economic development efforts have been largely geared to attract the sort of businesses
23 highlighted above to the state. Front and center in their promotional campaigns has been

1 the low cost of doing business in Kentucky, which always emphasize the state's low
2 industrial electricity rates. While I do not have any specific recommendation regarding
3 the level of rate increase the Commission should approve for the Companies, the
4 Commission should be mindful of the economic impact that large rate increases may
5 have on the ability to attract and retain the energy-intensive export industries that will be
6 necessary for the health of the economy in southeastern Kentucky.

7
8 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

9 **A. Yes**

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EXHIBIT OF BARRY KORNSTEIN

ON BEHALF OF

KENTUCKY INDUSTRIAL UTILITY CUSTOMERS

The Differential Economic Importance of Industries in Kentucky and the Southeastern Part of the State and Its Relation to Electricity Usage

by
Barry J. Kornstein
Consulting Economic Researcher

October 2, 2017

Economic importance is a term used to describe the relative importance that an industry or activity has on a regional economy in terms of the number of jobs, the amount of payroll, total sales, taxes collected, etc., that are ultimately being supported by an industry or ongoing activity as the dollars that are initially spent are re-spent again and again both inside and outside the region. It is a static analysis that records the relative reach of an industry in a region and how much its activities are related to other economic activity in a region. But when we use the word importance in conversation we are often concerned with the impact of a change in an activity. We want to know how big of a ripple effect through the entire regional economy would arise from a change in an industry's operations. Economists know that the largest effects result from activities that bring in new money to a regional economy and use the term economic impact to describe the ultimate effects of such change. While we are not conducting an economic impact study in this report, we are using the term importance in the sense that it is akin to greater or lesser economic impact. If changes were to occur, we want to know which would be the most important, or impactful, industries.

Economic activity in Kentucky is classified under hundreds of different industries, but some are much more important than others in terms of overall growth and prosperity in the state. As alluded to above, the most important industries, in terms of economic growth, are those that export their goods and services to customers around the US and the world, such as the operations of most manufacturing plants (because they sell their goods nationally or internationally). Firms in these industries bring new dollars into Kentucky and thereby lift firms in other linked industries, as well as the incomes of Kentucky households. As household incomes grow, so do sales and employment in retail and service industries (and governments) that provide goods and services to households. Most retail and service industries merely absorb local dollars that would have been spent regionally if not at a particular merchant in question. In fact, many businesses provide a mix of export and local supply. But it is the export-based industries that are the primary engines of growth, and hence the target of economic development agencies, while the retail and service industries are essentially captive and require no special incentives to operate in the state.

The Kentucky Cabinet for Economic Development (KCED) has taken just such an approach in its efforts at business attraction and retention. The state's new and expanding business incentive programs, such as the Kentucky Business Investment (KBI) program, are specifically open only to agribusiness, regional or national headquarters, manufacturers, and non-retail service and technology companies. Some of the smaller incentive programs for new and expanding

businesses are also open to tourism industries, but this is also with an eye towards attracting new dollars to the state. The job retention incentive programs are targeted only to manufacturing (and sometimes coal) facilities. In addition, there are a variety of programs targeting technology, energy, and environmental businesses.

Together with the Education and Workforce Development Cabinet, the KCED also has a number of workforce training initiatives. Perhaps the largest is the Kentucky Work Ready Skills Initiative (KWRSI) which seeks to “build a highly trained, modernized workforce” and has awarded \$100 million in statewide bonds to 40 public-private partnerships that include private sector employers and high schools, secondary technical schools or postsecondary institutions. The recipients are required to provide training related to manufacturing, technology (life sciences, data centers), transportation (logistics and distribution), healthcare, or related construction trades.

As we will show in this report, many of the industries in these broad targeted sectors – agribusiness, manufacturing, business services, technology, and healthcare – are among the industries that create the most spin-off economic activity from their operations and use the most electricity per facility. We will use economic impact modeling software to illustrate the former and data from the 2012 Economic Census, conducted by the U.S. Census Bureau, to show the latter.

Employment Linkages by Industry

We utilize the IMPLAN economic modeling program to estimate all of the spending effects in this report. IMPLAN is one of the most widely used regional input-output modeling systems in the world, used in thousands of studies. Input-output models are based upon detailed data describing how much each industry buys from every other industry in order to produce their output, in addition to the compensation they pay their employees and the taxes they pay. IMPLAN can be customized to analyze any region that is a set of contiguous counties. IMPLAN has details on 536 industries and associated commodities (goods and services) and includes a sophisticated county-to-county trade model which it uses to predict how much each industry buys from every other industry in the region of interest, as well as how much must be imported from outside the region to support a given level of production. Industry production creates household spending, as well as goods and services, through labor income, much of which is then spent on goods and services itself. IMPLAN models this through detailed data on personal consumption expenditures, creating detailed household spending patterns for each of nine household income groups.

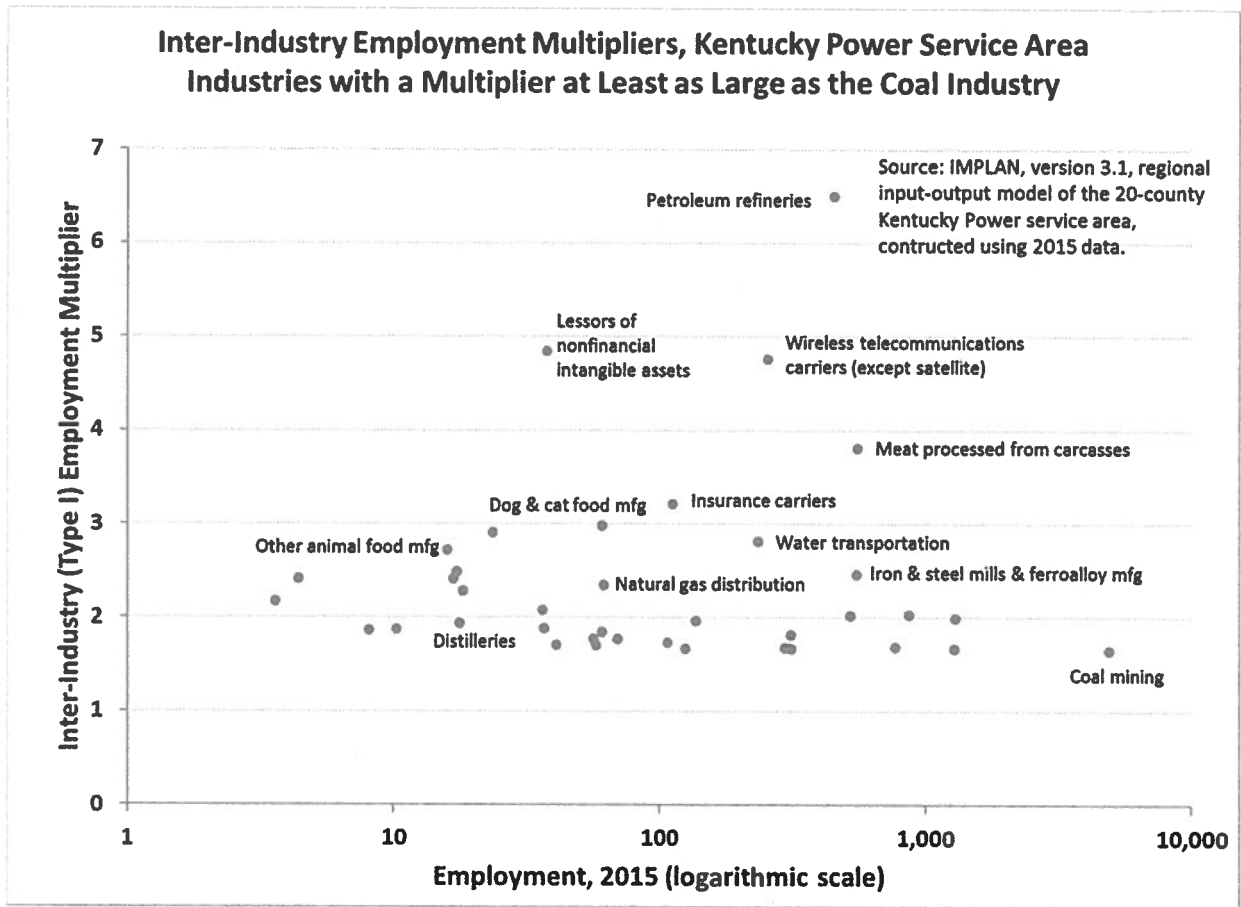
For our purposes, the most relevant IMPLAN output are the economic multipliers. They measure the amount of economic spinoff arising from the business-to-business and household spending of the industry, its suppliers, and all the employees involved. We use what are called ‘Type I employment multipliers’. These measure how much total employment in Kentucky (or the Kentucky Power service area) would rise per new job in the reference industry, due to vendor linkages among industries. The Type I multipliers exclude the additional household spending impacts (Type II), and allow us to focus clearly on industrial linkages that drive the overall economy. A multiplier of 1.75 indicates we would expect that for every 100 additional

jobs in the industry a further 75 jobs would be supported by all the spin-off activity, for a total of 175 new jobs.

The figure below shows the industries in the 20-county service area of Kentucky Power located in southeastern Kentucky with an inter-industry employment multiplier at least as large as that of coal mining (1.65). Together, these 40 industries total about 14,100 jobs, roughly 8.1 percent of the region's employment in 2015. We plot employment versus the multiplier (we use a logarithmic scale for employment so that the industries are more distinguishable). We have labeled some of the most notable industries. It is evident that manufacturing is very important. In fact, 21 of the 40 industries are manufacturing, with six others involving power generation and distribution, coal mining, natural gas, and water and pipeline transportation. Though not necessarily labeled in the chart, the industries include chemicals, both human and animal food manufacturing, sawmills, and iron and steel plants.

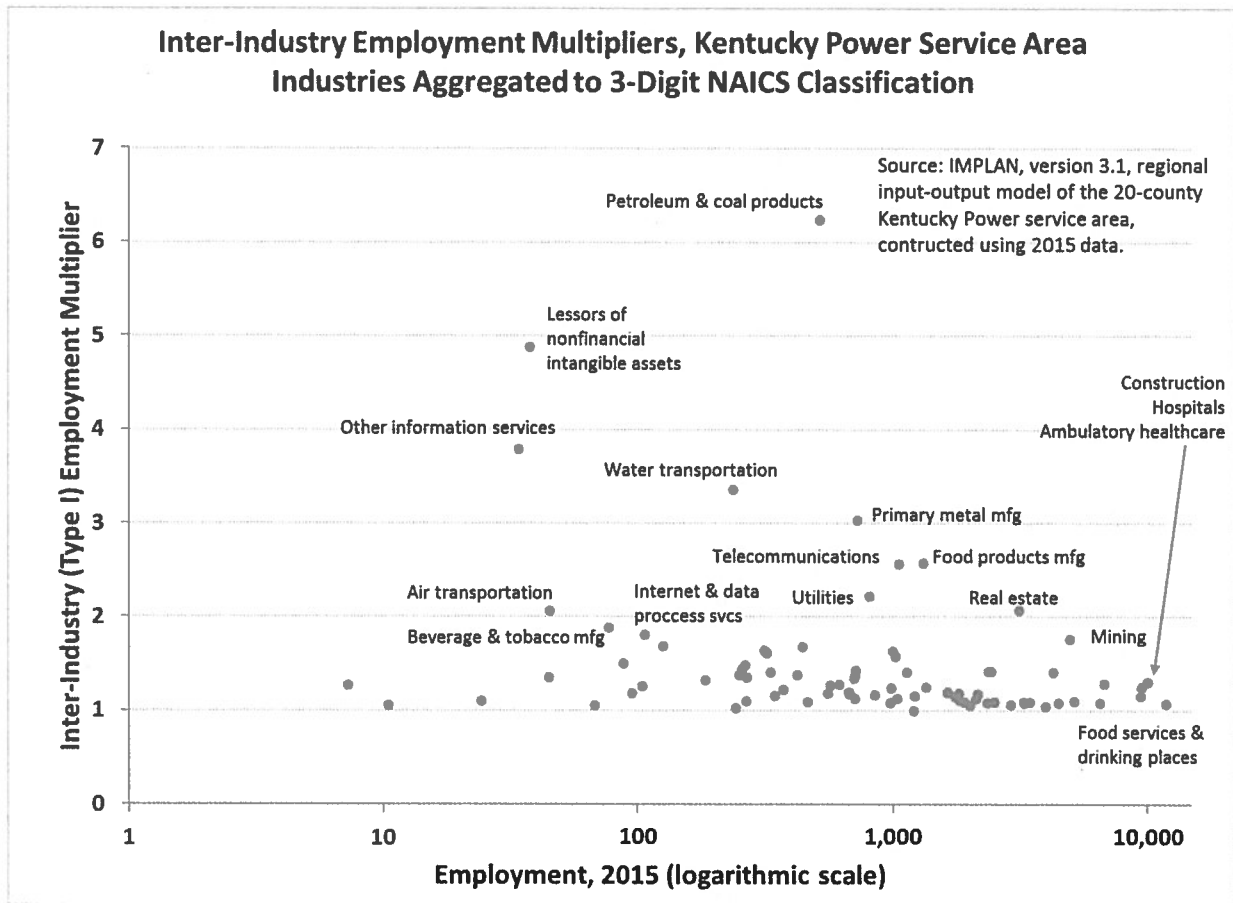
However, the petroleum refining facilities in Boyd County represent by far the most impactful industry. Each of the approximately 450 petroleum refinery jobs in the area supports an additional 5.5 jobs elsewhere in the region just from its supplier linkages. That is almost two jobs more than any other industry's business-to-business spending impact.

With a relative lack of manufacturing in the area, 13 of the 40 industries are services. They account for 3,200 of the jobs in the figure, and are mostly spread across the telecommunications, broadcasting, and data processing sectors. Among them are a few unexpected industries, such as wireless telecommunications and lessors of nonfinancial intangible assets (which is involved with the legal and financial aspects of branding, patents, trademarks and franchises). Not labeled are two new economy industries; Data processing, hosting, and related services, and Internet publishing and broadcasting and web search portals.



The next figure aggregates the industries to the 3-digit NAICS level, so that there are just 87 industries rather than 536. Clusters of industries tend to have similar linkages, so in aggregating we can see patterns that may be obscured in the details. To the lower right we see the private sector industries that have the most employment, food and drinking places, construction, hospitals, and doctor's offices. Construction has the largest Type I employment multiplier of the four industry sectors, 1.31, about the middle of the pack among the 87 sectors. In general, the multipliers are very low for these high employment sectors because they are downstream industries that require the success of upstream industries to prosper.

The industries dominating the high multipliers are producing the food and beverages that keep us alive, our communications infrastructure, the means to get everything to its destination, and the energy, chemicals, and metals required to produce them. They produce either products that require many and varied inputs, or basic inputs having sophisticated production processes.



Two industry sectors not mentioned in the previous discussions of the statewide and service area multipliers are wholesale and retail trade. The table below shows the Type-I employment multipliers for wholesale trade and twelve types of retail services for both Kentucky statewide and the 20-county service area. We can see that the multipliers are very low for the retail service sectors. In the Kentucky Power service area, 100 retail jobs only support about 10 extra jobs through business-to-business interactions.

The multipliers are low because most of what is involved in wholesale and retail trade is moving finished goods from producer to retailer and then from retailer to consumer. Intermediate inputs generally make up only about 35 percent of the value of total output, while for many manufacturing industries they can be over 70 percent. So, there are fewer linkages to the wider economy. In addition, these services are primarily oriented towards the local market, with exports generally in the range of 4-8 percent of industry output.

**Inter-Industry Employment Multipliers for the Wholesale Trade and Retail Service Sectors
Kentucky Statewide and Kentucky Power 20-County Service Area**

| | Kentucky | | KY Power Service Area | |
|--|------------------------------------|--------------------------------------|------------------------------------|--------------------------------------|
| | Inter-Industry (Type I) Emp. Mult. | Percent of Industry Service Exported | Inter-Industry (Type I) Emp. Mult. | Percent of Industry Service Exported |
| Wholesale trade distribution | 1.59 | 15.12% | 1.40 | 9.49% |
| Motor vehicle and parts dealers | 1.17 | 1.53% | 1.11 | 1.31% |
| Furniture and home furnishings stores | 1.24 | 0.54% | 1.16 | 0.43% |
| Electronics and appliance stores | 1.15 | 4.86% | 1.10 | 4.23% |
| Building material & garden equipment and supplies stores | 1.22 | 7.63% | 1.15 | 6.25% |
| Food and beverage stores | 1.14 | 0.69% | 1.09 | 0.61% |
| Health and personal care stores | 1.19 | 10.62% | 1.13 | 8.91% |
| Gasoline stores | 1.14 | 18.50% | 1.10 | 16.18% |
| Clothing and clothing accessories stores | 1.19 | 0.46% | 1.13 | 0.39% |
| Sporting goods, hobby, musical instrument & book stores | 1.12 | 4.09% | 1.08 | 3.64% |
| General merchandise stores | 1.16 | 13.33% | 1.10 | 11.51% |
| Miscellaneous store retailers | 1.09 | 1.56% | 1.06 | 1.43% |
| Nonstore retailers | 1.29 | 0.24% | 1.20 | 0.19% |

Source: Kentucky and Kentucky Power Service Area IMPLAN models with 2015 data.

While there is a great deal of variation within industry sectors, the table below shows that, in general, manufacturing industries have denser inter-industry linkages resulting in higher employment multipliers, and that this is at least partially due to their export nature.

**Inter-Industry Employment Multipliers by Industry Sector
Kentucky Statewide and Kentucky Power 20-County Service Area**

| | Kentucky | | KY Power Service Area | |
|--|------------------------------------|-------------------------------------|------------------------------------|-------------------------------------|
| | Inter-Industry (Type I) Emp. Mult. | Percent of Industry Output Exported | Inter-Industry (Type I) Emp. Mult. | Percent of Industry Output Exported |
| Agriculture, Mining, Utilities, & Construction | 1.39 | 28.8% | 1.36 | 61.3% |
| Manufacturing | 2.00 | 88.6% | 2.15 | 88.7% |
| Wholesale & Retail Trade | 1.26 | 10.9% | 1.16 | 16.7% |
| Transportation & Business Services | 1.47 | 17.1% | 1.42 | 17.9% |
| Education, Healthcare, & Personal Services | 1.12 | 9.1% | 1.09 | 18.8% |

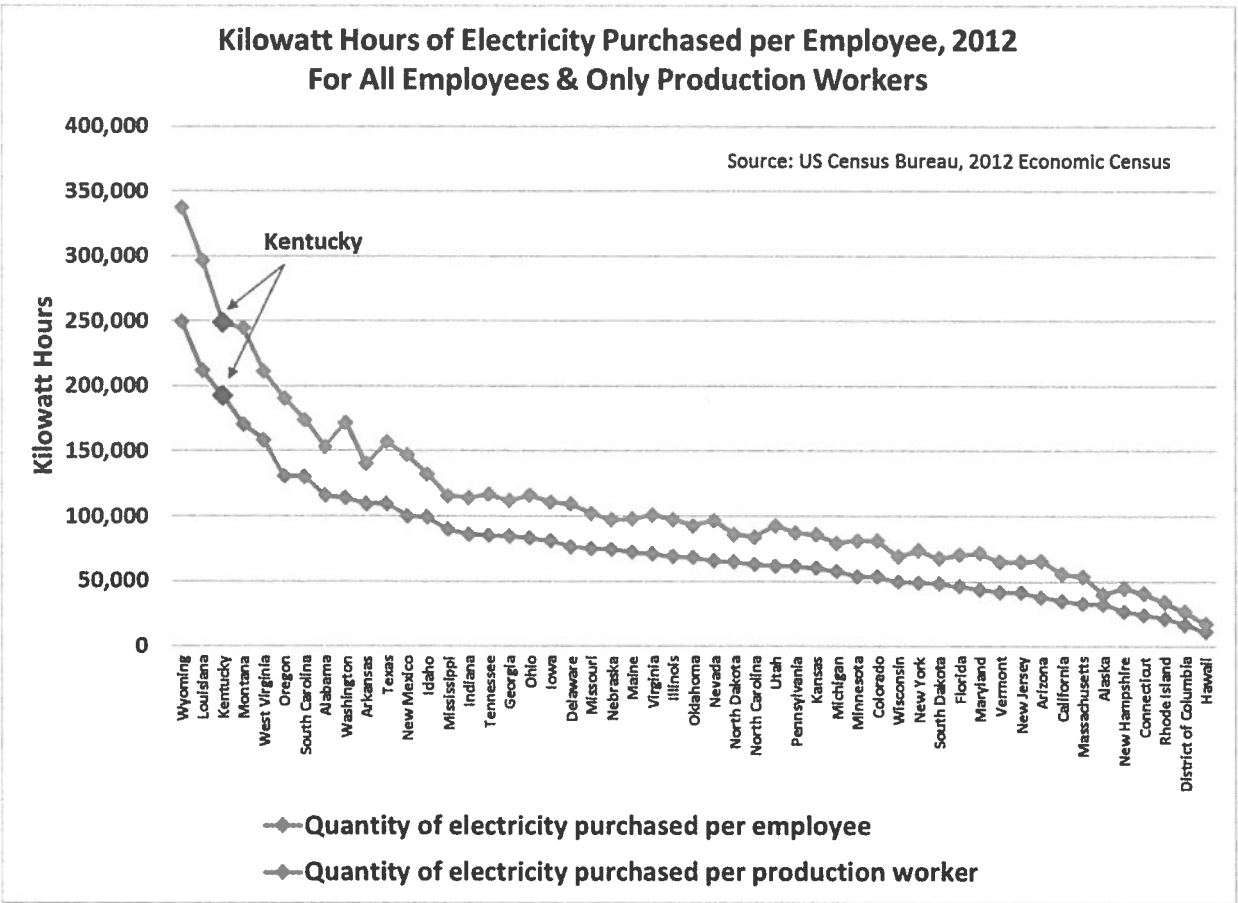
Source: Kentucky and Kentucky Power Service Area IMPLAN models with 2015 data.

Electricity Usage by Industry

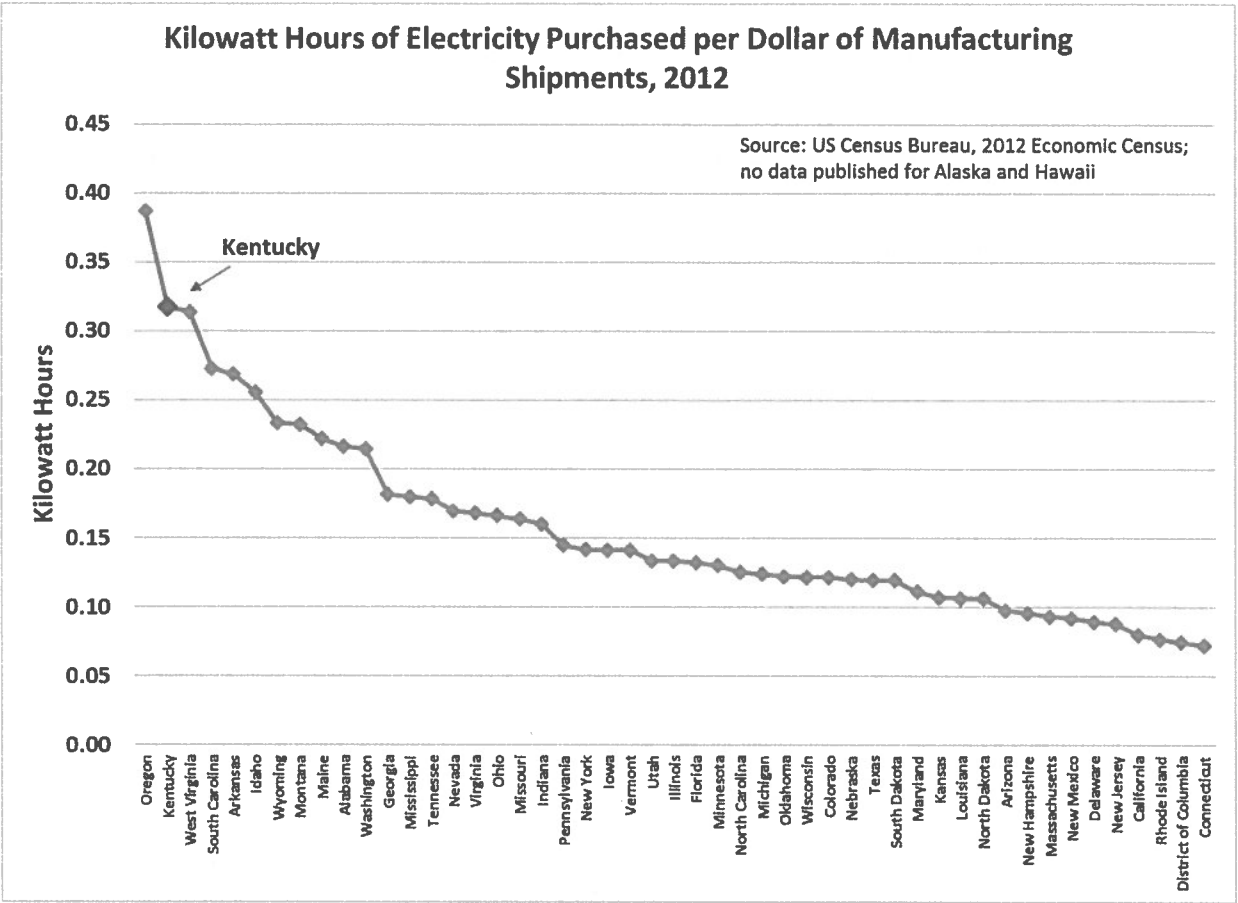
According to the U.S. Energy Information Administration, in 2016, retail sales of electricity were about 3.71 trillion kilowatt hours (kWh), with residential uses making up 38 percent of the total, commercial uses 37 percent, and industrial uses 25 percent. Of the industrial electricity usage, about half is used to operate machinery.

Many of the industries we have identified as having the larger employment impacts in the 20-county Kentucky Power service area also are among the most energy-intensive. Whereas a household or a small business may spend a few thousand dollars annually on electricity and natural gas, an aluminum smelter, for example, will purchase tens of millions of dollars of electricity. Larger retail and commercial firms, hospitals, and the like purchase energy for heating, air conditioning and lighting, with annual energy expenditures per employee of perhaps a few hundred dollars. Many manufacturing operations use energy as part of their production processes, and petroleum refineries may purchase three-quarters-of-a-million kilowatt hours of electricity per employee annually. While residential and commercial uses each account for about 50 percent more electricity usage than industry uses, there are literally millions of residences and commercial establishments across the country, but only 300,000 manufacturing establishments. Industrial electricity usage is far more intensive than residential and commercial.

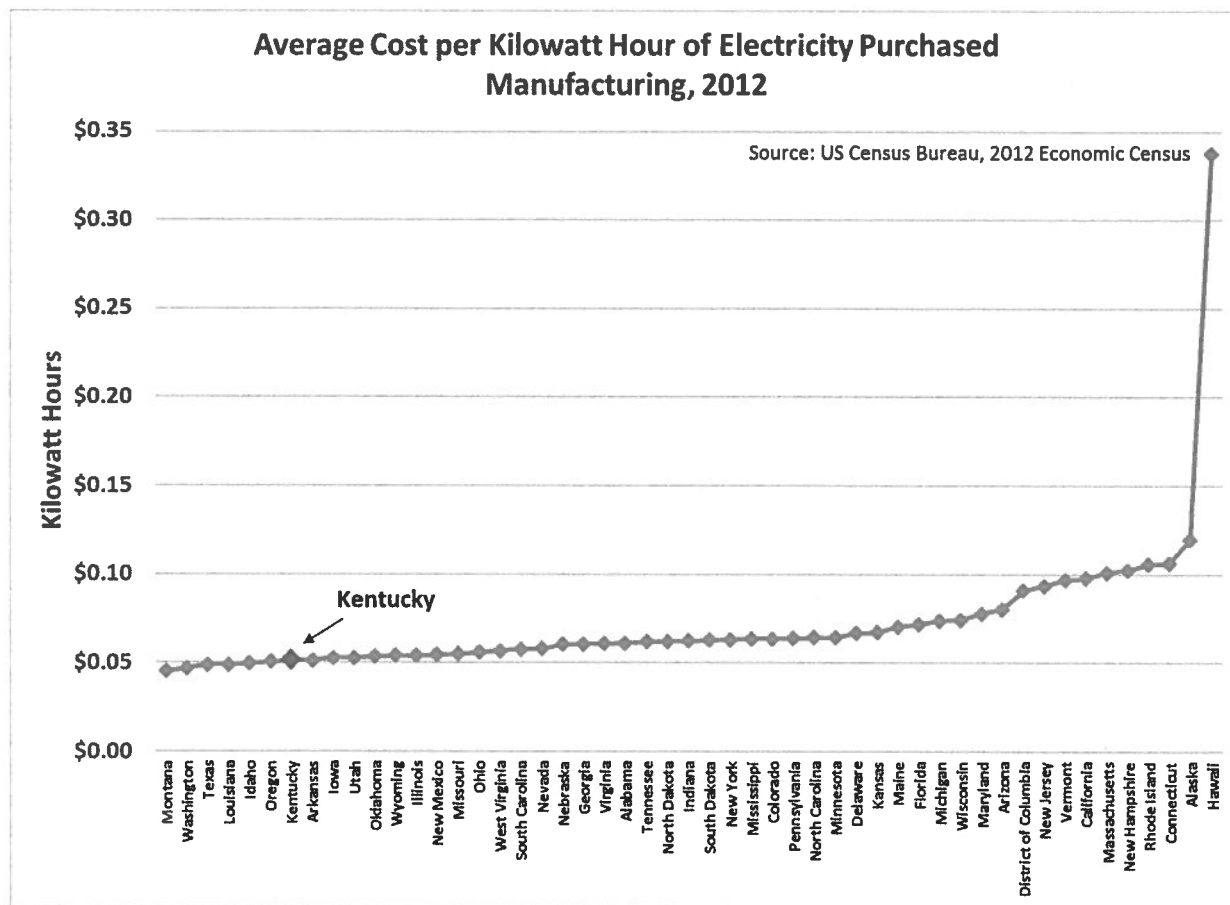
The 2012 Economic Census shows that Kentucky has one of the most energy-intensive portfolios of manufacturing industries in the US. The next chart plots electricity purchases per employee against total manufacturing employment and total number of production workers in each state. Kentucky had 214,000 manufacturing employees, ranking 21st highest, and 165,000 production workers, ranking 17th. However, Kentucky manufacturing firms purchased 192,200 kilowatt hours per employee and 248,600 kilowatt hours per production worker, both 3rd highest. Moreover, Kentucky has many more manufacturing employees than the two states with higher electricity intensity — Wyoming and Louisiana.



One further way to sort the data is to look at the quantity of electricity purchased by manufacturers divided by the value of their shipments. Here Kentucky ranks 2nd highest among US states, with 0.32 kilowatt hours per dollar of shipments. Clearly, Kentucky has an extremely energy-intensive portfolio of manufacturing industries.



At 5.13 cents average cost per kilowatt hour of electricity purchased for industrial purposes in 2012, Kentucky has the 7th lowest industrial electricity costs of any state, as seen in the following chart. The Economic Development Cabinet touts Kentucky’s low industrial electric utility rates (and low overall rates) prominently in all of its marketing materials. Kentucky has the lowest cost of electricity in the industrial sector among states east of the Mississippi River, with average rates nearly 20 percent lower than the national average (Kentucky was 4th lowest in 2014).



The Census Bureau does not publish state-level data on electricity usage for detailed manufacturing industries. However, they do publish details for 364 industries at the national level, and Kentucky has a significant presence in many of the most energy intensive industries. In the Appendix, we display the top 50 manufacturing industries nationally, in terms of electricity purchases per establishment (also showing their purchases per employee), and also show associated Kentucky employment and statewide Type I employment multipliers. The listing is particularly interesting since many of the top energy using industries are prominent in Kentucky and the 20-county Kentucky Power service area. There are more than 500 jobs in Kentucky in 18 of the 50 industries, with several having a presence in the Kentucky Power region. The second highest electricity purchases per establishment on the list (301 million kWh per establishment) are in the petroleum refining industry, which has a large presence in the 20-county service area and has the largest economic spinoff related to its operations. Other prominent Kentucky industries in the list include primary aluminum production, steel, secondary aluminum, plastics, paper, organic chemicals, autos and light trucks, and aluminum sheet, plate, and foil. These industries all purchase more than 10 million kWh of electricity per establishment, some significantly more. Indeed, access to Kentucky's historically inexpensive electricity is the reason many of these industries are located in the state.

Finally, we have matched across the databases to see what particular industries stand out in the 20-county Kentucky Power service area. That is, what detailed industries have (a) significant employment in the region, (b) high employment multipliers, and (c) high national electricity

purchases per employee. The top thirteen industries are shown in the table below, ranked by their employment multiplier. The list includes petroleum and chemical manufacturing, food processing, wood product processing, tire manufacturing, and metal production. Nearly all of the products of these industries are exported from the 20-county region. In addition, almost all have average labor incomes per employee significantly above the state and region averages. This means that they will also have much higher than average Type II, or induced household impacts as well.

Kentucky Power Service Area Industries with Significant Employment, Dense Industry Linkages, and High Electricity Purchases

| Industry Description | Industry Code (NAICS 2012) | Kentucky Power Service Area Employment | Average Labor Income per Employee | Service Area Employment Inter-Industry Multiplier (Type I) | Percent of Primary Product Exported | Quantity of Electricity Purchased per Employee (kWh), US |
|---|----------------------------|--|-----------------------------------|--|-------------------------------------|--|
| Petroleum refineries | 324110 | 451 | \$216,806 | 6.498 | 83.0% | 760,616 |
| Meat processed from carcasses | 311612 | 555 | \$47,312 | 3.807 | 86.8% | 45,538 |
| Dog and cat food manufacturing | 311111 | 61 | \$70,270 | 2.983 | 99.5% | 88,112 |
| Iron and steel mills and ferroalloy manufacturing | 331110 | 550 | \$86,143 | 2.461 | 97.7% | 600,361 |
| Other basic inorganic chemical manufacturing | 325180 | 36 | \$96,948 | 2.079 | 98.7% | 868,849 |
| Sawmills | 321113 | 521 | \$27,674 | 2.024 | 83.8% | 89,393 |
| Bottled and canned soft drinks & water | 312111, 312112 | 37 | \$86,644 | 1.886 | 83.9% | 75,191 |
| Rolled steel shape manufacturing | 331221 | 61 | \$122,830 | 1.847 | 97.7% | 143,631 |
| Tire manufacturing | 326211, 326212 | 313 | \$71,585 | 1.815 | 97.1% | 81,178 |
| All other petroleum and coal products manufacturing | 324199 | 57 | \$156,915 | 1.770 | 89.8% | 151,325 |
| All other food manufacturing | 311991, 311999 | 70 | \$53,494 | 1.770 | 99.2% | 38,281 |
| Veneer and plywood manufacturing | 321211, 321212 | 58 | \$53,525 | 1.705 | 83.9% | 58,514 |
| Other miscellaneous chemical product manufacturing | 325998 | 313 | \$110,925 | 1.669 | 97.4% | 58,051 |

Sources: Employment and multipliers from Kentucky Power Service Area IMPLAN model, 2015 data; electricity data from 2012 Economic Census, US Census Bureau. The term "exported" in the table means that the product is sold to customers outside of Kentucky. Average labor income per employee in the region is \$43,373. US average kilowatt hours per employee of electricity purchased by manufacturing businesses is 73,291 kWh.

Kentucky has a competitive advantage in electricity costs, and the Commonwealth's economic development efforts have been largely geared to attract the sort of businesses highlighted above to the state. Front and center in their promotional campaigns has been the low cost of doing business in Kentucky, which always emphasize the state's low industrial electricity rates. The state's workforce development efforts are also focused on skills needed in these industries.

Appendix

Top 50 U.S. Manufacturing Industries for Electricity Purchases, per Establishment & per Employee, 2012

| Industry | 2012 NAICS code | Quantity of electricity purchased per establishment (kWh) | Quantity of electricity purchased per employee (kWh) | Kentucky Employment | Type I Emp. Mult. |
|--|------------------------|---|--|------------------------|-------------------------|
| Alumina refining and primary aluminum production | 331313 | 621,099,600 | 3,169,594 | 1,355 | 2.04 |
| Petroleum refineries | 324110 | 301,078,937 | 760,616 | 633 | 9.70 |
| Paper mills | 322121, 322122 | 159,081,115 | 456,370 | 1,586 | 2.68 |
| Petrochemical manufacturing | 325110 | 155,101,255 | 994,007 | 0 | 0 |
| Iron and steel mills and ferroalloy manufacturing | 331110 | 152,269,788 | 600,361 | 1,353 | 2.92 |
| Paperboard mills | 322130 | 133,453,173 | 596,353 | 118 | 3.35 |
| Wet corn milling | 311221 | 96,358,203 | 933,534 | 11 | 7.43 |
| Glass container manufacturing | 327213 | 57,591,590 | 240,886 | 0 | 0 |
| Other basic inorganic chemical manufacturing | 325180 | 49,994,518 | 868,849 | 635 | 2.48 |
| Aluminum sheet, plate, and foil manufacturing | 331315 | 49,324,269 | 299,844 | 2,504 | 2.77 |
| Light truck and utility vehicle manufacturing | 336112 | 48,875,962 | 64,992 | 10,018 | 2.94 |
| Pulp mills | 322110 | 47,480,813 | 196,608 | 0 | 0 |
| Industrial gas manufacturing | 325120 | 45,594,140 | 2,114,878 | 194 | 2.68 |
| Nonferrous metal (except aluminum) smelting and refining | 331410 | 45,555,705 | 859,698 | 0 | 0.00 |
| Guided missile and space vehicle manufacturing | 336414 | 44,711,057 | 32,489 | 0 | 0.00 |
| Cement manufacturing | 327310 | 41,623,448 | 838,944 | 180 | 2.33 |
| Aircraft manufacturing | 336411 | 40,303,201 | 67,583 | 1,275 | 1.83 |
| Secondary smelting and alloying of aluminum | 331314 | 36,372,287 | 747,999 | 508 | 3.48 |
| Rice milling | 311212 | 31,564,147 | 551,339 | 0 | 0 |
| Semiconductor and related device manufacturing | 334413 | 29,611,943 | 248,859 | 22 | 1.91 |
| Flat glass manufacturing | 327211 | 29,435,516 | 202,284 | 784 | 1.79 |
| Other basic organic chemical manufacturing | 325193, 325194, 325199 | 28,971,849 | 405,595 | 1,448 | 4.00 |
| Artificial and synthetic fibers and filaments manufacturing | 325220 | 28,012,258 | 254,210 | 0 | 0 |
| Beet sugar manufacturing | 311313 | 23,651,548 | 115,156 | 0 | 0 |
| Phosphatic fertilizer manufacturing | 325312 | 23,279,423 | 275,873 | 0 | 0 |
| Plastics material and resin manufacturing | 325211 | 22,270,780 | 384,135 | 2,458 | 2.55 |
| Automobile manufacturing | 336111 | 21,756,162 | 58,092 | 9,390 | 2.43 |
| Reconstituted wood product manufacturing | 321219 | 21,060,500 | 339,309 | 26 | 1.82 |
| Storage battery manufacturing | 335911 | 20,037,008 | 130,742 | 417 | 1.39 |
| Soybean and other oilseed processing | 311224 | 19,839,140 | 380,400 | 152 | 11.39 |
| Breakfast cereal manufacturing | 311230 | 19,254,127 | 90,173 | 0 | 0 |
| Guided missile & space vehicle propulsion unit & propulsion unit parts mfg | 336415 | 18,100,464 | 40,448 | 0 | 0 |
| Synthetic dye and pigment manufacturing | 325130 | 17,105,177 | 298,171 | 173 | 2.66 |
| Lime manufacturing | 327410 | 16,672,255 | 359,201 | 167 | 2.27 |
| Nitrogenous fertilizer manufacturing | 325311 | 16,419,328 | 590,533 | 79 | 3.70 |
| Poultry processing | 311615 | 15,813,825 | 37,474 | 5,285 | 1.73 |
| Sanitary paper product manufacturing | 322291 | 15,568,887 | 122,339 | 838 | 2.00 |
| Metal can manufacturing | 332431 | 15,149,069 | 151,526 | 0 | 0 |
| Fiber, yarn, and thread mills | 313110 | 14,934,810 | 192,912 | 0 | 0 |
| Iron and steel pipe and tube manufacturing from purchased steel | 331210 | 14,243,626 | 111,143 | 605 | 1.72 |
| Plastics bottle manufacturing | 326160 | 13,455,823 | 193,694 | 930 | 1.43 |
| Malt manufacturing | 311213 | 13,447,258 | 410,704 | 0 | 0 |
| Frozen fruit, juice, and vegetable manufacturing | 311411 | 13,019,650 | 84,829 | 0 | 0 |
| Nonwoven fabric mills | 313230 | 12,480,398 | 176,710 | 265 | 1.61 |
| Mineral wool manufacturing | 327993 | 12,153,808 | 236,106 | 482 | 1.60 |
| Cane sugar manufacturing | 311314 | 12,012,468 | 84,481 | 0 | 0 |
| Ferrous metal foundries | 331511, 331512, 331513 | 11,454,410 | 118,758 | 221 | 1.61 |
| Carbon and graphite product manufacturing | 335991 | 10,183,058 | 175,531 | 99 | 1.66 |
| Copper rolling, drawing, extruding, and alloying | 331420 | 9,715,083 | 114,520 | 1,338 | 1.91 |
| Dry, condensed, and evaporated dairy product manufacturing | 311514 | 9,490,876 | 117,268 | 334 | 4.76 |

Source: U.S. Census Bureau, 2012 Economic Census of Manufacturing.

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of the Electronic Application of Kentucky Power :
Company for (1) A General Adjustment of Its Rates for Electric :
Service; (2) An Order Approving Its 2017 Environmental :
Compliance Plan; (3) An Order Approving Its Tariffs and Riders; (4) :
An Order Approving Accounting Practices to Establish Regulatory :
Assets and Liabilities; and (5) An Order Granting All Other :
Required Approvals and Relief. :

Case No 2017-00179

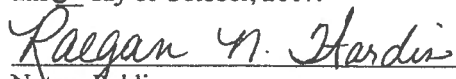
AFFIDAVIT

STATE OF Kentucky)
COUNTY OF Jefferson)

Barry Kornstein, being duly sworn, deposes and states: that the attached is his sworn testimony and that the statements contained are true and correct to the best of his knowledge, information and belief.


Barry Kornstein

Subscribed and sworn to or affirmed before me
this 3rd day of October, 2017.


Notary Public

RAEGAN N HARDIN
Notary Public
State at Large
Kentucky
My Commission Expires Jan. 04, 2020

