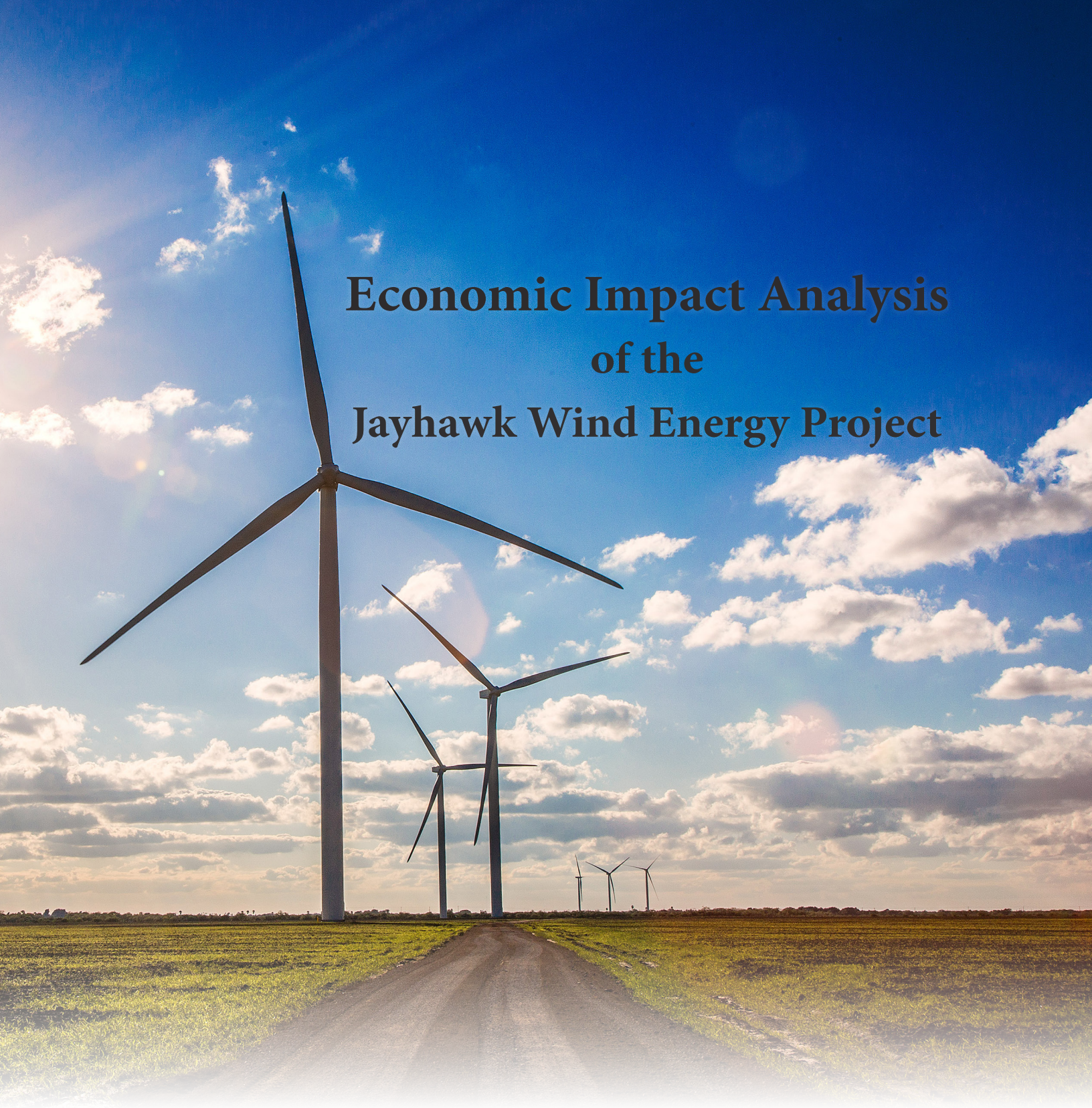

Economic Impact Analysis of the Jayhawk Wind Energy Project

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About the Author

Dr. David G. Loomis is Professor of Economics at Illinois State University and Co-Founder of the Center for Renewable Energy. He has over 10 years of experience in the renewable energy field and has performed economic analyses at the county, region, state and national levels for utility-scale wind and solar generation. In particular, he has performed economic impact analyses for wind projects in Illinois, Iowa, Kansas, Michigan, Nebraska, New Mexico, New New York, Pennsylvania, South Dakota, and Wisconsin. He has served as a consultant for Apex, Clean Line Energy Partners, EDF Renewables, EO.N, Geronimo Energy, Invenergy, J-Power, the National Renewable Energy Laboratories, Ranger Power, State of Illinois, Tradewind, and others. He has testified on the economic impacts of energy projects before the Illinois Commerce Commission, Illinois Senate Energy and Environment Committee, Missouri Public Service Commission, the New Mexico Public Regulation Commission, the Wisconsin Public Service Commission and numerous county boards. Dr. Loomis is a widely recognized expert and has been quoted in the Wall Street Journal, Forbes Magazine, Associated Press, and Chicago Tribune as well as appearing on CNN.

Dr. Loomis has published over 25 peer-reviewed articles in leading energy policy and economics journals. He has raised and managed over $7 million in grants and contracts from government, corporate and foundation sources. He received the 2011 Department of Energy's Midwestern Regional Wind Advocacy Award and the 2006 Best Wind Working Group Award. Dr. Loomis received his Ph.D. in economics from Temple University in 1995.

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SER Strategic Economic Research, LLC

I. Executive Summary

Apex Clean Energy Management, LLC is developing the Jayhawk Wind Energy project (the "Project") in Bourbon and Crawford Counties in Kansas. This report evaluates the economic impact of the project on Bourbon and Crawford Counties and the State of Kansas. The basis of this analysis is to study the direct, indirect and induced impacts on job creation, wages and total economic output. The model is run twice to evaluate the separate scenarios: once for the impacts on the county, and once for the impacts on the State. Figures for the State of Kansas are not in addition to the County numbers.

The Jayhawk Wind Energy project is expected to consist of 64 wind turbines and the associated access roads, substations, transmission and communication equipment, storage areas, and control facilities. The project represents an investment of almost $250 million. The total project, including direct, indirect, and induced impacts, is expected to result in the following:

Jobs – all jobs numbers are full-time equivalents

- 318 (115 direct) local jobs during construction for Bourbon and Crawford Counties
- 634 (190 direct) local jobs during construction for the State of Kansas
- 30 (7 direct) long-term jobs for Bourbon and Crawford Counties
- 43 (9 direct) long-term jobs for the State of Kansas

Earnings

- Over $15.7 million in local earnings during construction for Bourbon and Crawford Counties
- Over $36.7 million in local earnings during construction for the State of Kansas
- Over $1.2 million in local long-term earnings for Bourbon and Crawford Counties annually
- Over $2.2 million in local long-term earnings for the State of Kansas annually

Output - the value of production in the state or local economy. It is an equivalent measure to the Gross Domestic Product.

- Over $36.2 million in local output during construction for Bourbon and Crawford Counties
- Over $98.2 million in local output during construction for the State of Kansas
- Over $4.4 million in local long-term output for Bourbon and Crawford Counties annually
- Over $7.5 million in local long-term output for the State of Kansas annually

Property Taxes

- Over $11.4 million in total county property taxes and contribution revenue for Bourbon County over the 25-year life of the Project[1]
- Over $3.9 million in total county property taxes and contribution revenue for Crawford County over the 25-year life of the Project[1]
- Over $9.4 million in local school district revenue over the life of the Project
- Over $3.8 million in community college revenue over the life of the Project
- Over $27.2 million in property taxes and contribution revenue[1] in total for all taxing districts over the life of the Project

[1] Assumes $2,000/MW/year, divided between the counties in a manner that is proportional to the number megawatts located in each county, for the first ten years of the Project's life while the property tax exemption is in place.

II. Wind Industry Growth and Economic Development

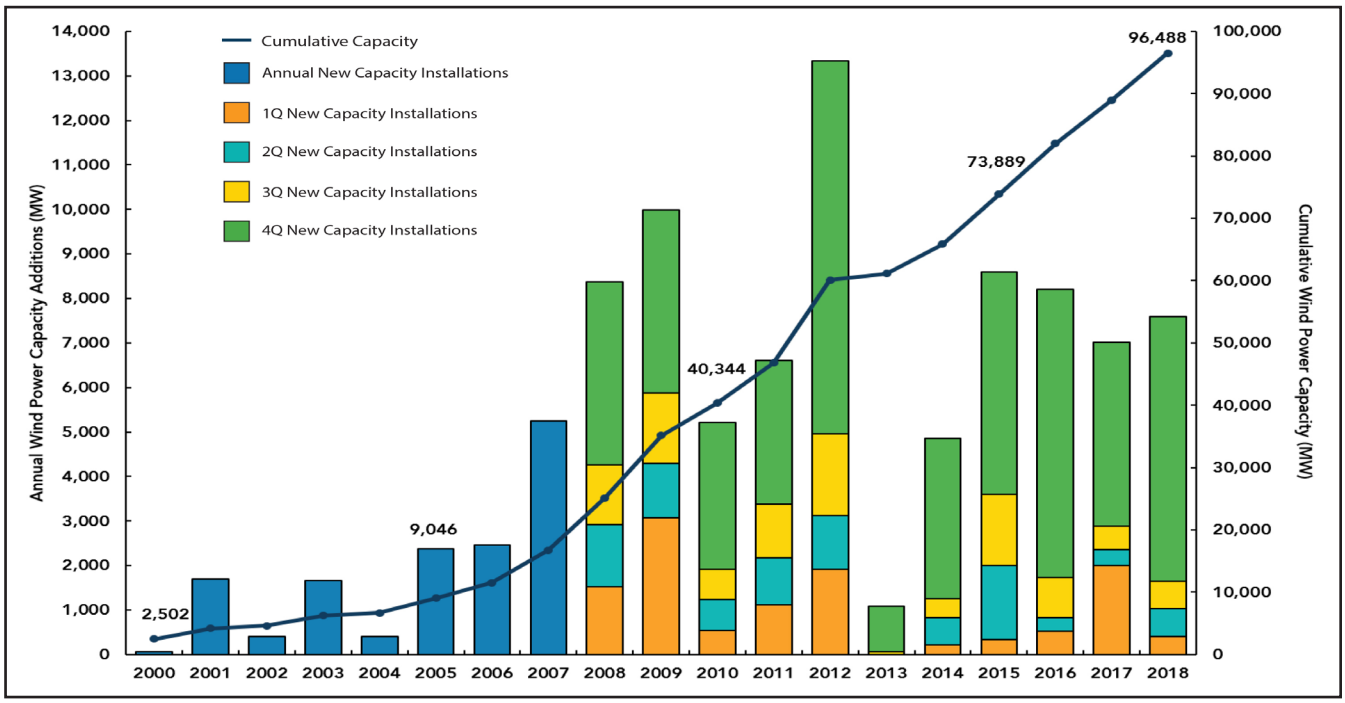
a. United States Wind Industry Growth

The United States wind industry grew at a rapid pace from 2006-2018, pausing only in 2013 due to federal policy uncertainty. In 2012, the U.S. set a new record of 13,131 MW far surpassing the previous annual peak just over 10,000 MW of wind power installed in 2009 (American Wind Energy Association, 2019). The industry rebounded with steady growth of 8,115 MW installed in 2015; 8,203 MW in 2016; 7,017 MW in 2017; and 7,588 MW in 2018 (AWEA, 2019).

The total amount of wind capacity in the U.S. by the end of 2018 was 96,488 MW, which is enough to power the equivalent of over 28 million homes (AWEA, 2018). China is the global leader with 188.4 gigawatts ("GW") of installed capacity, with Germany in third place with 56.1 GW of installed capacity (2017 figures with the United States in second place) (GWEC, 2018). Figure 1 shows the growth in installed annual capacity and cumulative capacity in the U.S., and Figure 2 shows the state-by-state breakdown of installed capacity.

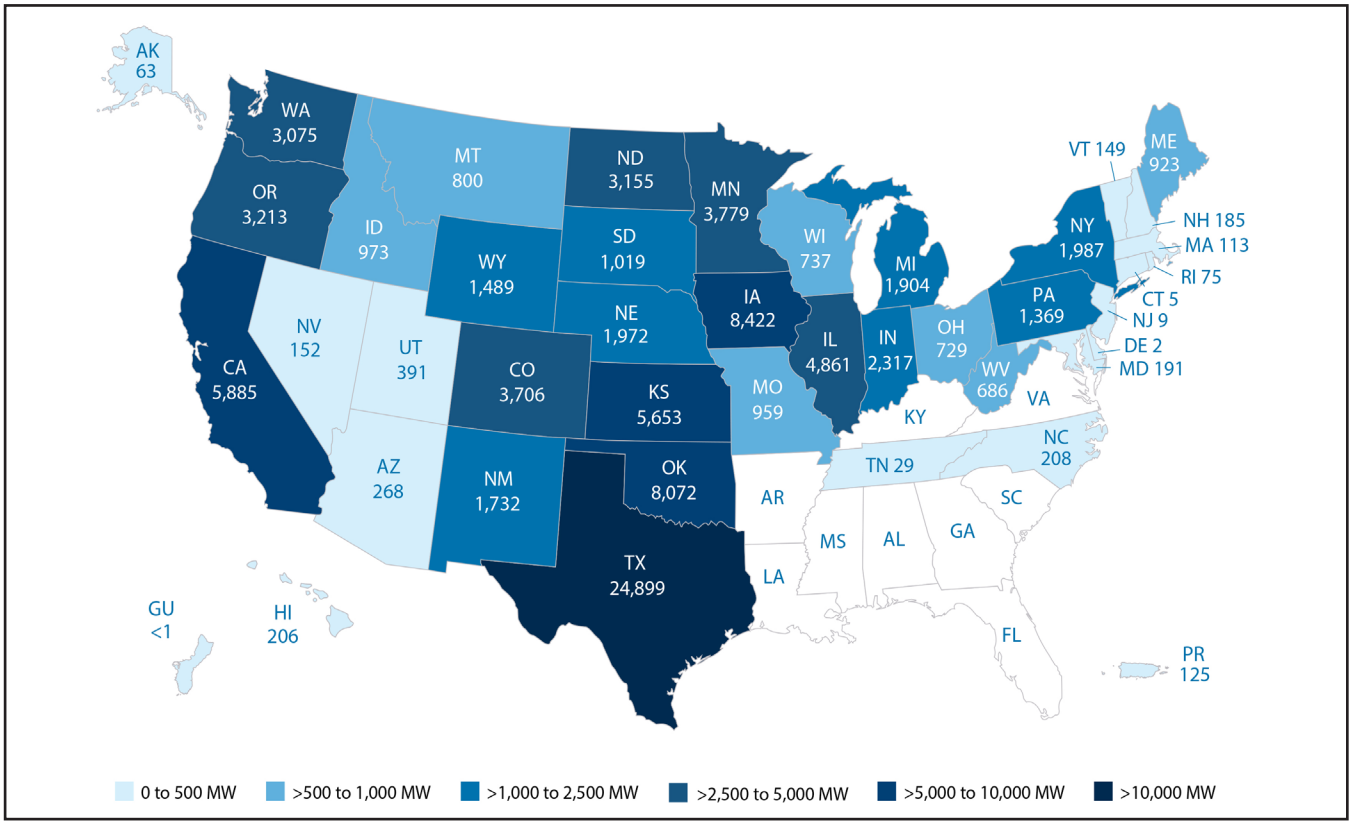
Several factors have spurred the continued growth of wind energy in recent years. First, new technology and rigorous competition among turbine manufacturers lowered the cost of wind turbines. Second, larger capacity wind turbines and higher hub heights produced more output and lowered the cost of wind energy production. Third, several large corporate buyers increased the demand for wind energy beyond the traditional electric utility market. Finally, the current phase-out of the Production Tax Credit (which provides a per-kWh tax credit) incentivized wind developers to develop projects as quickly as possible to receive the maximum tax credit.

Figure 1.—U.S. Annual and Cumulative Wind Power Capacity Growth



Source: American Wind Energy Association, U.S. Wind Industry 4Q2018 Market Report

Figure 2.—Total Wind Capacity by State



Source: American Wind Energy Association, U.S. Wind Industry 4Q2018 Market Report

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b. Kansas Wind Industry Growth

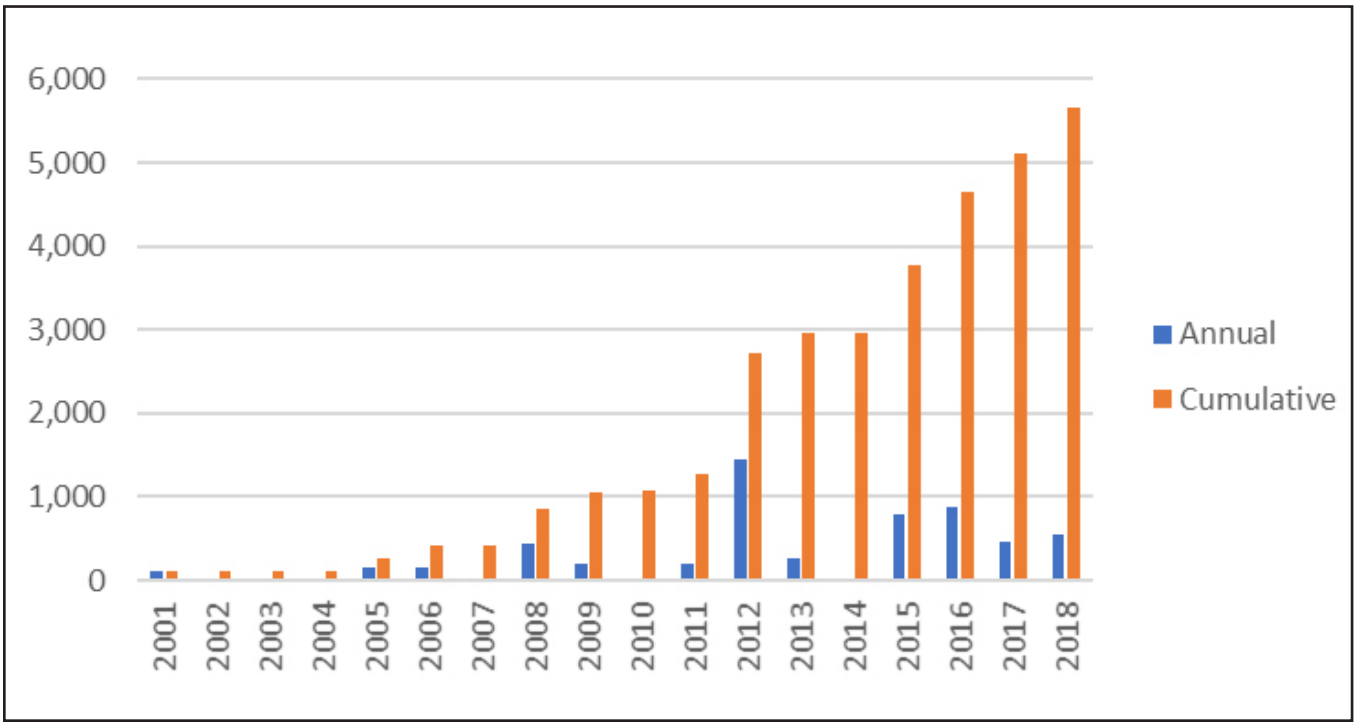
Kansas ranks fifth among states in installed capacity behind Texas, Iowa, Oklahoma, and California. In 2018, Kansas generated 36.4% of its electricity from wind power which is the highest in the nation (AWEA, 2018b). Table 1 has a list of the operational wind farms in Kansas through 2019 (several small projects below 15 MW were omitted from the table). The year-by-year and cumulative growth in Kansas' wind energy capacity is shown in Figure 3. In 2001, 2005 and 2006, Kansas had single projects completed in each year. Growth accelerated with two projects completed in 2008 that were both larger in size than previous wind farms. Growth exploded in 2012 with nine projects completed with a total installed capacity of 1,440.3 MW. There are currently four projects under construction: East Fork (196 MW); Neosho Ridge Wind (300 MW); Reading Wind Facility (200.13 MW); and Solomon Forks (276 MW).

Table 1.—Kansas Wind Farm Projects

Wind Farm	Year Online	Capacity (MW)
Flat Ridge 2	2012	470
Cimarron Bend	2016, 2017	400
Diamond Vista	2018	299.25
Western Plains	2017	280.6
Buffalo Dunes	2013	249.75
Pratt Wind Energy Center	2018	243.8
Smoky Hills	2008	249.3
Ninnescah	2016	208.265
Kingman Wind Energy Center	2016	206.55
Meridian Way	2008	201
Post Rock Wind	2012	201
Buckeye	2015	200.48
Caney River	2011	199.8
Waverly	2015	199.5
Prairie Queen	2019	199.3
Cedar Bluff	2015	198.7
Bloom	2017	178.2
Ironwood I	2012	167.9
Cimarron I	2012	165.6
Elk River	2005	150
Slate Creek	2015	150
Spearville	2006, 2010	148.5
Cimarron II	2012	131.1
Gray County	2001	112.2
Shooting Star	2012	104
Spearville 3	2012	100.8
Central Plains	2009	99
Ensign	2012	98.9
Marshall Wind Energy	2016	72
Flat Ridge I	2009	50
Flat Ridge I (Westar)	2009	50
Alexander	2015	48.3

Source: America Wind Energy Association Market Database

Figure 3.—Kansas' Wind Energy Generation from 2001 to 2018



Source: America Wind Energy Association Market Database

c. Economic Benefits of Wind Farms

Wind farms have numerous economic benefits including creation of job opportunities in the local area during both the short-term construction phase and the long-term operational phase. Short-term construction jobs include both workers at the wind farm site and jobs created along the supply chain. Long-term operational jobs include wind turbine technicians, supervisors, administrators, and supply chain jobs.

Wind developers typically lease the land for the turbines from local landowners. Only a small portion (1-2%) of the total project footprint is used for the turbines, access roads, feeder lines and substations. Lease payments made to landowners provide a steady source of long-term income to offset the uncertain income from fluctuating commodity prices. Landowners then have additional funds to make purchases in the local economy and elsewhere, and the remaining land is still available for agricultural use.

Wind projects enhance the equalized assessed value of property within the county. Typically, wind developers pay taxes based on that improved value unless preempted by law or mutual agreement. Wind farms strengthen the local tax base helping to improve county services, schools, police and fire departments and infrastructure improvements, such as public roads.

Numerous studies have quantified the economic benefits across the United States (see http://apps2.eere.energy.gov/wind/windexchange/economics_tools.asp). The National Renewable Energy Laboratory has produced economic impact reports for many states over the past nine years including the State of New Mexico (NREL, 2008e). (See also NREL 2008a, 2008b, 2008d, 2008f, 2008g, 2008h, 2008i, 2008j, 2008k, 2013, 2014). Utah State University published several reports on Utah's potential for wind energy development as well as the economic impacts of those developments (Parker, et. al. 2013a, 2013b, 2013c).

III. Project Description and Location

a. Jayhawk Wind Energy Project Description

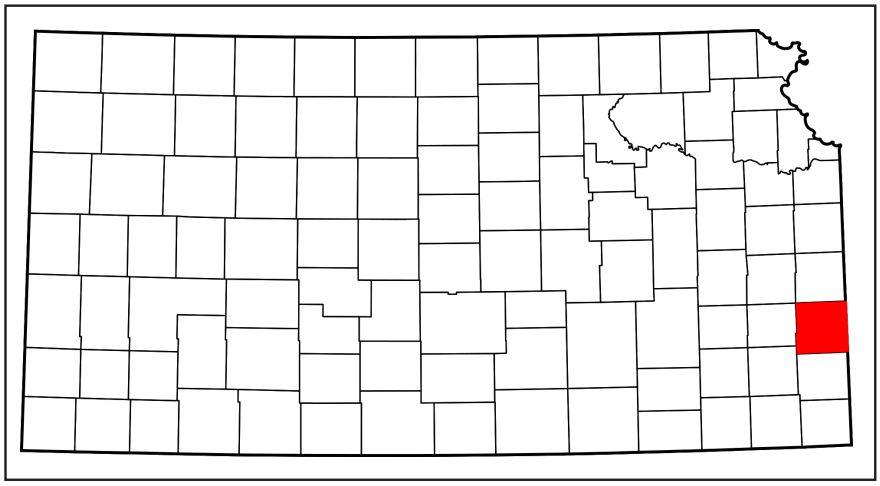
Jayhawk Wind, LLC ("Jayhawk Wind" or the "Project"), is an approximated 195 MW wind project located in Bourbon and Crawford County, Kansas, near the locality of Hepler. The project is expected to enter operation by Q4 2021. Project highlights include the following:

- The Jayhawk Wind project boasts an excellent wind resource for Southeast Kansas and will contribute substantially to the clean energy future of Kansas given the wind resources available at the site and the use of the latest wind turbine technology.
- In structuring this wind energy project, we have relied upon Apex's extensive experience developing and constructing similarly sized projects.
- The final model turbine has yet to be selected however, the project will utilize potentially up to 100 modern wind turbines.
- The turbine layout is targeted to encompass approximately 28,000 acres of land.
- The project has been engineered and planned to qualify for the federal product production tax credit ("PTC") under current law and IRS guidance.

b. Bourbon County, Kansas

Bourbon County is located in the Eastern part of Kansas (see Figure 4). It has a total area of 639 square miles and the U.S. Census estimates that the 2010 population was 15,173 with 7,202 housing units. The county has a population density of 24 (persons per square mile) compared to 34.9 for the State of Kansas. Median household income in the county was $38,045.

Figure 4.—Location of Bourbon County, Kansas



Source: https://en.wikipedia.org/wiki/Bourbon_County,_Kansas#/media/File:Map_of_Kansas_highlighting_Bourbon_County.svg, public domain

As shown in Table 2, the largest industry is "Manufacturing" followed by "Health Care," "Retail Trade" and "Accommodation." These data for Table 2 come from the U.S. Census' County Business Patterns. County Business Patterns, "covers most of the country's economic activity. The series excludes data on self-employed individuals, employees of private households, railroad employees, agricultural production employees, and most government employees." Thus, the employment in Agriculture listed in Table 2 only counts individuals employed by a company. To get a more accurate picture of the agriculture sector in the county, the 2012 Census of Agriculture lists 406 principal operators with farming as their primary occupation and another 497 principal operators having another occupation as their primary occupation. These principal operators would put the agriculture sector near the highest sector at around 20% of the county's private workforce.

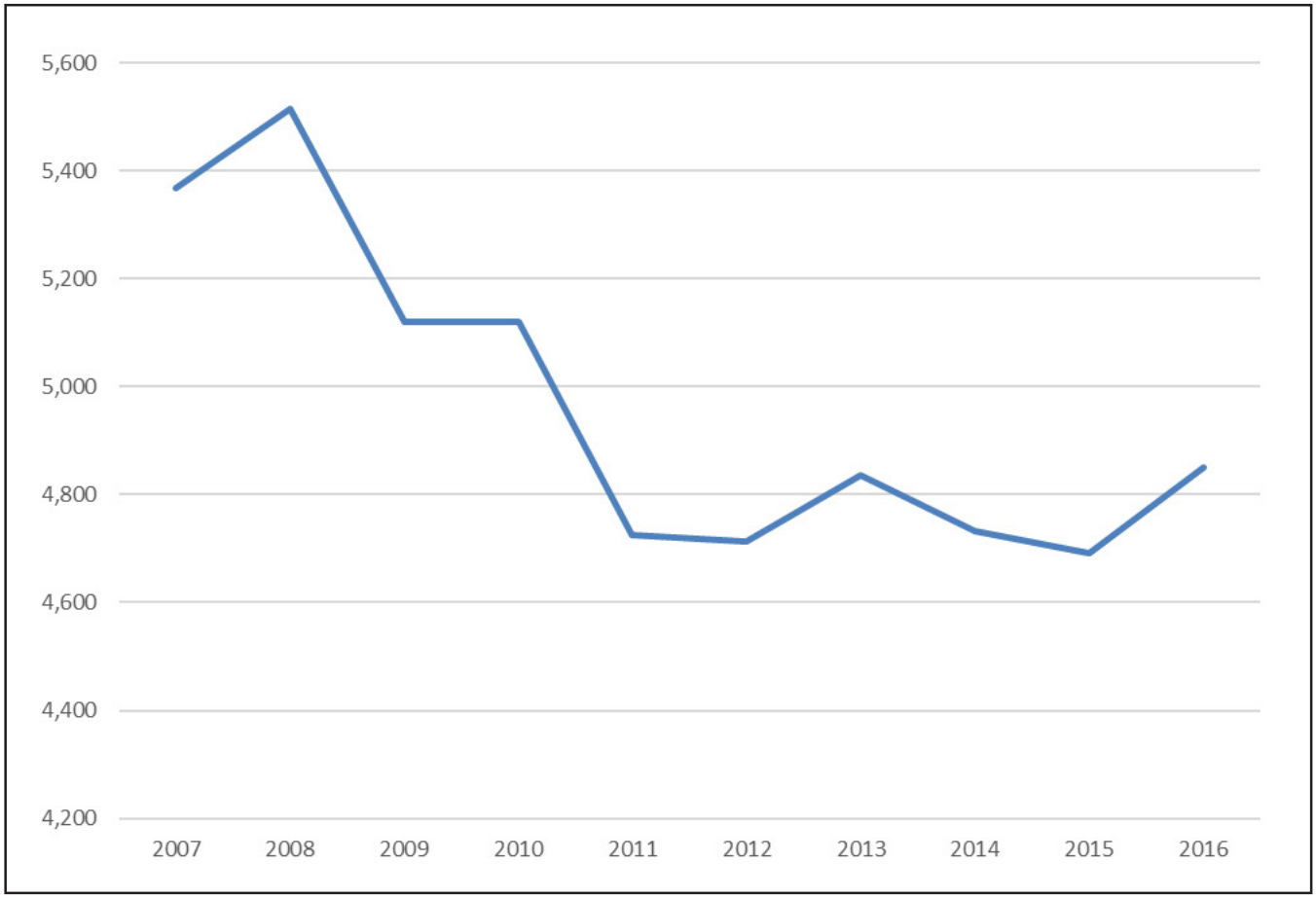
Table 2.—Employment by Industry in Bourbon County

Industry	Number	Percent
Manufacturing	1,423	29.3%
Health care and social assistance	974	20.1%
Retail trade	733	15.1%
Accommodation and food services	371	7.6%
Wholesale trade	319	6.6%
Finance and insurance	230	4.7%
Construction	210	4.3%
Other services (except public administration)	170	3.5%
Professional, scientific, and technical services	117	2.4%
Management of companies and enterprises	100-249	2.1%-5.1%
Transportation and warehousing	42	0.9%
Information	42	0.9%
Real estate and rental and leasing	27	0.6%
Mining, quarrying, and oil and gas extraction	25	0.5%
Educational services	20-99	0.4%-2.0%
Administrative and support and waste management and remediation services	18	0.4%
Utilities	0-19	0.0%-0.4%
Arts, entertainment, and recreation	0-19	0.0%-0.4%

Source: U. S. Census Bureau, 2016 County Business Patterns

Table 2 provides the most recent snapshot of non-governmental employment but does not examine the historical trends within the county. Figure 5 shows the total non-governmental employment from 2007 to 2016. Private employment in Bourbon County was at its highest at 5,516 in 2008 and its lowest at 4,692 in 2015.

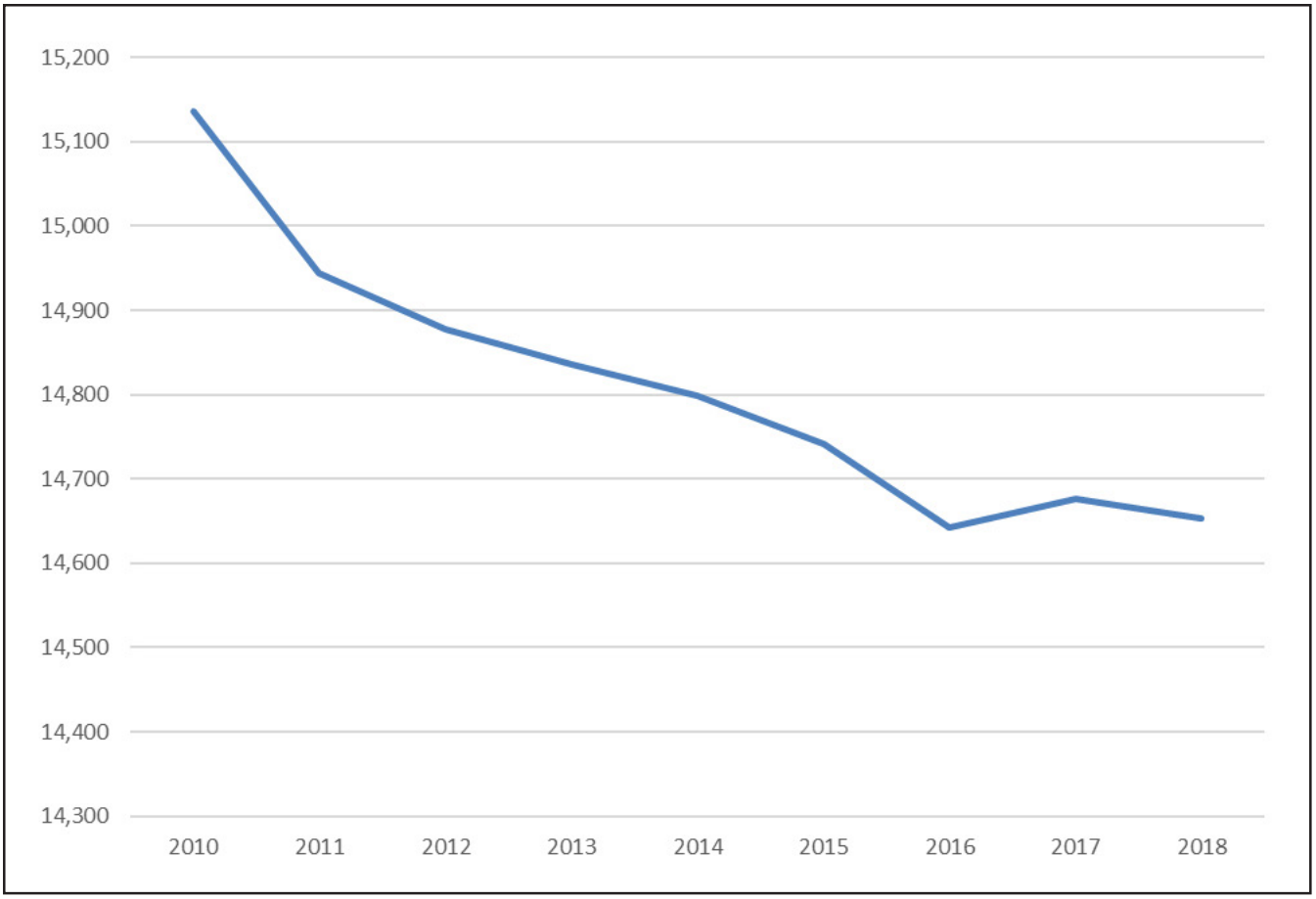
Figure 5.— Non-Governmental Employment in Bourbon County from 2007 to 2016



Source: 2007-2016 County Business Patterns, U.S. Census

Similar to the trends of private employment, the overall population trend in the county has been trending lower, as shown in Figure 6. Bourbon County population was 15,136 in 2010 and 14,653 in 2018, a loss of 483. The average annual population decrease over this time period was 60.

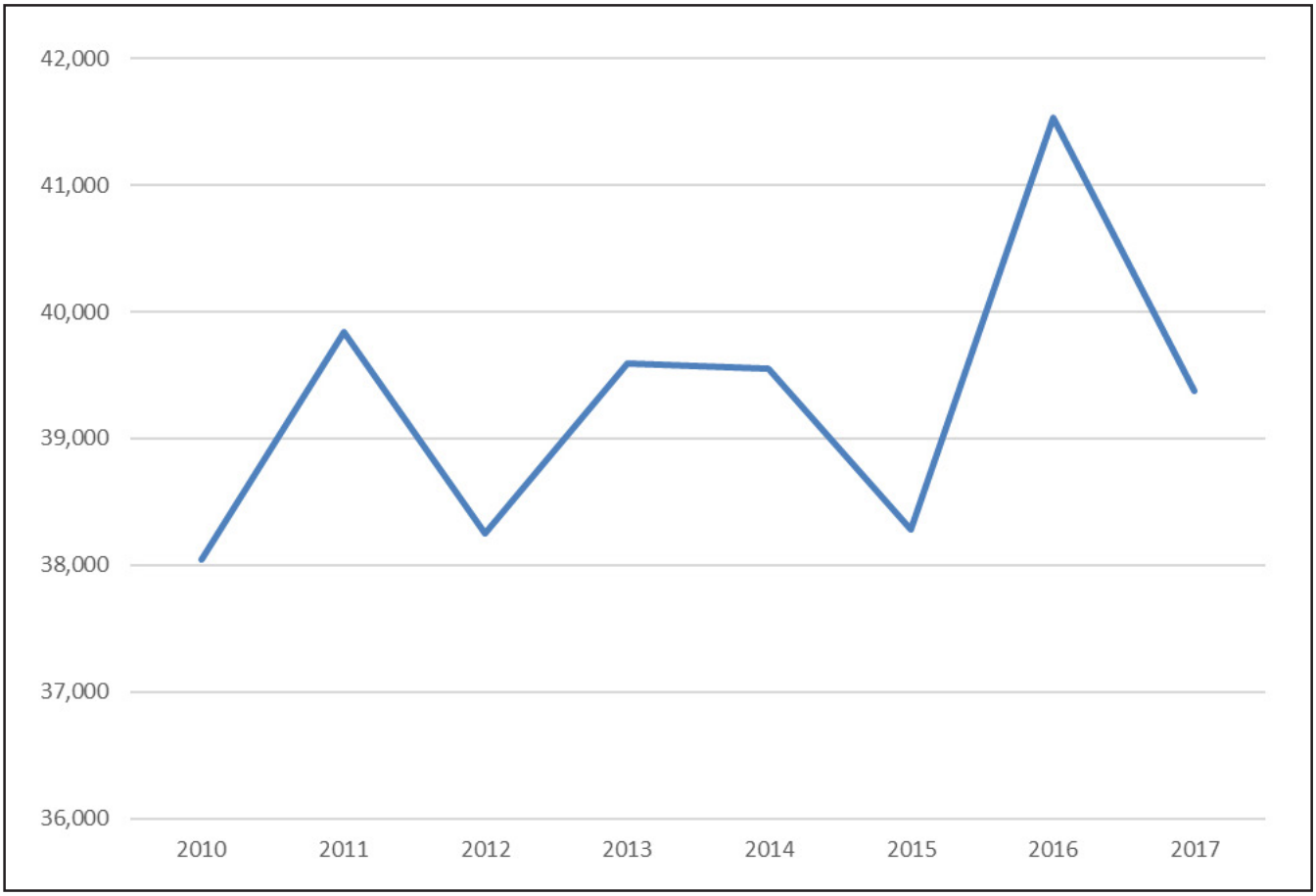
Figure 6.—Population in Bourbon County 2010-2018



Source: 2018 Population Estimates Program, Annual Population Estimates, U.S. Census

Unlike the population trends, the trends in household income have fluctuated greatly since 2010 in Bourbon County. Figure 7 shows the median household income in Bourbon County from 2010 to 2017. Household income was at its lowest at $38,045 in 2010 and its highest at $41,529 in 2016.

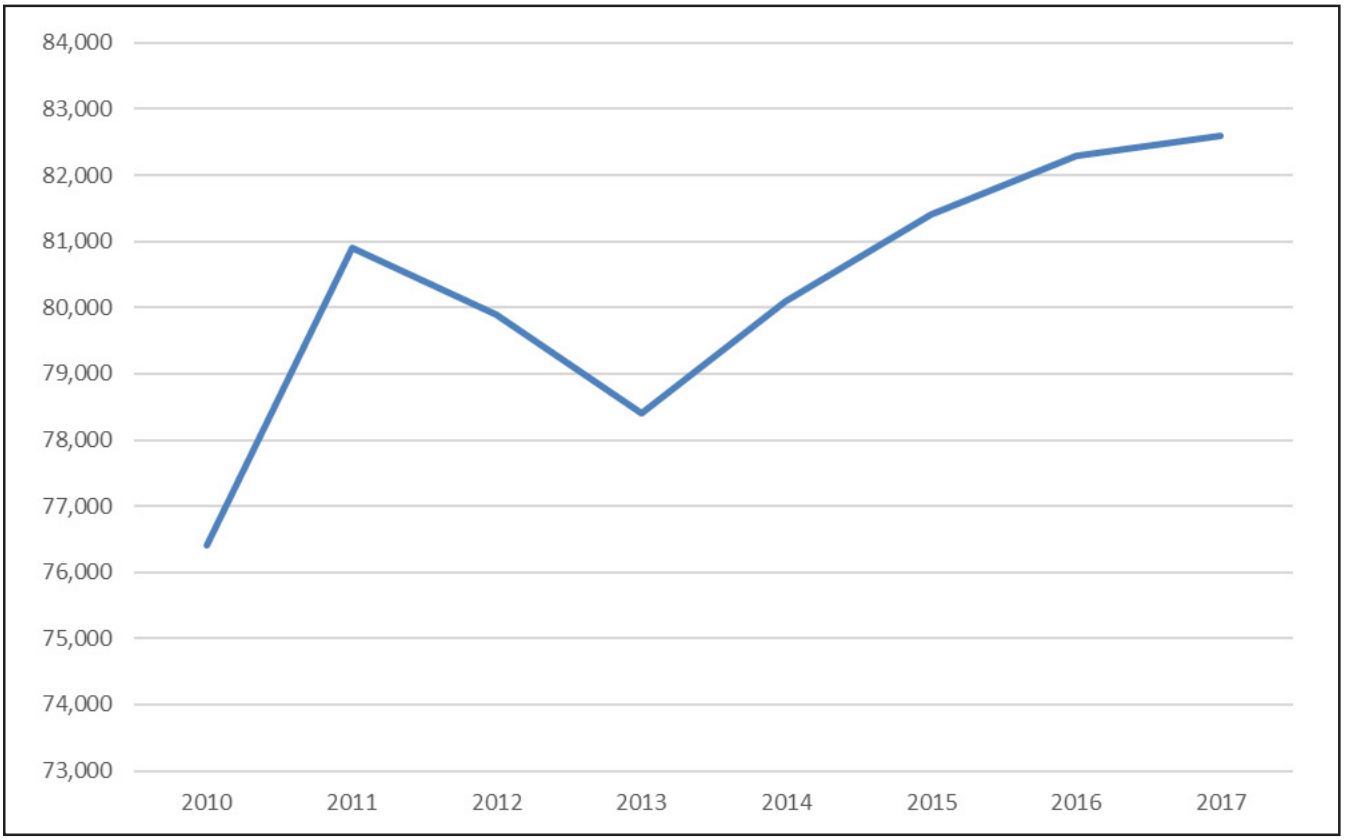
Figure 7.—Median Household Income in Bourbon County from 2010 to 2017



Source: American Community Survey 5-year Estimates 2010-2017, U.S. Census

Owner-occupied housing values have been trending higher in Bourbon County since 2010. The county hit its lowest at $76,400 in 2010 as shown in Figure 8. The highest that the median housing value reached was $82,600 in 2017.

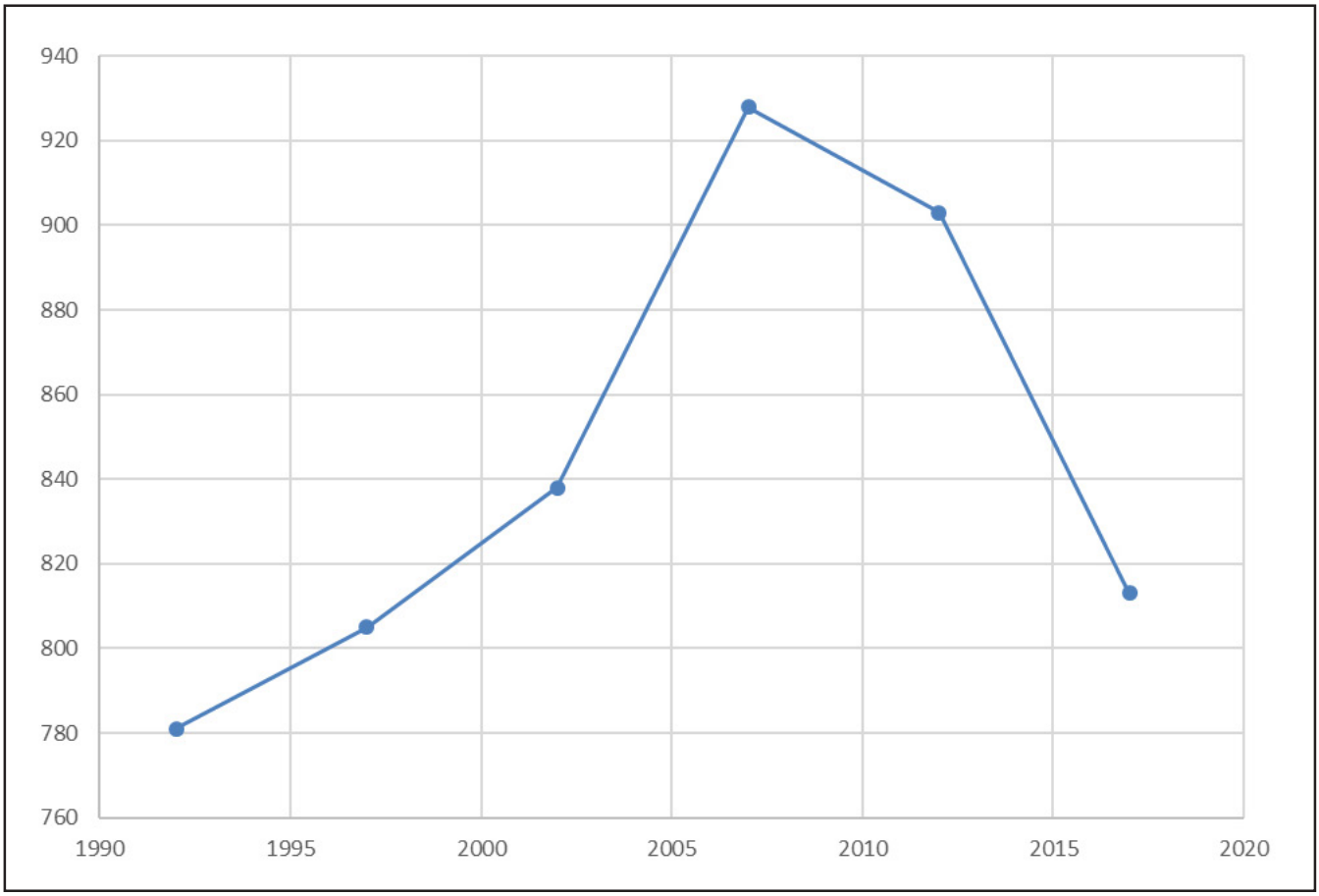
Figure 8.—Median Owner-Occupied Property Values in Bourbon County from 2010-2017



Source: American Community Survey 5-year Estimates 2010-2017, U.S. Census

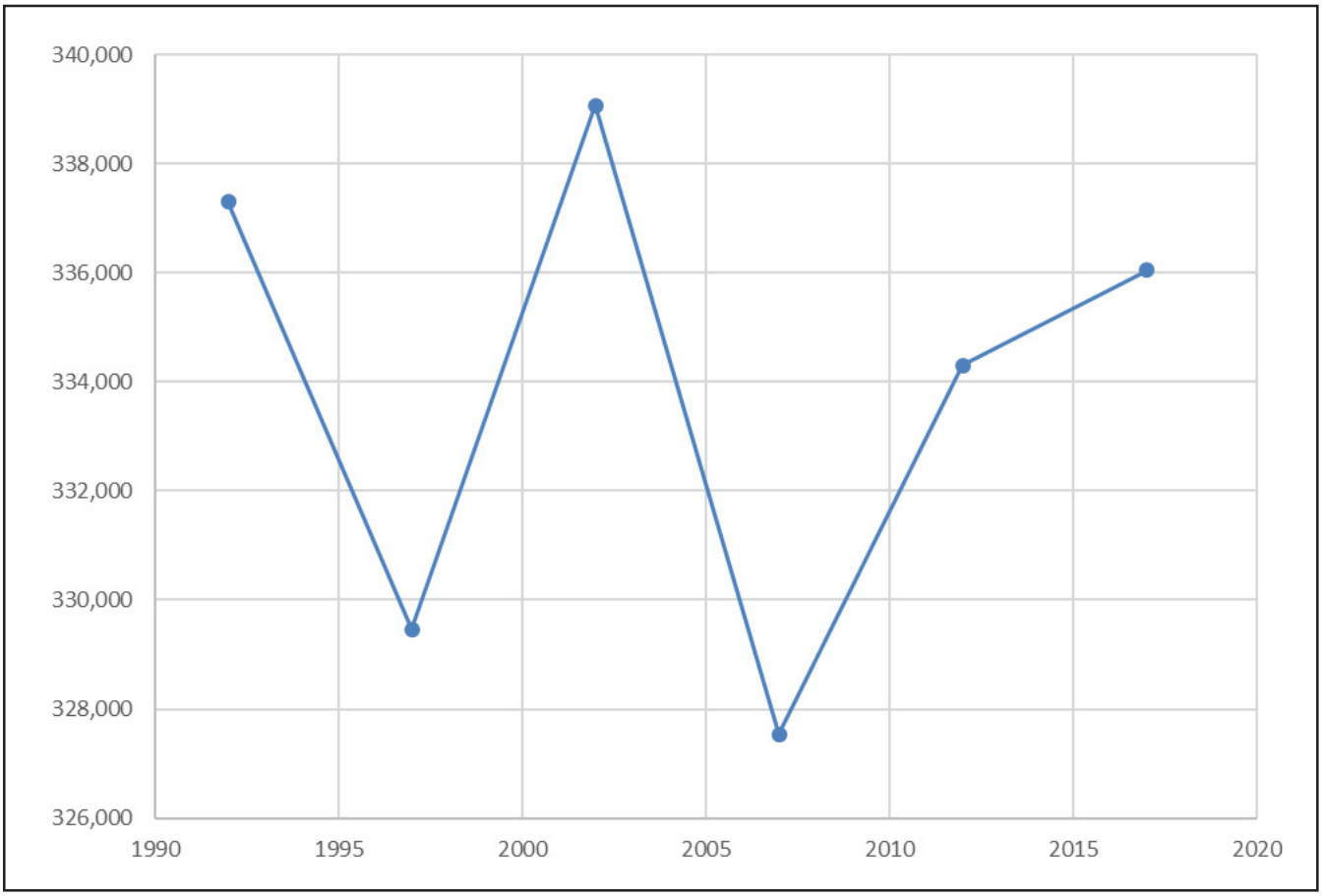
Farming has declined in Bourbon County. As shown in Figure 9, the number of farms increased from 781 in 1992 to 928 in 2007. Since 2007, the number of farms has been decreasing quickly. The amount of land in farms has not remained consistent either. The County hit a peak of 339,073 in 2002 then quickly hit its lowest of 327,534 in 2007 according to Figure 10. Since 2007, the amount of land in farms has been trending upward.

Figure 9.—Number of Farms in Bourbon County from 1992 to 2017



Source: Census of Agriculture, 1992-2017

Figure 10.—Land in Farms in Bourbon County from 1992 to 2017

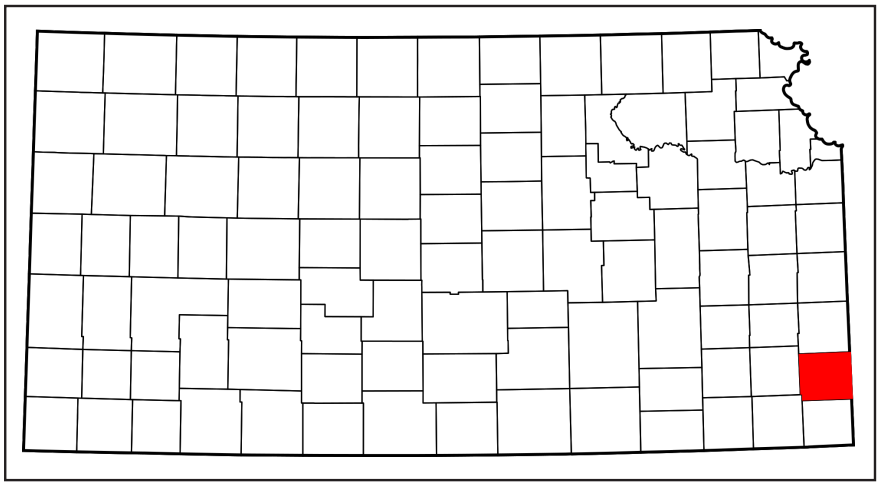


Source: Census of Agriculture, 1992-2017

c. Crawford County, Kansas

Crawford County is located in the Southeastern part of Kansas (see Figure 11). It has a total area of 595 square miles and the U.S. Census estimates that the 2010 population was 39,134 with 17,807 housing units. The county has a population density of 66 (persons per square mile) compared to 34.9 for the State of Kansas. Median household income in the county was $35,286.

Figure 11.—Location of Crawford County, Kansas



Source: https://en.wikipedia.org/wiki/Crawford_County,_Kansas#/media/File:Map_of_Kansas_highlighting_Crawford_County.svg, public domain

As shown in Table 3, the largest industry is "Manufacturing" followed by "Health Care," "Retail Trade" and "Accommodation." These data for Table 3 come from the U.S. Census' County Business Patterns. County Business Patterns, "covers most of the country's economic activity. The series excludes data on self-employed individuals, employees of private households, railroad employees, agricultural production employees, and most government employees." Thus, the employment in Agriculture listed in Table 3 only counts individuals employed by a company. To get a more accurate picture of the agriculture sector in the county, the 2012 Census of Agriculture lists 312 principal operators with farming as their primary occupation and another 534 principal operators having another occupation as their primary occupation. These principal operators would put the agriculture sector near the highest sector at around 6% of the county's private workforce.

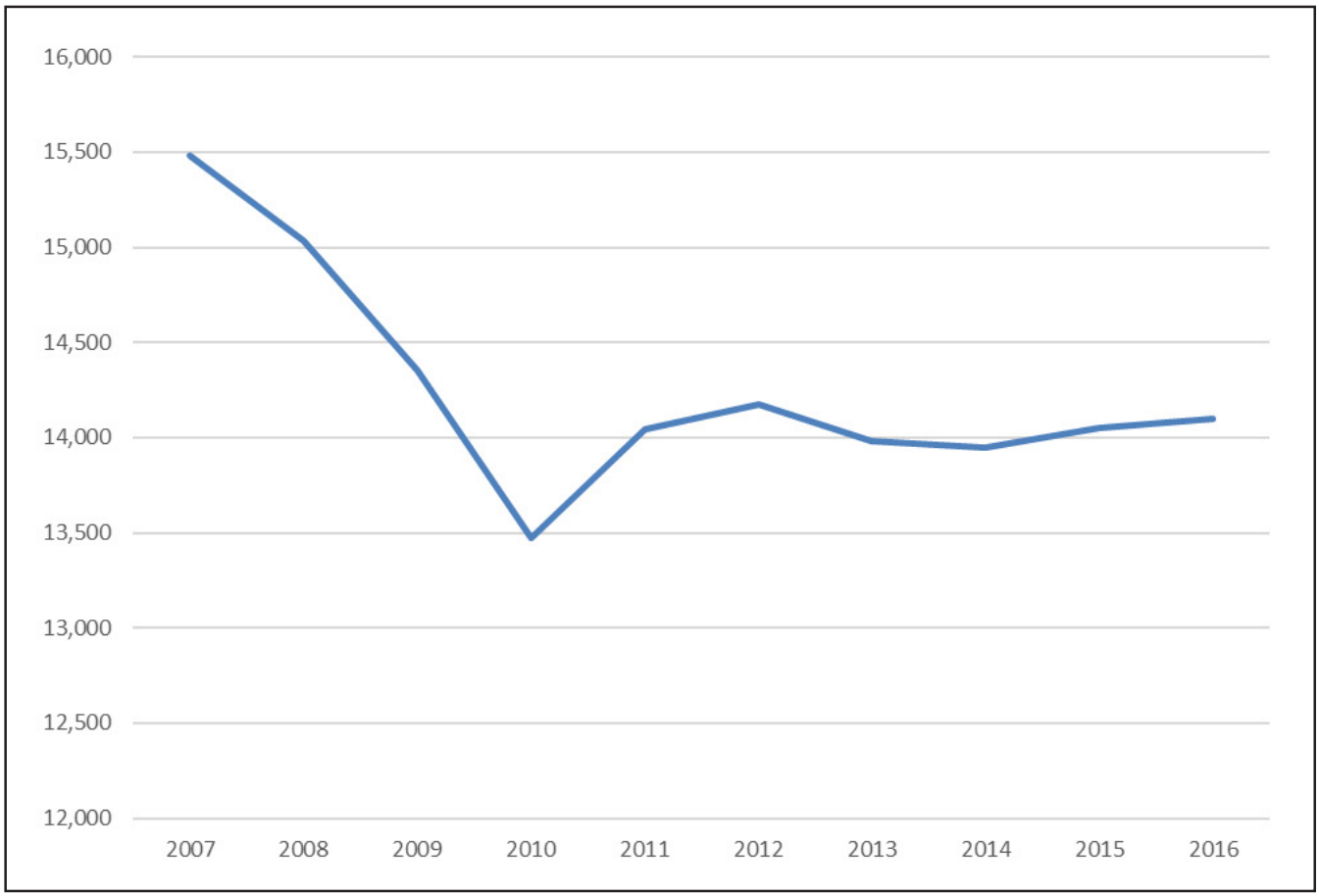
Table 3.—Employment by Industry in Crawford County

Industry	Number	Percent
Manufacturing	2,814	20.0%
Health care and social assistance	2,760	19.6%
Retail trade	1,986	14.1%
Accommodation and food services	1,532	10.9%
Wholesale trade	712	5.1%
Construction	705	5.0%
Educational services	500-999	3.5%-7.1%
Other services (except public administration)	476	3.4%
Information	445	3.2%
Administrative and support and waste management and remediation services	389	2.8%
Management of companies and enterprises	332	2.4%
Finance and insurance	317	2.2%
Professional, scientific, and technical services	292	2.1%
Transportation and warehousing	246	1.7%
Arts, entertainment, and recreation	155	1.1%
Real estate and rental and leasing	121	0.9%
Utilities	76	0.5%
Mining, quarrying, and oil and gas extraction	25	0.2%
Industries not classified	1	0.0%
Agriculture, forestry, fishing and hunting	0-19	0.0%-0.1%

Source: U. S. Census Bureau, 2016 County Business Patterns

Table 3 provides the most recent snapshot of non-governmental employment but does not examine the historical trends within the county. Figure 12 shows the total non-governmental employment from 2007 to 2016. Private employment in Crawford County was at its highest at 15,485 in 2007 and its lowest at 13,473 in 2010. After 2010, the number of non-governmental employees increased slightly and has remained steady since then.

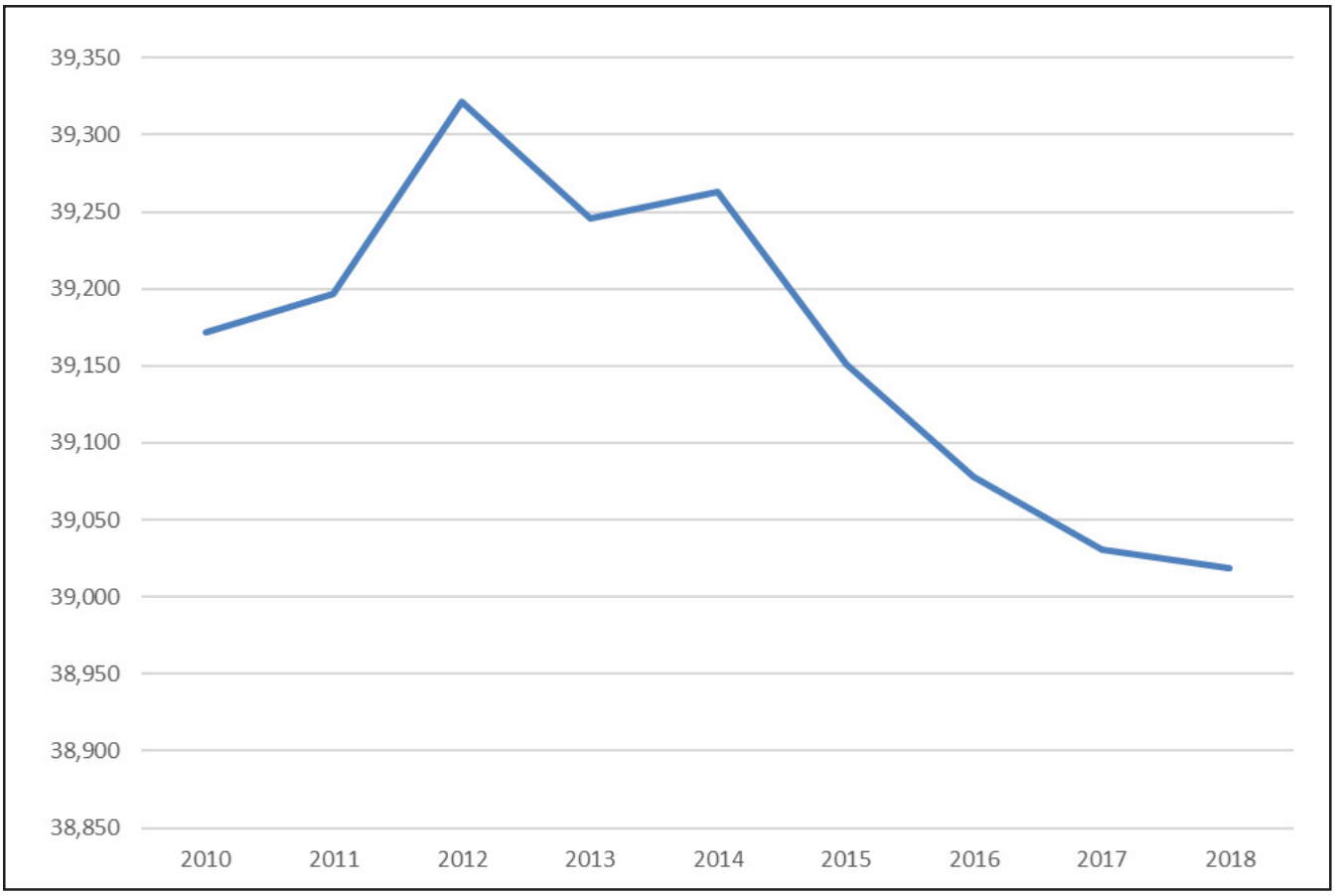
Figure 12.— Non-Governmental Employment in Crawford County from 2007 to 2016



Source: 2007-2016 County Business Patterns, U.S. Census

The overall population trend in the county has been trending lower, as shown in Figure 13. Crawford County population was 39,321 in 2012 and 39,019 in 2018, a loss of 302. The average annual population decrease over this time period was 50.

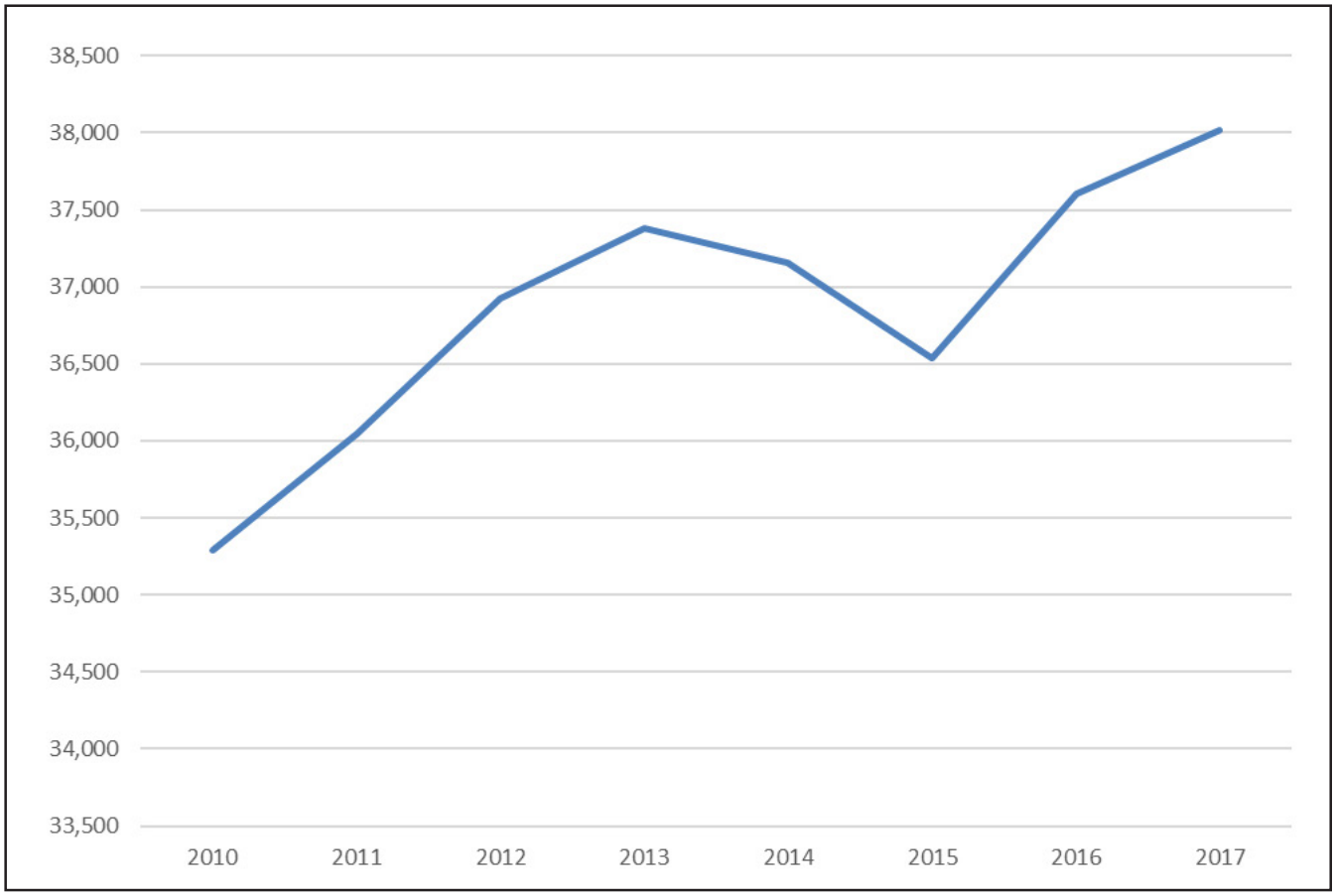
Figure 13.—Population in Crawford County 2010-2018



Source: 2018 Population Estimates Program, Annual Population Estimates, U.S. Census

Unlike the population trends, the trends in household income have trended upward since 2010 in Crawford County. Figure 14 shows the median household income in Crawford County from 2010 to 2017. Household income was at its lowest at $35,286 in 2010 and its highest at $38,017 in 2017.

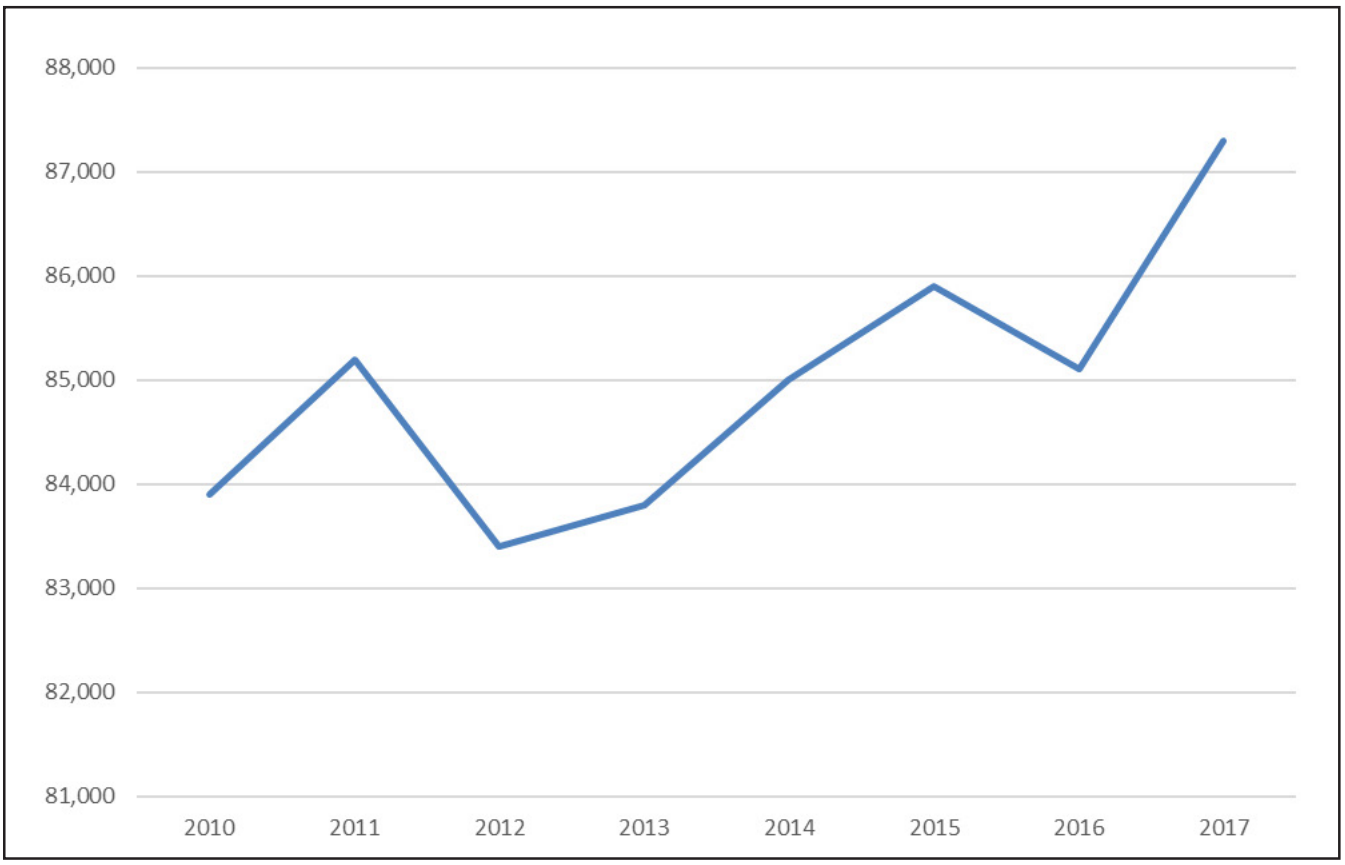
Figure 14.—Median Household Income in Crawford County from 2010 to 2017



Source: American Community Survey 5-year Estimates 2010-2017, U.S. Census

Owner-occupied housing values have been trending higher in Crawford County since 2010. The county hit its lowest at $83,400 in 2012 as shown in Figure 15. The highest that the median housing value reached was $87,300 in 2017.

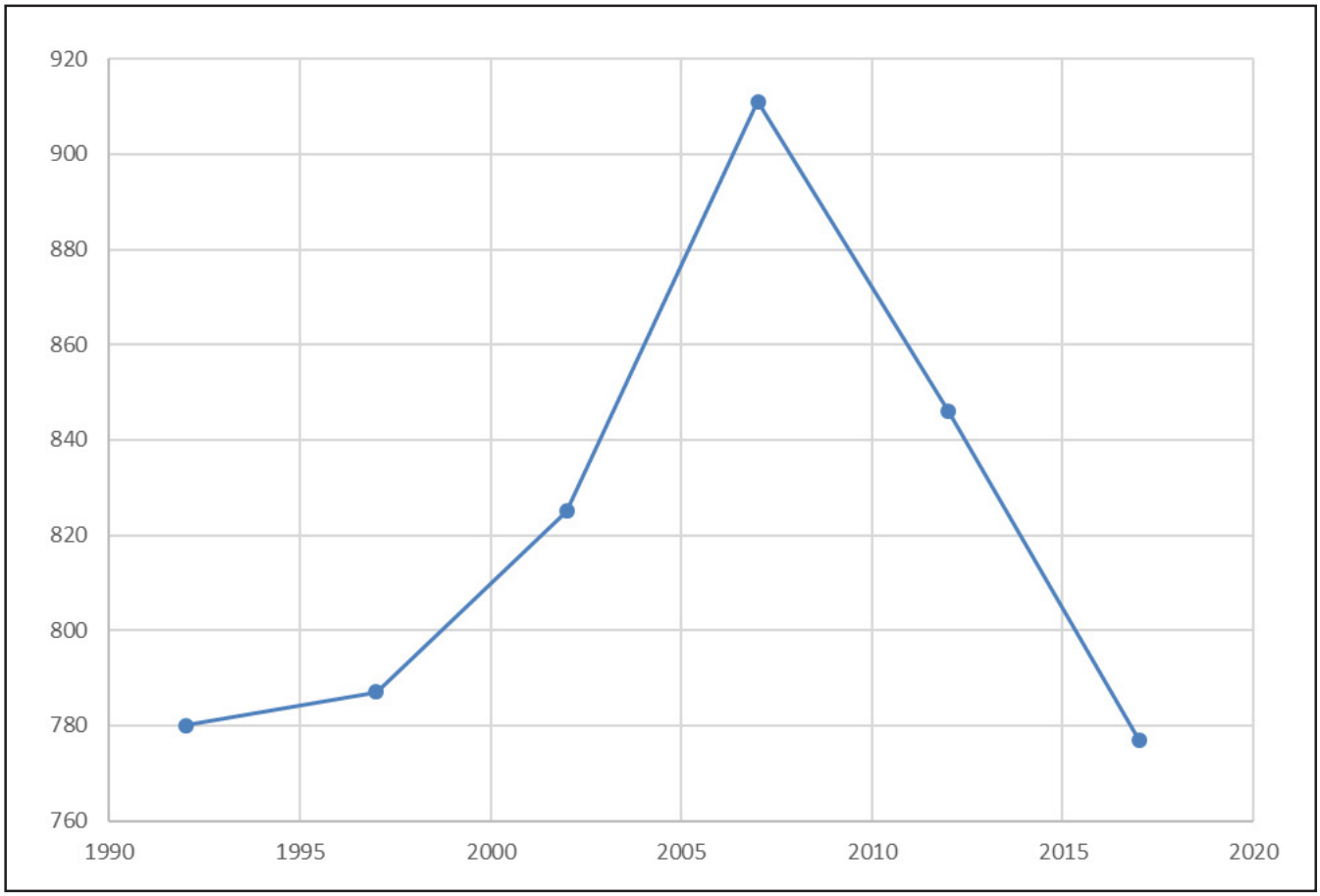
Figure 15.—Median Owner-Occupied Property Values in Crawford County from 2010-2017



Source: American Community Survey 5-year Estimates 2010-2017, U.S. Census

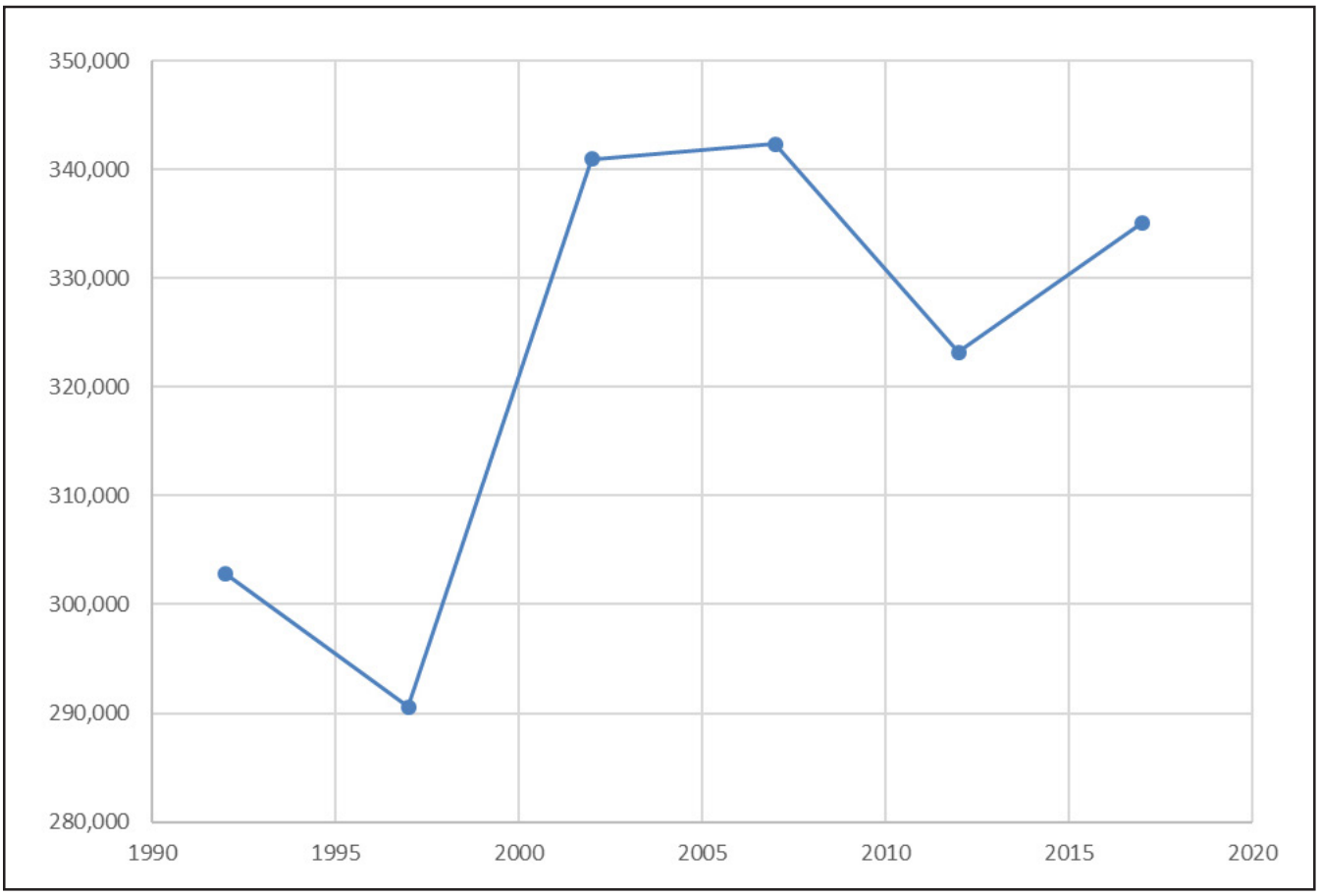
Farming has not been steady in Crawford County. As shown in Figure 16, the number of farms increased from 780 in 1992 to 911 in 2007. The number of farms in the county hit a low point of 777 in 2017. The amount of land in farms has fluctuated. The county was at its lowest at 290,557 in 1997 then quickly hit a peak of 342,349 in 2007 according to Figure 17.

Figure 16.—Number of Farms in Crawford County from 1992 to 2017



Source: Census of Agriculture, 1992-2017

Figure 17.—Land in Farms in Crawford County from 1992 to 2017



Source: Census of Agriculture, 1992-2017

IV. Methodology

The economic analysis of wind power development presented here utilizes the National Renewable Energy Laboratory's (NREL's) latest Jobs and Economic Development Impacts (JEDI) Wind Energy Model (W6-28-19). NREL is the U.S. Department of Energy's primary national laboratory for renewable energy and energy efficiency research and development. The JEDI Wind Energy Model is a model that measures the spending patterns and location-specific economic structures that reflect expenditures supporting varying levels of employment, income, and output. Essentially, JEDI is an input-output model, which takes into account the fact that the output of one industry can be used as an input for another. For example, when a wind farm developer purchases turbines to build a wind farm, those wind turbines are made of components such as fiberglass, aluminum, steel, copper, etcetera. Therefore, purchases of wind turbines impact the demand for these components as indirect impacts. In addition, when a wind farm developer purchases a wind turbine from a manufacturing facility, the manufacturer uses some of that money to pay employees, and then the employees spend that money to purchase goods and services within their community, which causes an induced impact. In essence, JEDI reveals how purchases of wind project materials not only benefit turbine manufacturers but also the local industries that supply the concrete, rebar, and other materials (Reategui et al., 2009). The JEDI model uses construction cost data, operating cost data, and data relating to the percentage of goods and services acquired in the state to calculate jobs, earnings, and economic activities that are associated with this information. The results are broken down into the construction period and the operation period of the wind project. Within each period, impacts are further divided into direct, turbine and supply chain (indirect), and induced impacts.

The JEDI Model was developed in 2002 to demonstrate the economic benefits associated with developing wind farms in the United States. The model was developed by Marshall Goldberg of MRG & Associates, under contract with the National Renewable Energy Laboratory. The JEDI model utilizes state specific industry multipliers obtained from IMPLAN (IMpact Analysis for PLANning). IMPLAN software and data are managed and updated by the Minnesota IMPLAN Group, Inc., using data collected at federal, state, and local levels. The JEDI model considers 14 aggregated industries that are impacted by the construction and operation of a wind farm: agriculture, construction, electrical equipment, fabricated metals, finance/insurance/real estate, government, machinery, mining, other manufacturing, other services, professional service, retail trade, transportation/ communication/public utilities, and wholesale trade (Reategui et al., 2009). This study does not analyze net jobs but rather the

gross jobs that the new wind farm development supports. A person who takes a job at the new wind farm could have been employed elsewhere beforehand, thus not every gross job results in a net additional job. A new jobs analysis would subtract the job losses from the job gains of the new project but it is highly speculative and very dependent on numerous interactions. Thus, it is more reliable to limit the analysis to the gross jobs created by the new wind development.

Direct impacts during the construction period refer to the changes that occur in the onsite construction industries in which the direct final demand (i.e., spending on construction labor and services) change is made. Final demands are goods and services purchased for their ultimate use by the end user. Onsite construction-related services include engineering, design, transport, legal, finance and other professional services. **Direct impacts during operating years** refer to the final demand changes that occur in the onsite spending for wind farm workers. Direct jobs consist primarily of onsite construction and other project labor.

The initial spending on the construction and operation of the wind farm creates a second layer of impacts, referred to as "turbine and supply chain impacts" or "indirect impacts." **Indirect impacts during the construction period** consist of the changes in inter-industry purchases resulting from the direct final demand changes, and include construction spending on materials and wind farm equipment and other purchases of goods and offsite services. Essentially, these impacts result from "spending related to project development and on-site labor such as equipment costs (turbines, blades, towers, transportation), manufacturing of components and supply chain inputs, materials (transformer, electrical, HV line extension, HV sub interconnection materials), and the supply chain of inputs required to produce these materials" (JEDI Support Team, 2009, 2). Concrete that is used in turbine foundations increases the demand for gravel, sand, and cement. As a result of the expenditure for concrete there is increased economic activity at quarries and cement factories and these changes are indirect impacts. As a further example, the accountant for the construction firm and the banker who finances the contractor are both considered indirect impacts. All supply chain component impacts/manufacturing-related activities are included under indirect impacts; therefore, the late stage turbine assembly process, which includes gearbox assembly, blade production, and steel rolling are all included under the construction period indirect impacts category.

Indirect impacts during operating years refer to the changes in inter-industry purchases resulting from the direct final demand changes. Essentially, these impacts result from "expenditures related to on-site labor, materials, and services needed to operate the wind

farms (e.g., vehicles, site maintenance, fees, permits, licenses, utilities, insurance, fuel, tools and supplies, replacement parts/ equipment); the supply chain of inputs required to produce these goods and services; and project revenues that flow to the local economy in the form of land lease revenue, property tax revenue, and revenue to equity investors" (JEDI Support Team, 2009, 3). All land lease payments and property taxes show up in the operating-years portion of the results because these payments do not support the day-to-day operations and maintenance of the wind farm but instead are more of a latent effect that results from the wind farm being present (Eric Lantz, February 25, 2009, email message to Jennifer Hinman).

Induced impacts during construction refer to the changes that occur in household spending as household income increases or decreases due to the direct and indirect effects of final demand changes. Local spending by employees working directly or indirectly on the wind farm project who receive their paychecks and then spend money in the community is included. Additional local jobs and economic activity are supported by these purchases of goods and services. Thus, for example, the increased economic activity at quarries and cement factories results in increased revenues for the affected firms and raises individual incomes. Individuals employed by these companies then spend more money in the local economy, e.g., as workers receive income, they may decide to purchase more expensive clothes, or higher quality food along with other goods and services from local businesses. This increased economic activity may result from "construction workers who spend a portion of their income on lodging, groceries, clothing, medicine, a local movie" theater, restaurant, or bowling alley; or a "steel mill worker who provides the inputs for turbine production and spends his money in a similar fashion, thus supporting jobs and economic activities in different sectors of the economy" (JEDI Support Team, 2009, 2). **Induced impacts during operating years** refer to the changes that occur in household spending as household income increases or decreases as a result of the direct and indirect effects from final demand changes. Some examples include a "wind farm technician who spends income from working at the wind farm on buying a car, a house, groceries, gasoline," or movie tickets; or a "worker at a hardware store who provides spare parts and materials needed at the wind farm and who spends money in a similar fashion, thus supporting jobs and economic activities in different sectors of the economy" (JEDI Support Team, 2009, 3).

This methodology has been validated by a paper in the peer-reviewed economics literature. In the article, "Ex Post Analysis of Economics Impacts from Wind Power Development in U.S. Counties," the authors conduct an ex post econometric analysis of the county-level economic development impacts of wind power installations from 2000 through 2008. They find an aggregate increase in county-level personal income and employment of approximately $11,000 and 0.5 jobs per megawatt of wind power capacity which is consistent with the JEDI results at the county level. (Brown, 2012)

It is important to note that there are factors that this analysis of the impacts of construction and operation of the Jayhawk Wind Farm does not include, such as the net effects of increased demand for the construction and operations of the wind farm on employment, income, and output in the affected regions. Additionally, the methodology in this section is highly dependent on the cost data and the percentage of equipment, materials and labor obtained locally. The cost data is based on preliminary estimates; high level figures were allocated based on industry standards. Specific contractors have different abilities to procure goods and labor locally and since a general contractor has not been selected for the project, the local material and labor could vary from these estimates. The author of this report has reviewed and evaluated all of the cost and local percentages and they are quite conservative estimates based on his modeling experience with other wind farms around the country.

V. Results

The results were derived from estimates supplied by Apex Clean Energy. In addition, Apex Clean Energy estimated the percentages of project materials and labor that will be coming from within Bourbon and Crawford Counties and the State of Kansas.

Three separate JEDI models were run to show the economic impact of the Jayhawk Wind Energy Project. The first JEDI model used the 2017 Bourbon County multipliers from IMPLAN and the project costs that will be spent in Bourbon County. The second JEDI model used the 2017 Crawford County multipliers from IMPLAN and the project costs that will be spent in Crawford County. The third JEDI model used the 2017 IMPLAN state multipliers for the State of Kansas and the same overall project costs. Because three separate models were run, the results for Bourbon and Crawford Counties are not simply a subset of the results for the State of Kansas. Even though the modeling was done separately for Bourbon and Crawford Counties, the results are totaled for both counties since it is hard to reliably estimate exactly how much will be spent in each county and exactly where the jobs will be located.

The output from these models is shown in Tables 4-6. Table 4 lists the total employment impact from the Jayhawk Wind Energy Project for the county level (Bourbon and Crawford Counties combined) and the State of Kansas. Table 5 shows the impact on total earnings. Table 6 contains the impact on total output. The results are divided into one-time construction impacts and ongoing annually recurring operations impacts that are expected to last for the full life of the project which is estimated to be 25 years. Project Development and Onsite Labor Impacts correspond to direct impacts as defined in the methodology section. Turbine and Supply Chain Impacts are the indirect impacts during construction and Local Revenue and Supply Chain Impacts are indirect impacts during operations.

Table 4.—Total Employment Impact from the Jayhawk Wind Energy Project

	Bourbon and Crawford Counties	State of Kansas
Construction		
Project Development and Onsite Labor Impacts	115	190
Turbine and Supply Chain Impacts	164	321
Induced Impacts	39	123
Local Jobs During Construction	318	634
Operations		
Onsite Labor Impacts	7	9
Local Revenue and Supply Chain Impacts	18	24
Induced Impacts	5	9
Local Long-Term Jobs	30	42

The results from the JEDI model show significant employment impacts from the Jayhawk Wind Energy Project. Employment impacts can be broken down into several different components. Direct jobs created during the construction phase typically last anywhere from 6 months to over a year depending on the size of the project; however, the direct job numbers present in Table 4 from the JEDI model are based on a full time equivalent (FTE) basis for a year. In other words, 1 job = 1 FTE = 2,080 hours worked in a year. A part time or temporary job would constitute only a fraction of a job according to the JEDI model and any lasts longer than a year is counted as an additional job. For example, the JEDI model results show 115 jobs during construction at the county level, though the construction of the wind farms could actually involve hiring closer to 77 workers for 18 months.

Direct jobs created during the operational phase last the life of the wind farm, typically 20-30 years. Direct construction jobs and operations and maintenance jobs both require highly-skilled workers in the fields of construction, management, and engineering. These well-paid professionals boost economic development in rural communities where new employment opportunities are welcome due to economic downturns (Reategui and Tegen, 2008).

As shown in Table 4, local jobs created or retained during construction total 318 for Bourbon and Crawford Counties and 634 for the State of Kansas. New local long-term jobs created from the Jayhawk Wind Energy Project total 30 at the county level and 42 for the State of Kansas.

It is important to not just look at the number of jobs but also the earnings that they produce. The earnings impacts from the Jayhawk Wind Energy Project are shown in Table 5 and are categorized by construction impacts and operations impacts. The local earnings during construction total almost $15.8 million at for Bourbon and Crawford Counties combined and over $36.7 million for the State of Kansas. The local long-term earnings total over $1.2 million at the county level and over $2.3 million for the State of Kansas.

Table 5.— Total Earnings Impact from the Jayhawk Wind Energy Project

	Bourbon and Crawford Counties	State of Kansas
Construction		
Project Development and Onsite Earnings Impacts	$7,630,831	$13,036,241
Turbine and Supply Chain Impacts	$6,647,251	$17,991,804
Induced Impacts	$1,498,796	$5,748,627
Local Earnings During Construction	$15,776,878	$36,776,672
Operations		
Onsite Labor Impacts	$349,508	$465,991
Local Revenue and Supply Chain Impacts	$725,248	$1,350,111
Induced Impacts	$177,303	$434,210
Local Long-Term Earnings	$1,252,059	$2,250,312

Output refers to economic activity or the value of production in the state or local economy. According to Table 6, the local output during construction totals over $36.2 million for Bourbon and Crawford Counties combined and over $98.2 million for the State of Kansas. The local long-term output totals over $4.4 million at the county level and over $7.6 million for the State of Kansas.

Table 6.—Total Output Impact from the Jayhawk Wind Energy Project

	Bourbon and Crawford Counties	State of Kansas
Construction		
Project Development and Onsite Jobs Impacts on Output	$8,269,217	$14,108,253
Turbine and Supply Chain Impacts	$23,270,356	$66,321,427
Induced Impacts	$4,710,731	$17,824,672
Local Output During Construction	$36,250,304	$98,254,352
Operations (Annual)		
Onsite Labor Impacts	$349,508	$465,991
Local Revenue and Supply Chain Impacts	$3,530,871	$5,728,108
Induced Impacts	$558,002	$1,346,495
Local Long-Term Output	$4,438,381	$7,540,594

VI. Property Taxes

Kansas recently changed the way that it taxes wind energy projects. Prior to 2016, renewable energy generating facilities such as wind farms were exempt from property taxes according to K.S.A. 79-201. Since 2016, renewable energy generators are exempt from property taxes for only twelve years if owned by an independent power producer and ten years if constructed by a regulated public utility per K.S.A. 79-259. After this exemption period, the wind energy project will pay property taxes to all the taxing jurisdictions. Typically, wind developers in Kansas energy into a contribution agreement to voluntarily support the county during the 10 or 12 year exemption period. Thus, wind power projects increase the property tax base of a county, creating a new revenue source for education and other local government services, such as road maintenance, libraries, and cemeteries.

After the exemption period is complete, the wind energy project will be appraised for tax purposes by the county appraiser. The county appraiser should use the "retail cost when new" less depreciation in order to appraise the project. Since the accounting depreciation is over a maximum of seven years for an asset whose life is over seven years, the wind farm could be fully depreciated by the time of the expiration of the exemption. However, the appraised value cannot be less than 20% of the "retail cost when new" if is in operation. In addition, the appraised value cannot be less than 20% of the retail cost when new by law. Thus, we assume the county appraiser will value the property at 20% of the "retail cost when new."

Tables 7-11 detail the tax implications of the Jayhawk Wind Energy Project. There are several important assumptions built into the analysis in these tables:

- The analysis assumes that the Apex enters into contribution agreements with Bourbon County and Crawford County to pay a total of $2,000/MW/year, divided between the counties, for the first ten years of the Project's life while the property tax exemption is in place.

- The tables assume that the Project is appraised at 20% of the "retail cost when new" and that any future inflation would be less than any eligible depreciation. Thus, the appraised value stays constant after the exemption expires. Assessment may be different if the Project is owned by a regulated utility.

- All tax rates are assumed to stay constant at their 2018 rates. For example, the Bourbon County Tax rate is assumed to stay constant at 66.572 and Crawford County Tax rate is assumed to stay constant at 50.228 through 2044.

- The analysis assumes that the Project is placed in service on or before January 1, 2022 but that the first full tax year is 2022.

- It assumes that the Project is decommissioned in 25 years and pays no more taxes after that date. The Project could last longer than 25 years so 25 years is a conservative assumption.

- Since the exact placement of the turbines has not been finalized, the actual taxes paid could vary depending on the relative tax rates between districts. This analysis assumes that the project comprises 64 turbines, of which 44 are placed in Bourbon County and 20 are placed in Crawford County. This is a preliminary layout and could change based on the final selected turbine model and other factors.

- This analysis assumes that the contribution revenue generated from the Project will be divided between Bourbon and Crawford Counties in a manner that is proportional to the number of megawatts located in each county. If it is decided that contribution revenue should be divided in a different manner, these numbers will need to be updated.

- No comprehensive tax payment was calculated for legal or taxing purposes, and these calculations are only to be used to illustrate the economic impact of the Project.

According to Table 7, the contribution revenue paid by the Project to Bourbon County would be $266,640 ($2,000/MW times 137.21 MW capacity contained in the county) for the first 10 years of the Project's life. After that, the Project is taxed through ordinary property tax yielding $586,380 to Bourbon County for the next 15 years. The total revenue to the Bourbon County from the Project would be over $11.4 million with an average annual amount paid of $458,484 over 25 years. Similarly, the contribution revenue paid by the Project to Crawford County would be $121,200 ($2,000/MW times 56.72 MW capacity contained in the county) for the first 10 years of the Project's life. For the following 15 years, Crawford County would receive $182,835 annually through ordinary property taxes. In total, Crawford County would receive over $3.9 million.

Table 7.—Bourbon and Crawford County Tax and Contribution Revenue from Jayhawk Wind Project

Tax Year	Bourbon County	Crawford County
2022	$266,640	$121,200
2023	$266,640	$121,200
2024	$266,640	$121,200
2025	$266,640	$121,200
2026	$266,640	$121,200
2027	$266,640	$121,200
2028	$266,640	$121,200
2029	$266,640	$121,200
2030	$266,640	$121,200
2031	$266,640	$121,200
2032	$586,380	$182,835
2033	$586,380	$182,835
2034	$586,380	$182,835
2035	$586,380	$182,835
2036	$586,380	$182,835
2037	$586,380	$182,835
2038	$586,380	$182,835
2039	$586,380	$182,835
2040	$586,380	$182,835
2041	$586,380	$182,835
2042	$586,380	$182,835
2043	$586,380	$182,835
2044	$586,380	$182,835
2045	$586,380	$182,835
2046	$586,380	$182,835
25 YEAR TOTAL	$11,462,102	$3,954,521
25 YEAR AVG ANNUAL	$458,484	$158,181

Table 7 only illustrates the taxes paid to the counties. Table 8 shows an estimate of the likely taxes paid to the school districts in the project area – USD 235, USD 248 and USD 101. The exact placement of the turbines has not been finalized and the taxes paid could be different if all of the turbines are not located within these educational taxing districts. Table 8 assumes that 40 turbines are placed in USD 235 School District, 21 are placed in USD 248 School District and 3 are place is USD 101 School District.

There is no revenue until 2032 due to the property tax exemption. Starting in 2032, USD 235 will receive over $161 thousand annually for the general fund, over $225 thousand for the "other" Fund which totals to over $2.4 million and over $3.3 million respectively. The USD 248 will receive over $76 thousand annually for the General Fund, over $123 thousand annually for the "other" Fund and almost $4 thousand annually for the Recreational Fund. The USD 101 will receive over $38 thousand annually. Over the expected 25 year life of the Project, the USD 235 General Fund will receive over $2.4 million and the USD 235 "Other" Fund will receive over $3.3 million. Likewise, the USD 248 General Fund should receive over $1.1 million, the USD 248 "Other" Fund over $1.8 million and the USD 248 Recreational Fund over $57 thousand over the life of the Project. Finally, USD 101 will receive $572 thousand in total.

Table 8.—School District Tax Revenue from Jayhawk Wind Project

Tax Year	USD 235 General Fund	USD 235 "Other" Fund	USD 248 General Fund	USD 248 "Other" Fund	USD 248 Recreation/ Rec Comm	USD 101 Total
2022	$0	$0	$0	$0	$0	$0
2023	$0	$0	$0	$0	$0	$0
2024	$0	$0	$0	$0	$0	$0
2025	$0	$0	$0	$0	$0	$0
2026	$0	$0	$0	$0	$0	$0
2027	$0	$0	$0	$0	$0	$0
2028	$0	$0	$0	$0	$0	$0
2029	$0	$0	$0	$0	$0	$0
2030	$0	$0	$0	$0	$0	$0
2031	$0	$0	$0	$0	$0	$0
2032	$161,604	$225,599	$76,442	$123,236	$3,822	$38,174
2033	$161,604	$225,599	$76,442	$123,236	$3,822	$38,174
2034	$161,604	$225,599	$76,442	$123,236	$3,822	$38,174
2035	$161,604	$225,599	$76,442	$123,236	$3,822	$38,174
2036	$161,604	$225,599	$76,442	$123,236	$3,822	$38,174
2037	$161,604	$225,599	$76,442	$123,236	$3,822	$38,174
2038	$161,604	$225,599	$76,442	$123,236	$3,822	$38,174
2039	$161,604	$225,599	$76,442	$123,236	$3,822	$38,174
2040	$161,604	$225,599	$76,442	$123,236	$3,822	$38,174
2041	$161,604	$225,599	$76,442	$123,236	$3,822	$38,174
2042	$161,604	$225,599	$76,442	$123,236	$3,822	$38,174
2043	$161,604	$225,599	$76,442	$123,236	$3,822	$38,174
2044	$161,604	$225,599	$76,442	$123,236	$3,822	$38,174
2045	$161,604	$225,599	$76,442	$123,236	$3,822	$38,174
2046	$161,604	$225,599	$76,442	$123,236	$3,822	$38,174
25 YEAR TOTAL	$2,424,057	$3,383,984	$1,146,630	$1,848,540	$57,332	$572,611
25 YEAR AVG ANNUAL	$96,962	$135,359	$45,865	$73,942	$2,293	$22,904

Table 9 shows an estimate of the likely taxes paid to the State of Kansas, Pawnee Township in Bourbon County, Walnut Township in Crawford County, and Sherman Township in Crawford County. The results assume that all of the turbines are subject to the State of Kansas tax, 10 are in Pawnee Township, 18 are in Walnut Township (34 turbines are also placed in Walnut Township of Bourbon County and not subject to a township tax there) and 2 are in Sherman Township. Beginning in 2032 due to the property tax exemption, the State of Kansas will receive over $18 thousand annually, Pawnee Township will receive $2,364 annually, Walnut Township will receive $7,977, and Sherman Township will receive $2,815. Over 25 years, the State of Kansas will receive over $280 thousand; Pawnee Township, over $35 thousand; Walnut Township over $119 thousand; and Sherman Township, over $42 thousand.

Table 9.—Tax Revenue from Jayhawk Wind Project for State, City, and Township Taxing Bodies

Tax Year	State of Kansas	Pawnee Township	Walnut Township	Sherman Township
2022	$0	$0	$0	$0
2023	$0	$0	$0	$0
2024	$0	$0	$0	$0
2025	$0	$0	$0	$0
2026	$0	$0	$0	$0
2027	$0	$0	$0	$0
2028	$0	$0	$0	$0
2029	$0	$0	$0	$0
2030	$0	$0	$0	$0
2031	$0	$0	$0	$0
2032	$18,672	$2,364	$7,977	$2,815
2033	$18,672	$2,364	$7,977	$2,815
2034	$18,672	$2,364	$7,977	$2,815
2035	$18,672	$2,364	$7,977	$2,815
2036	$18,672	$2,364	$7,977	$2,815
2037	$18,672	$2,364	$7,977	$2,815
2038	$18,672	$2,364	$7,977	$2,815
2039	$18,672	$2,364	$7,977	$2,815
2040	$18,672	$2,364	$7,977	$2,815
2041	$18,672	$2,364	$7,977	$2,815
2042	$18,672	$2,364	$7,977	$2,815
2043	$18,672	$2,364	$7,977	$2,815
2044	$18,672	$2,364	$7,977	$2,815
2045	$18,672	$2,364	$7,977	$2,815
2046	$18,672	$2,364	$7,977	$2,815
25 YEAR TOTAL	$280,087	$35,464	$119,659	$42,223
25 YEAR AVG ANNUAL	$11,203	$1,419	$4,786	$1,689

Table 10 shows an estimate of the likely taxes paid to the Fire District 3, Rosedale Cemetery, Hospital District 1, Southwind Extension District, Crawford County Extension Council, Fort Scott Community College, SEK Library, and Watershed District 102. The results assume that 44 turbines are placed in Fire District 3, Rosedale Cemetery, Southwind Extension District and Fort Scott Community College. Hospital District 1 and Crawford County Extension Council is assumed to have 20 turbines. SEK Library and Watershed District 102 are assumed to have all 64 turbines. Beginning in 2032 due to the property tax exemption, Fire District 3 will receive over $65 thousand annually; Rosedale Cemetery, over $12 thousand annually; Hospital District 1, over $29 thousand annually; Southwind Extension District, over $14 thousand annually; Crawford County Extension Council almost $5 thousand annually; Fort Scott Community College, over $256 thousand annually; SEK Library, over $19 thousand annually; Watershed District 102, over $49 thousand annually. Over 25 years, Fire District 3 will receive over $979 thousand; Rosedale Cemetery, over $189 thousand; Hospital District 1, over $436 thousand; Southwind Extension District, over $222 thousand; Crawford County Extension Council, over $73 thousand; Fort Scott Community District, over $3.8 million; SEK Library, over $292 thousand; and Watershed District 102, over $742 thousand.

Table 10.—Tax Revenue from Jayhawk Wind Project for Other Taxing Bodies

Tax Year	Fire District 3	Rosedale Cemetary	Hospital District 1	Southwind Extension District	Crawford Co. Ext. Council	Fort Scott Community College	SEK Library	Watershed District 102
2022	$0	$0	$0	$0	$0	$0	$0	$0
2023	$0	$0	$0	$0	$0	$0	$0	$0
2024	$0	$0	$0	$0	$0	$0	$0	$0
2025	$0	$0	$0	$0	$0	$0	$0	$0
2026	$0	$0	$0	$0	$0	$0	$0	$0
2027	$0	$0	$0	$0	$0	$0	$0	$0
2028	$0	$0	$0	$0	$0	$0	$0	$0
2029	$0	$0	$0	$0	$0	$0	$0	$0
2030	$0	$0	$0	$0	$0	$0	$0	$0
2031	$0	$0	$0	$0	$0	$0	$0	$0
2032	$65,304	$12,613	$29,121	$14,824	$4,925	$256,803	$19,482	$49,470
2033	$65,304	$12,613	$29,121	$14,824	$4,925	$256,803	$19,482	$49,470
2034	$65,304	$12,613	$29,121	$14,824	$4,925	$256,803	$19,482	$49,470
2035	$65,304	$12,613	$29,121	$14,824	$4,925	$256,803	$19,482	$49,470
2036	$65,304	$12,613	$29,121	$14,824	$4,925	$256,803	$19,482	$49,470
2037	$65,304	$12,613	$29,121	$14,824	$4,925	$256,803	$19,482	$49,470
2038	$65,304	$12,613	$29,121	$14,824	$4,925	$256,803	$19,482	$49,470
2039	$65,304	$12,613	$29,121	$14,824	$4,925	$256,803	$19,482	$49,470
2040	$65,304	$12,613	$29,121	$14,824	$4,925	$256,803	$19,482	$49,470
2041	$65,304	$12,613	$29,121	$14,824	$4,925	$256,803	$19,482	$49,470
2042	$65,304	$12,613	$29,121	$14,824	$4,925	$256,803	$19,482	$49,470
2043	$65,304	$12,613	$29,121	$14,824	$4,925	$256,803	$19,482	$49,470
2044	$65,304	$12,613	$29,121	$14,824	$4,925	$256,803	$19,482	$49,470
2045	$65,304	$12,613	$29,121	$14,824	$4,925	$256,803	$19,482	$49,470
2046	$65,304	$12,613	$29,121	$14,824	$4,925	$256,803	$19,482	$49,470
25 YEAR TOTAL	$979,561	$189,200	$436,811	$222,363	$73,876	$3,852,050	$292,224	$742,043
25 YEAR AVG ANNUAL	$39,182	$7,568	$17,472	$8,895	$2,955	$154,082	$11,689	$29,682

Table 11 shows the sum of all the property taxes and contribution income listed in Tables 7 through 10 by year. From 2022 to 2031, the annual contribution revenue will be over $387 thousand. In 2032, the total property taxes paid jumps to over $1.5 million annually. Over the 25-year life of the project, the total property taxes and contribution revenue paid to the various taxing entities will be over $27.2 million with an annual average of almost $1.1 million.

Table 11.—Total Property Tax and Contribution Revenue from Jayhawk Wind Project

Tax Year	Total Property Tax
2022	$387,840
2023	$387,840
2024	$387,840
2025	$387,840
2026	$387,840
2027	$387,840
2028	$387,840
2029	$387,840
2030	$387,840
2031	$387,840
2032	$1,556,708
2033	$1,556,708
2034	$1,556,708
2035	$1,556,708
2036	$1,556,708
2037	$1,556,708
2038	$1,556,708
2039	$1,556,708
2040	$1,556,708
2041	$1,556,708
2042	$1,556,708
2043	$1,556,708
2044	$1,556,708
2045	$1,556,708
2046	$1,556,708
25 YEAR TOTAL	$27,229,021
25 YEAR AVG ANNUAL	$1,089,161

VII. References

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Lantz, E., Tegen, S., 2009b. Economic Benefits, Carbon Dioxide (CO2) Emissions Reductions, and Water Conservation Benefits from 1,000 Megawatts (MW) of New Wind Power in Tennessee. Technical Report DOE/GO-102009-2754, March 2009. NREL, Golden, CO.

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National Renewable Energy Laboratory (NREL), 2008b. Economic Benefits, Carbon Dioxide (CO2) Emissions Reductions, and Water Conservation Benefits from 1,000 Megawatts (MW) of New Wind Power in Idaho. Technical Report DOE/GO-102008-2671, October 2008. NREL, Golden, CO. Available at <http://www.nrel.gov/docs/fy09osti/44145.pdf>.

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VIII. Curriculum Vitae - David Loomis

David G. Loomis
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Education

Doctor of Philosophy, Economics, Temple University, Philadelphia, PA, May 1995.

Bachelor of Arts, Mathematics and Honors Economics, Temple University, Philadelphia, PA, Magna Cum Laude, May 1985.

Experience

1996-present Illinois State University, Normal, IL
Professor, Department of Economics (2010-present)
Associate Professor, Department of Economics (2002-2009)
Assistant Professor, Department of Economics (1996-2002)
- Taught Regulatory Economics, Telecommunications Economics and Public Policy, Industrial Organization and Pricing, Individual and Social Choice, Economics of Energy and Public Policy and a Graduate Seminar Course in Electricity, Natural Gas and Telecommunications Issues.
- Supervised as many as five graduate students in research projects each semester.
- Served on numerous departmental committees.

1997-present Institute for Regulatory Policy Studies, Normal, IL
Executive Director (2005-present)
Co-Director (1997-2005)
- Grew contributing membership from five companies to 16 organizations.
- Doubled the number of workshop/training events annually.
- Supervised two Directors, Administrative Staff and internship program.
- Developed and implemented state-level workshops concerning regulatory issues related to the electric, natural gas, and telecommunications industries.

2006-2017 Illinois Wind Working Group, Normal, IL
Director
- Founded the organization and grew the organizing committee to over 200 key wind stakeholders
- Organized annual wind energy conference with over 400 attendees
- Organized strategic conferences to address critical wind energy issues
- Initiated monthly conference calls to stakeholders
- Devised organizational structure and bylaws

Experience (cont.)

2007-2017 Center for Renewable Energy, Normal, IL
Director
- Created founding document approved by the Illinois State University Board of Trustees and Illinois Board of Higher Education.
- Secured over $150,000 in funding from private companies.
- Hired and supervised four professional staff members and supervised three faculty members as Associate Directors.
- Reviewed renewable energy manufacturing grant applications for Illinois Department of Commerce and Economic Opportunity for a $30 million program.
- Created technical "Due Diligence" documents for the Illinois Finance Authority loan program for wind farm projects in Illinois.

2011-present Strategic Economic Research, LLC, Normal, IL
President
- Performed economic impact analyses on policy initiatives and energy projects such as wind energy, solar energy, natural gas plants and transmission lines at the county and state level.
- Provided expert testimony before state legislative bodies, state public utility commissions, and county boards.
- Wrote telecommunications policy impact report comparing Illinois to other Midwestern states.

1997-2002 International Communications Forecasting Conference
Chair
- Expanded Planning Committee with representatives from over 18 different international companies and delivered high quality conference attracting over 500 people over four years.

1985-1996 Business Research Bell Atlantic, Philadelphia, PA
Economist
- Wrote and taught Applied Business Forecasting multimedia course.
- Developed and documented 25 econometric demand models that were used in regulatory filings.
- Provided statistical and analytic support to regulatory costing studies.
- Served as subject matter expert in switched and special access.
- Administered $4 million budget including $1.8 million consulting budget.

Professional Awards and Memberships

2016 Outstanding Cross-Disciplinary Team Research Award with Jin Jo and Matt Aldeman – recognizes exemplary collaborative research conducted by multiple investigators from different disciplines.

2011 Midwestern Regional Wind Advocacy Award from the U. S. Department of Energy's Wind Powering America presented at Windpower 2011

2009 Economics Department Scott M. Elliott Faculty Excellence Award – awarded to faculty who demonstrate excellence in teaching, research and service.

2009 Illinois State University Million Dollar Club – awarded to faculty who have over $1 million in grants through the university.

2008 Outstanding State Wind Working Group Award from the U. S. Department of Energy's Wind Power America presented at Windpower 2008.

1999 Illinois State University Teaching Initiative Award.

Member of the American Economic Association, National Association of Business Economists, International Association for Energy Economics, Institute for Business Forecasters, Institute for International Forecasters, International Forecasters, and International Telecommunications Society.

Professional Publications

Jin, J.H., Cross, J., Rose, Z., Daebel, E., Verderber, A., and Loomis, D. G. (2016). Financing options and economic impact: distributed generation using solar photovoltaic systems in Normal, Illinois, AIMS Energy, 4(3): 504-516.

Loomis, D.G., Hayden, J., Noll, S. and Payne, J.E. (2016). Economic Impact of Wind Energy Development in Illinois, The Journal of Business Valuation and Economic Loss Analysis, 11(1), 3-23.

Loomis, D.G., Jo, J.H., and Aldeman, M.R., (2016). Economic Impact Potential of Solar Photovoltiacs in Illinois, Renewable Energy, 87, 253-258.

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Loomis, D. G. and Bowden, N. S. (2013). Nationwide Database of Electric Rates to Become Available, Natural Gas & Electricity, 30 (5), 20-25.

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Professional Publications (cont.)

Malm, E., Loomis, D. G., DeFranco, J. (2012). A Campus Technology Choice Model with Incorporated Network Effects: Choosing Between General Use and Campus Systems, International Journal of Computer Trends and Technology, 3(4), 622-629.

Chupp, B. A., Hickey, E.A. &Loomis, D. G. (2012). Optimal Wind Portfolios in Illinois, Electricity Journal, 25, 46-56.

Hickey, E., Loomis, D. G., & Mohammadi, H. (2012). Forecasting hourly electricity prices using ARMAX-GARCH models: An application to MISO hubs,Energy Economics, 34, 307-315.

Theron, S., Winter, J.R, Loomis, D. G., & Spaulding, A. D. (2011). Attitudes Concerning Wind Energy in Central Illinois. Journal of the America Society of Farm Managers and Rural Appraisers, 74, 120-128.

Payne, J.E.,Loomis, D.G. &Wilson, R. (2011). Residential Natural Gas Demand in Illinois: Evidence from the ARDL Bounds Testing Approach. Journal of Regional Analysis and Policy, 41(2), 138.

Loomis, D.G. & Ohler, A. O. (2010). Are Renewable Portfolio Standards A Policy Cure-all? A Case Study of Illinois's Experience. Environmental Law and Policy Review, 35, 135-182.

Gil-Alana, L. A., Loomis, D. G., &Payne, J. E. (2010). Does energy consumption by the U.S. electric power sector exhibit long memory behavior ? Energy Policy, 38, 7512-7518.

Carlson, J. L., Payne, J. E., & Loomis, D. G. (2010). An assessment of the Economic Impact of the Wind Turbine Supply Chain in Illinois. Electricity Journal, 13, 75-93.

Apergis, N., Payne, J. E., & Loomis, D. G. (2010). Are shocks to natural gas consumption transitory or permanent? Energy Policy, 38, 4734-4736.

Apergis, N., Payne, J. E., & Loomis, D. G. (2010). Are fluctuations in coal consumption transitory or permanent? Evidence from a panel of U.S. states. Applied Energy, 87, 2424-2426.

Hickey, E. A., Carlson, J. L., & Loomis, D. G.(2010). Issues in the determination of the optimal portfolio of electricity supply options. Energy Policy, 38, 2198-2207.

Carlson, J. L., &Loomis, D. G. (2008). An assessment of the impact of deregulation on the relative price of electricity in Illinois. Electricity Journal, 21, 60-70.

Loomis, D. G., (2008). The telecommunications industry. In H. Bidgoli (Ed.), The handbook of computer networks (pp. 3-19). Hoboken, NJ: John Wiley & Sons.

Cox, J. E., Jr., &Loomis, D. G. (2007). A managerial approach to using error measures in the evaluation of forecasting methods. International Journal of Business Research, 7, 143-149.

Professional Publications (cont.)

Cox, J. E., Jr., & Loomis, D. G. (2006). Improving forecasting through textbooks – a 25 year review. International Journal of Forecasting, 22, 617-624.

Swann, C. M., & Loomis, D. G. (2005). Competition in local telecommunications – there's more than you think. Business Economics, 40, 18-28.

Swann, C. M., & Loomis, D. G. (2005). Intermodal competition in local telecommunications markets. Information Economics and Policy, 17, 97-113.

Swann, C. M., & Loomis, D. G. (2004) Telecommunications demand forecasting with intermodal competition – a multi-equation modeling approach. Telektronikk, 100, 180-184.

Cox, J. E., Jr., & Loomis, D. G. (2003). Principles for teaching economic forecasting. International Review of Economics Education, 1, 69-79.

Taylor, L. D. & Loomis, D. G. (2002). Forecasting the internet: understanding the explosive growth of data communications. Boston: Kluwer Academic Publishers.

Wiedman, J. & Loomis, D. G. (2002). U.S. broadband pricing and alternatives for internet service providers. In D. G. Loomis & L. D. Taylor (Eds.) Boston: Kluwer Academic Publishers.

Cox, J. E., Jr. & Loomis, D. G. (2001). Diffusion of forecasting principles: an assessment of books relevant to forecasting. In J. S. Armstrong (Ed.), Principles of Forecasting: A Handbook for Researchers and Practitioners (pp. 633-650). Norwell, MA: Kluwer Academic Publishers.

Cox, J. E., Jr. & Loomis, D. G. (2000). A course in economic forecasting: rationale and content. Journal of Economics Education, 31, 349-357.

Malm, E. & Loomis, D. G. (1999). Active market share: measuring competitiveness in retail energy markets. Utilities Policy, 8, 213-221.

Loomis, D. G. (1999). Forecasting of new products and the impact of competition. In D. G. Loomis & L. D. Taylor (Eds.), The future of the telecommunications industry: forecasting and demand analysis. Boston: Kluwer Academic Publishers.

Loomis, D. G. (1997). Strategic substitutes and strategic complements with interdependent demands. The Review of Industrial Organization, 12, 781-791.

Expert Testimony

Macon County (Illinois) Environmental, Education, Health and Welfare Committee, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of E.ON Energy, Direct Oral Testimony, August 20, 2015.

Illinois Commerce Commission, Case No. 15-0277, Oral Cross-Examination Testimony on behalf of Grain Belt Express Clean Line LLC, appeared before the Commission on August 19, 2015.

Macon County (Illinois) Zoning Board of Appeals, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of E.ON Energy, Direct Oral Testimony, August 11, 2015.

Illinois Commerce Commission, Case No. 15-0277, Written Rebuttal Testimony on behalf of Grain Belt Express Clean Line LLC filed August 7, 2015.

Kankakee County (Illinois) Planning, Zoning, and Agriculture Committee, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of EDF Renewables,Direct Oral Testimony, July 22, 2015.

Kankakee County (Illinois) Zoning Board of Appeals, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of EDF Renewables,Direct Oral Testimony, July 13, 2015.

Bureau County (Illinois) Zoning Board of Appeals, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of Berkshire Hathaway Energy/Geronimo Energy,Direct Oral Testimony, June 16, 2015.

Illinois Commerce Commission, Case No. 15-0277, Written Direct Testimony on behalf of Grain Belt Express Clean Line LLC filed April 10, 2015.

Livingston County (Illinois) Zoning Board of Appeals, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of Invenergy, Oral Cross-Examination, December 8-9, 2014.

Missouri Public Service Commission, Case No. EA-2014-0207, Oral Cross-examination Testimony on behalf of Grain Belt Express Clean Line LLC, appeared before the Commission on November 21, 2014.

Livingston County (Illinois) Zoning Board of Appeals, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of Invenergy, Direct Oral Testimony, November 17-19, 2014.

Missouri Public Service Commission, Case No. EA-2014-0207, Written Surrebuttal Testimony on behalf of Grain Belt Express Clean Line LLC, filed October 14, 2014.

Missouri Public Service Commission, Case No. EA-2014-0207, Written Direct Testimony on behalf of Grain Belt Express Clean Line LLC, filed March 26, 2014.

Expert Testimony (cont.)

Illinois Commerce Commission, Case No. 12-0560, Oral Cross-Examination Testimony on behalf of Rock Island Clean Line LLC, appeared before the Commission on December 11, 2013.

Illinois Commerce Commission, Case No. 12-0560, Written Rebuttal Testimony on behalf of Rock Island Clean Line LLC filed August 20, 2013.

Boone County (Illinois) Board, Examination of Wind Energy Conversion System Ordinance, Direct Testimony and Cross-Examination, April 23, 2013.

Illinois Commerce Commission, Case No. 12-0560, Written Direct Testimony on behalf of Rock Island Clean Line LLC, filed October 10, 2012.

Whiteside County (Illinois) Board and Whiteside County Planning and Zoning Committee, Examination of Wind Energy Conversion System Ordinance, Direct Testimony and Cross-Examination, on behalf of the Center for Renewable Energy, April 12, 2012.

State of Illinois Senate Energy and Environment Committee, Direct Testimony and Cross-Examination, on behalf of the Center for Renewable Energy, October 28, 2010.

Livingston County (Illinois) Zoning Board of Appeals, Application for Special Use Permit for a Wind Energy Conversion System, on behalf of the Center for Renewable Energy, Direct Testimony and Cross-Examination, July 28, 2010.

Selected Presentations

"Energy Storage Economics and RTOs," presented October 30, 2016 at the Energy Storage Conference at Argonne National Laboratory.

"Wind Energy in Illinois," on October 6, 2016 at the B/N Daybreak Rotary Club, Bloomington, IL.

"Smart Grid for Schools," presented August 17, 2016 to the Ameren External Affairs Meeting, Decatur, IL.

"Solar Energy in Illinois," presented July 28, 2016 at the 3rd Annual K-12 Teachers Clean Energy Workshop, Richland Community College, Decatur, IL

"Wind Energy in Illinois," presented July 28, 2016 at the 3rd Annual K-12 Teachers Clean Energy Workshop, Richland Community College, Decatur, IL

"Smart Grid for Schools," presented June 21, 2016 at the ISEIF Grantee and Ameren Meeting, Decatur, IL.

"Costs and Benefits of Renewable Energy," presented November 4, 2015 at the Osher Lifelong Learning Institute at Bradley, University, Peoria, IL.

"Energy Sector Workforce Issues," presented September 17, 2015 at the Illinois Workforce Investment Board, Springfield, IL.

Selected Presentations (cont.)

"The Past, Present and Future of Wind Energy in Illinois," presented March 13, 2015 at the Peoria Rotary Club, Peoria, IL.

"Where Are All the Green Jobs?" presented January 28, 2015 at the 2015 Illinois Green Economy Network Sustainability Conference, Normal, IL.

"Teaching Next Generation Energy Concepts with Next Generation Science Standards: Addressing the Critical Need for a More Energy-Literate Workforce," presented September 30, 2014 at the Mathematics and Science Partnerships Program 2014 Conference in Washington, DC.

"National Utility Rate Database," presented October 23, 2013 at Solar Power International, Chicago, IL.

"Potential Economic Impact of Offshore Wind Energy in the Great Lakes," presented May 6, 2013 at Windpower 2013, Chicago, IL.

"Why Illinois? Windy City, Prairie Power," presented May 5, 2013 at Windpower 2013, Chicago, IL.

"National Utility Rate Database," presented January 29, 2013 at the EUEC Conference, Phoenix, AZ.

"Energy Learning Exchange and Green Jobs," presented December 13, 2012 at the TRICON Meeting of Peoria and Tazewell County Counselors, Peoria, IL.

"Potential Economic Impact of Offshore Wind Energy in the Great Lakes," presented November 12, 2012 at the Offshore Wind Jobs and Economic Development Impacts Webinar.

"Energy Learning Exchange," presented October 31, 2012 at the Utility Workforce Development Meeting, Chicago, IL.

"Wind Energy in McLean County," presented June 26, 2012 at BN By the Numbers, Normal, IL.

"Wind Energy," presented June 14, 2012 at the Wind for Schools Statewide Teacher Workshop, Normal, IL.

"Economic Impact of Wind Energy in Illinois," presented June 6, 2012 at AWEA's Windpower 2012, Atlanta, GA.

"Trends in Illinois Wind Energy," presented March 6, 2012 at the AWEA Regional Wind Energy Summit – Midwest in Chicago, IL.

"Challenges and New Growth Strategies in the Wind Energy Business," invited plenary session speaker at the Green Revolution Leaders Forum, November 18, 2011 in Seoul, South Korea.

"Overview of the Center for Renewable Energy," presented July 20, 2011 at the University-Industry Consortium Meeting at Illinois Institute of Technology, Chicago, IL.

"Building the Wind Turbine Supply Chain," presented May 11, 2011 at the Supply Chain Growth Conference, Chicago, IL.

"Building a Regional Energy Policy for Economic Development," presented April 4, 2011 at the Midwestern Legislative Conference's Economic Development Committee Webinar.

Selected Presentations (cont.)

"Wind Energy 101," presented February 7, 2011 at the Wind Power in Central Illinois - A Public Forum, CCNET Renewable Energy Group, Champaign, IL.

"Alternative Energy Strategies," presented with Matt Aldeman November 19, 2010 at the Innovation Talent STEM Education Forum, Chicago, IL. "Siting and Zoning in Illinois," presented November 17, 2010 at the Wind Powering America Webinar.

"What Governor Quinn Should Do about Energy?" presented November 15, 2010 at the Illinois Chamber of Commerce Energy Forum Conference, Chicago, IL.

"Is Wind Energy Development Right for Illinois," presented with Matt Aldeman, October 28, 2010 at the Illinois Association of Illinois County Zoning Officials Annual Seminar in Utica, IL.

"Economic Impact of Wind Energy in Illinois," presented July 22, 2010 at the AgriEnergy Conference in Champaign, IL.

"Renewable Energy Major at ISU," presented July 21, 2010 at Green Universities and Colleges Subcommittee Webinar.

"Economics of Wind Energy," presented May 19, 2010 at the U.S. Green Building Council meeting in Chicago, IL.

"Forecasting: A Primer for the Small Business Entrepreneur," presented with James E. Cox, Jr., April 14, 2010 at the Allied Academies' Spring International Conference in New Orleans, LA.

"Are Renewable Portfolio Standards a Policy Cure-All? A Case Study of Illinois' Experience," presented January 30, 2010 at the 2010 William and Mary Environmental Law and Policy Review Symposium in Williamsburg, VA.

"Creating Partnerships between Universities and Industry," presented November 19, 2009, at New Ideas in Educating a Workforce in Renewable Energy and Energy Efficiency in Albany, NY.

"Educating Illinois in Renewable Energy, presented November 14, 2009 at the Illinois Science Teachers Association in Peoria, IL.

"Green Collar Jobs," invited presentation October 14, 2009 at the 2009 Workforce Forum in Peoria, IL.

"The Role of Wind Power in Illinois," presented March 4, 2009 at the Association of Illinois Electric Cooperatives Engineering Seminar in Springfield, IL.

"The Economic Benefits of Wind Farms," presented January 30, 2009 at the East Central Illinois Economic Development District Meeting in Champaign, IL.

"Green Collar Jobs in Illinois," presented January 6, 2009 at the Illinois Workforce Investment Board Meeting in Macomb, IL.

"Green Collar Jobs: What Lies Ahead for Illinois?" presented August 1, 2008 at the Illinois Employment and Training Association Conference.

Selected Presentations (cont.)

"Mapping Broadband Access in Illinois," presented October 16, 2007 at the Rural Telecon '07 conference.

"A Managerial Approach to Using Error Measures to Evaluate Forecasting Methods," presented October 15, 2007 at the International Academy of Business and Economics.

"Dollars and Sense: The Pros and Cons of Renewable Fuel," presented October 18, 2006 at Illinois State University Faculty Lecture Series.

"Broadband Access in Illinois," presented July 28, 2006 at the Illinois Association of Regional Councils Annual Meeting.

"Broadband Access in Illinois," presented November 17, 2005 at the University of Illinois' Connecting the e to Rural Illinois.

"Improving Forecasting Through Textbooks – A 25 Year Review," with James E. Cox, Jr., presented June 14, 2005 at the 25th International Symposium on Forecasting.

"Telecommunications Demand Forecasting with Intermodal Competition, with Christopher Swann, presented April 2, 2004 at the Telecommunications Systems Management Conference 2004.

"Intermodal Competition," with Christopher Swann, presented April 3, 2003 at the Telecommunications Systems Management Conference 2003.

"Intermodal Competition in Local Exchange Markets," with Christopher Swann, presented June 26, 2002 at the 20th Annual International Communications Forecasting Conference.

"Assessing Retail Competition," presented May 23, 2002 at the Institute for Regulatory Policy Studies' Illinois Energy Policy for the 21st Century workshop.

"The Devil in the Details: An Analysis of Default Service and Switching," with Eric Malm presented May 24, 2001 at the 20th Annual Advanced Workshop on Regulation and Competition.

"Forecasting Challenges for U.S. Telecommunications with Local Competition," presented June 28, 1999 at the 19th International Symposium on Forecasting.

"Acceptance of Forecasting Principles in Forecasting Textbooks," presented June 28, 1999 at the 19th International Symposium on Forecasting.

"Forecasting Challenges for Telecommunications With Local Competition," presented June 17, 1999 at the 17th Annual International Communications Forecasting Conference.

"Measures of Market Competitiveness in Deregulating Industries," with Eric Malm, presented May 28, 1999 at the 18th Annual Advanced Workshop on Regulation and Competition.

Selected Presentations (cont.)

"Trends in Telecommunications Forecasting and the Impact of Deregulation," Proceedings of EPRI's 11th Forecasting Symposium, 1998.

"Forecasting in a Competitive Age: Utilizing Macroeconomic Forecasts to Accurately Predict the Demand for Services," invited speaker, Institute for International Research Conference, September 29, 1997.

"Regulatory Fairness and Local Competition Pricing," presented May 30, 1996 at the 15th Annual Advanced Workshop in Regulation and Public Utility Economics.

"Optimal Pricing For a Regulated Monopolist Facing New Competition: The Case of Bell Atlantic Special Access Demand," presented May 28, 1992 at the Rutgers Advanced Workshop in Regulation and Public Utility Economics.

Grants

"Energy Learning Exchange - Implementing Nationally Recognized Energy Curriculum and Credentials in Illinois," Northern Illinois University, RSP Award Number A17-0098, February, 2017, $13,000.

"Smart Grid for Schools 2017 and Energy Challenge," with William Hunter, Illinois Science and Energy Innovation Foundation, RSP Award Number A15-0092-002 - extended, January 2017, $350,000.

"Illinois Jobs Project," University of California Berkeley, RSP Award Number A16-0148, August, 2016, $10,000.

"Energy Workforce Ready Through Building Performance Analysis," Illinois Department of Commerce and Economic Opportunity through the Department of Labor, RSP Number A16-0139, June, 2016, $328,000 (grant was de-obligated before completion).

"Smart Grid for Schools 2016 and Smart Appliance Challenge," with William Hunter, Brad Christenson and Jeritt Williams, Illinois Science and Energy Innovation Foundation, RSP Award Number A15-0092-002, January 2016, $450,000.

"Smart Grid for Schools 2015," with William Hunter and Matt Aldeman, Illinois Science and Energy Innovation Foundation, RSP Award Number A15-0092-001, February 2015, $400,000.

"Economic Impact of Nuclear Plant Closings: A Response to HR 1146," Illinois Department of Economic Opportunity, RSP Award Number 14-025001 amended, January, 2015, $22,000.

"Partnership with Midwest Renewable Energy Association for Solar Market Pathways" with Missy Nergard and Jin Jo, U.S. Department of Energy Award Number DE-EE0006910, October, 2014, $109,469 (ISU Award amount).

"Renewable Energy for Schools," with Matt Aldeman and Jin Jo, Illinois Department of Commerce and Economic Opportunity, Award Number 14-025001, June, 2014, $130,001.

Grants (cont.)

"SmartGrid for Schools 2014," with William Hunter and Matt Aldeman, Illinois Science and Energy Innovation Foundation, RSP Number 14B116, March 2014, $451,701.

"Windpower 2014 Conference Exhibit," Illinois Department of Commerce and Economic Opportunity, RSP Number 14C167, March, 2014, $95,000.

"Lake Michigan Offshore Wind Energy Buoy,"with Matt Aldeman, Illinois Clean Energy Community Foundation, Request ID 6435, November, 2013, $90,000.

"Teaching Next Generation Energy Concepts with Next Generation Science Standards," with William Hunter, Matt Aldeman and Amy Bloom, Illinois State Board of Education, RSP Number 13B170A, October, 2013, second year, $159,954; amended to $223,914.

"Solar for Schools," with Matt Aldeman, Illinois Green Economy Network, RSP Number 13C280, August, 2013, $66,072.

"Energy Learning Exchange Implementation Grant," with William Hunter and Matt Aldeman, Illinois Department of Commerce and Economic Opportunity, Award Number 13-052003, June, 2013, $350,000.

"Teaching Next Generation Energy Concepts with Next Generation Science Standards," with William Hunter, Matt Aldeman and Amy Bloom, Illinois State Board of Education, RSP Number 13B170, April, 2013, $159,901.

"Illinois Sustainability Education SEP," Illinois Department of Commerce and Economic Opportunity, Award Number 08-431006, March, 2013, $225,000.

"Illinois Pathways Energy Learning Exchange Planning Grant," with William Hunter and Matt Aldeman, Illinois State Board of Education (Source: U.S. Department of Education), RSP Number 13A007, December, 2012, $50,000.

"Illinois Sustainability Education SEP," Illinois Department of Commerce and Economic Opportunity, Award Number 08-431005, June 2011, amended March, 2012, $98,911.

"Wind for Schools Education and Outreach," with Matt Aldeman, Illinois Department of Commerce and Economic Opportunity, Award Number 11-025001, amended February, 2012, $111,752.

"A Proposal to Support Solar Energy Potential and Job Creation for the State of Illinois Focused on Large Scale Photovoltaic System," with Jin Jo (lead PI), Illinois Department of Commerce and Economic Opportunity, Award Number 12-025001, January 2012, $135,000.

"National Database of Utility Rates and Rate Structure," U.S. Department of Energy, Award Number DE-EE0005350TDD, 2011-2014, $850,000.

"Illinois Sustainability Education SEP," Illinois Department of Commerce and Economic Opportunity, Award Number 08-431005, June 2011, $75,000.

Grants (cont.)

"Wind for Schools Education and Outreach," with Matt Aldeman, Illinois Department of Commerce and Economic Opportunity, Award Number 11-025001, March 2011, $190,818.

"Using Informal Science Education to Increase Public Knowledge of Wind Energy in Illinois," with Amy Bloom and Matt Aldeman, Scott Elliott Cross-Disciplinary Grant Program, February 2011, $13,713.

"Wind Turbine Market Research," with Matt Aldeman, Illinois Manufacturers Extension Center, May, 2010, $4,000.

"Petco Resource Assessment," with Matt Aldeman, Petco Petroleum Co., April, 2010 amended August 2010 $34,000; original amount $18,000.

"Wind for Schools Education and Outreach," with Anthony Lornbach and Matt Aldeman, Scott Elliott Cross-Disciplinary Grant Program, February, 2010, $13,635.

"IGA IFA/ISU Wind Due Diligence," Illinois Finance Authority, November, 2009, $8,580 amended December 2009; original amount $2,860.

"Green Industry Business Development Program, with the Shaw Group and Illinois Manufacturers Extension Center, Illinois Department of Commerce and Economic Opportunity, Award Number 09-021007, August 2009, $245,000.

"Wind Turbine Workshop Support," Illinois Department of Commerce and Economic Opportunity, June 2009, $14,900.

"Illinois Wind Workers Group," with Randy Winter, U.S. Department of Energy, Award Number DE-EE0000507, 2009-2011, $107,941.

"Wind Turbine Supply Chain Study," with J. Lon Carlson and James E. Payne, Illinois Department of Commerce and Economic Opportunity, Award Number 09-021003, April 2009, $125,000.

"Renewable Energy Team Travel to American Wind Energy Association Windpower 2009 Conference," Center for Mathematics, Science and Technology, February 2009, $3,005.

"Renewable Energy Educational Lab Equipment," with Randy Winter and David Kennell, Illinois Clean Energy Community Foundation (peer-reviewed), February, 2008, $232,600.

"Proposal for New Certificate Program in Electricity, Natural Gas and Telecommunications Economics," with James E. Payne, Extended Learning Program Grant, April, 2007, $29,600.

"Illinois Broadband Mapping Study," with J. Lon Carlson and Rajeev Goel, Illinois Department of Commerce and Economic Opportunity, Award Number 06-205008, 2006-2007, $75,000.

"Illinois Wind Energy Education and Outreach Project," with David Kennell and Randy Winter, U.S. Department of Energy, Award Number DE-FG36-06GO86091, 2006-2010, $990,000.

Grants (cont.)

"Wind Turbine Installation at Illinois State University Farm," with Doug Kingman and David Kennell,Illinois Clean Energy Community Foundation (peer-reviewed), May, 2004, $500,000.

"Wind Turbine Installation at Illinois State University Farm," with Doug Kingman and David Kennell,Illinois Clean Energy Community Foundation (peer-reviewed), May, 2004, $500,000.

"Illinois State University Wind Measurement Project," Doug Kingman and David Kennell,Illinois Clean Energy Community Foundation (peer-reviewed), with August, 2003, $40,000.

"Illinois State University Wind Measurement Project," with Doug Kingman and David Kennell, NEG Micon matching contribution, August, 2003, $65,000.

"Distance Learning Technology Program," Illinois State University Faculty Technology Support Services, Summer 2002, $3,000.

"Providing an Understanding of Telecommunications Technology By Incorporating Multimedia into Economics 235," Instructional Technology Development Grant (peer-reviewed), January 15, 2001, $1,400.

"Using Real Presenter to create a virtual tour of GTE's Central Office," with Jack Chizmar, Instructional Technology Literacy Mentoring Project Grant (peer-reviewed), January 15,2001, $1,000.

"An Empirical Study of Telecommunications Industry Forecasting Practices," with James E. Cox, College of Business University Research Grant (peer-reviewed), Summer, 1999, $6,000.

"Ownership Form and the Efficiency of Electric Utilities: A Meta-Analytic Review" with L. Dean Hiebert, Institute for Regulatory Policy Studies research grant (peer-reviewed), August 1998, $6,000.

Total Grants: $7,482,913

External Funding

Corporate Funding for Institute for Regulatory Policy Studies, Ameren ($7,500), Aqua Illinois ($7,500); Commonwealth Edison ($7,500); Exelon/ ($7,500); Illinois American Water ($7,500) ITC Holdings ($7,500); Midcontinent ISO ($7,500); NICOR Energy ($7,500); People Gas Light and Coke ($7,500); PJM Interconnect ($7,500); Fiscal Year 2017, $75,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with Adrienne Ohler, Fiscal Year 2016, $19,667.

Corporate Funding for Energy Learning Exchange, Calendar Year 2016, $53,000.

Corporate Funding for Institute for Regulatory Policy Studies, Ameren ($7,500), Aqua Illinois ($7,500); Commonwealth Edison ($7,500); Exelon/ Constellation NewEnergy ($7,500); Illinois American Water ($7,500) ITC Holdings ($7,500); Midcontinent ISO ($7,500); NICOR Energy ($7,500); People Gas Light and Coke ($7,500); PJM Interconnect ($7,500); Utilities, Inc. ($7,500) Fiscal Year 2016, $82,500 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with Adrienne Ohler, Fiscal Year 2015, $15,897.

Corporate Funding for Institute for Regulatory Policy Studies, Ameren ($7,500), Alliance Pipeline ($7,500); Aqua Illinois ($7,500); AT&T ($7,500);Commonwealth Edison ($7,500); Exelon/Constellation NewEnergy ($7,500); Illinois American Water ($7,500) ITC Holdings ($7,500); Midcontinent ISO ($7,500); NICOR Energy ($7,500); People Gas Light and Coke ($7,500); PJM Interconnect ($7,500); Fiscal Year 2015, $90,000 total.

Corporate Funding for Energy Learning Exchange, Calendar Year 2014, $55,000.

Workshop Surplus for Institute for Regulatory Policy Studies, with Adrienne Ohler, Fiscal Year 2014, $12,381.

Corporate Funding for Institute for Regulatory Policy Studies, Ameren ($7,500), Alliance Pipeline ($7,500); Aqua Illinois ($7,500); AT&T ($7,500);Commonwealth Edison ($7,500); Constellation NewEnergy ($7,500); Illinois American Water ($7,500) ITC Holdings ($7,500); Midwest Energy Efficiency Alliance ($4,500); Midwest Generation ($7,500); Midwest ISO ($7,500); NICOR Energy ($7,500); People Gas Light and Coke ($7,500); PJM Interconnect ($7,500); Fiscal Year 2014, $102,000 total.

Corporate Funding for Energy Learning Exchange, Calendar Year 2013, $53,000.

Workshop Surplus for Institute for Regulatory Policy Studies, with Adrienne Ohler, Fiscal Year 2013, $17,097.

Corporate Funding for Institute for Regulatory Policy Studies, Ameren ($7,500), Alliance Pipeline ($7,500); Aqua Illinois ($7,500); AT&T ($7,500);Commonwealth Edison ($7,500); Constellation NewEnergy ($7,500); Illinois American Water ($7,500) ITC Holdings ($7,500); Midwest Generation ($7,500); Midwest ISO ($7,500); NICOR Energy ($7,500); People Gas Light and Coke ($7,500); PJM Interconnect ($7,500); Fiscal Year 2013, $97,500 total.

External Funding (cont.)

Corporate Funding for Illinois Wind Working Group, Calendar Year 2012, $29,325.

Workshop Surplus for Institute for Regulatory Policy Studies, with Adrienne Ohler, Fiscal Year 2012, $16,060.

Corporate Funding for Institute for Regulatory Policy Studies, Alliance Pipeline ($7,500); Aqua Illinois ($7,500); AT&T ($7,500);Commonwealth Edison ($7,500); Constellation NewEnergy ($7,500); Illinois American Water ($7,500) ITC Holdings ($7,500); Midwest Generation ($7,500); MidWest ISO ($7,500); NICOR Energy ($7,500); People Gas Light and Coke ($7,500); PJM Interconnect ($7,500); Fiscal Year 2012, $90,000 total.
Corporate Funding for Illinois Wind Working Group, Calendar Year 2011, $57,005.

Workshop Surplus for Institute for Regulatory Policy Studies, with Adrienne Ohler, Fiscal Year 2011, $13,562.

Corporate Funding for Institute for Regulatory Policy Studies, Alliance Pipeline ($7,500); Aqua Illinois ($7,500); AT&T ($7,500);Commonwealth Edison ($7,500); Constellation NewEnergy ($7,500); Illinois American Water ($7,500) ITC Holdings ($7,500); Midwest Generation ($7,500); MidWest ISO ($7,500); NICOR Energy ($7,500); People Gas Light and Coke ($7,500); PJM Interconnect ($7,500); Fiscal Year 2011, $90,000 total.

Corporate Funding for Center for Renewable Energy, Calendar Year 2010, $50,000.

Corporate Funding for Illinois Wind Working Group, Calendar Year 2010, $49,000.

Workshop Surplus for Institute for Regulatory Policy Studies, with Lon Carlson, Fiscal Year 2010, $17,759.

Corporate Funding for Institute for Regulatory Policy Studies, Alliance Pipeline ($7,500); Ameren ($7,500); AT&T ($7,500);Commonwealth Edison ($7,500); Constellation NewEnergy ($7,500); ITC Holdings ($7,500); Midwest Generation ($7,500); MidWest ISO ($7,500); NICOR Energy ($7,500); People Gas Light and Coke ($7,500); PJM Interconnect ($7,500); Fiscal Year 2010, $82,500 total.

Corporate Funding for Illinois Wind Working Group, Calendar Year 2009, $57,140.

Workshop Surplus for Institute for Regulatory Policy Studies, with Lon Carlson, Fiscal Year 2009, $21,988.

Corporate Funding for Institute for Regulatory Policy Studies, Alliance Pipeline ($7,500); Ameren ($7,500); AT&T ($7,500);Commonwealth Edison ($7,500); Constellation NewEnergy ($7,500); MidAmerican Energy ($7,500); Midwest Generation ($7,500); MidWest ISO ($7,500); NICOR Energy ($7,500); People Gas Light and Coke ($7,500); PJM Interconnect ($7,500); Fiscal Year 2009, $82,500 total.

Corporate Funding for Center for Renewable Energy, Calendar Year 2008, $157,500.

Corporate Funding for Illinois Wind Working Group, Calendar Year 2008, $38,500.

External Funding (cont.)

Workshop Surplus for Institute for Regulatory Policy Studies, with Lon Carlson, Fiscal Year 2008, $28,489.

Corporate Funding for Institute for Regulatory Policy Studies, Alliance Pipeline ($5,000); Ameren ($5,000); AT&T ($5,000);Commonwealth Edison ($5,000); Constellation NewEnergy ($5,000); MidAmerican Energy ($5,000); Midwest Generation ($5,000); Midwest ISO ($5,000); NICOR Energy ($5,000); Peabody Energy ($5,000), People Gas Light and Coke ($5,000); PJM Interconnect ($5,000); Fiscal Year 2008, $60,000 total.

Corporate Funding for Illinois Wind Working Group, Calendar Year 2007, $16,250.

Workshop Surplus for Institute for Regulatory Policy Studies, with Lon Carlson, Fiscal Year 2007, $19,403.

Corporate Funding for Institute for Regulatory Policy Studies, AARP ($3,000), Alliance Pipeline ($5,000), Ameren ($5,000); Citizens Utility Board ($5,000); Commonwealth Edison ($5,000); Constellation NewEnergy ($5,000); MidAmerican Energy ($5,000); Midwest Generation ($5,000); Midwest ISO ($5,000); NICOR Energy ($5,000); Peabody Energy ($5,000), People Gas Light and Coke ($5,000); PJM Interconnect ($5,000); SBC ($5,000); Verizon ($5,000); Fiscal Year 2007, $73,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with Lon Carlson, Fiscal Year 2006, $13,360.

Corporate Funding for Institute for Regulatory Policy Studies, AARP ($1,500), Alliance Pipeline ($2,500), Ameren ($5,000); Citizens Utility Board ($5,000); Commonwealth Edison ($5,000); Constellation NewEnergy ($5,000); DTE Energy ($5,000); MidAmerican Energy ($5,000); Midwest Generation ($5,000); Midwest ISO ($5,000); NICOR Energy ($5,000); Peabody Energy ($2,500), People Gas Light and Coke ($5,000); PJM Interconnect ($5,000); SBC ($5,000); Verizon ($5,000); Fiscal Year 2006, $71,500 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Fiscal Year 2005, $12,916.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS ($5,000); Citizens Utility Board ($5,000); Commonwealth Edison ($5,000); Constellation NewEnergy ($5,000); Illinois Power ($5,000); MidAmerican Energy ($5,000); Midwest Generation ($5,000); Midwest ISO ($5,000); NICOR Energy ($5,000); People Gas Light and Coke ($5,000); PJM Interconnect ($5,000); SBC ($2,500); Verizon ($2,500); Fiscal Year 2005, $60,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Fiscal Year 2004, $17,515.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS ($5,000); Commonwealth Edison ($5,000); Constellation NewEnergy ($5,000); Illinois Power ($5,000); MidAmerican Energy ($5,000); Midwest Generation ($5,000); NICOR Energy ($5,000); People Gas Light and Coke ($5,000); PJM Interconnect ($5,000); Fiscal Year 2004, $45,000 total.

External Funding (cont.)

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Fiscal Year 2003, $8,300.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS ($5,000); AT&T ($2,500); Commonwealth Edison ($5,000); Illinois Power ($5,000); MidAmerican Energy ($5,000); NICOR Energy ($5,000); People Gas Light and Coke ($5,000); Fiscal Year 2003, $32,500 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Calendar Year 2002, $15,700.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS ($2,500); AT&T ($5,000); Commonwealth Edison ($2,500); Illinois Power ($2,500); MidAmerican Energy ($2,500); NICOR Energy ($2,500); People Gas Light and Coke ($2,500); Calendar Year 2002, $17,500 total.

Corporate Funding for International Communications Forecasting Conference, National Economic Research Associates ($10,000); Taylor Nelson Sofres Telecoms ($10,000); Calendar Year 2002, $20,000 total.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS ($5,000); AT&T ($5,000); Commonwealth Edison ($5,000); Illinois Power ($5,000); MidAmerican Energy ($5,000); NICOR Energy ($5,000); People Gas Light and Coke ($5,000); Calendar Year 2001, $35,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Calendar Year 2001, $19,400.

Corporate Funding for International Communications Forecasting Conference, National Economic Research Associates ($10,000); Taylor Nelson Sofres Telecoms ($10,000); SAS Institute ($10,000); Calendar Year 2001, $30,000 total.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS ($5,000); AT&T ($5,000); Commonwealth Edison ($5,000); Illinois Power ($5,000); MidAmerican Energy ($5,000); NICOR Energy ($5,000); People Gas Light and Coke ($5,000); Calendar Year 2000, $35,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Calendar Year 2000, $20,270.

Corporate Funding for International Communications Forecasting Conference, National Economic Research Associates ($10,000); Taylor Nelson Sofres Telecoms ($10,000); Calendar Year 2000, $20,000 total.

Corporate Funding for International Communications Forecasting Conference, National Economic Research Associates ($10,000); Taylor Nelson Sofres Telecoms ($10,000); Calendar Year 2002, $20,000 total.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS ($5,000); AT&T ($5,000); Commonwealth Edison ($5,000); Illinois Power ($5,000); MidAmerican Energy ($5,000); NICOR Energy ($5,000); People Gas Light and Coke ($5,000); Calendar Year 2001, $35,000 total.

External Funding (cont.)

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Calendar Year 2001, $19,400.

Corporate Funding for International Communications Forecasting Conference, National Economic Research Associates ($10,000); Taylor Nelson Sofres Telecoms ($10,000); SAS Institute ($10,000); Calendar Year 2001, $30,000 total.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS ($5,000); AT&T ($5,000); Commonwealth Edison ($5,000); Illinois Power ($5,000); MidAmerican Energy ($5,000); NICOR Energy ($5,000); People Gas Light and Coke ($5,000); Calendar Year 2000, $35,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Calendar Year 2000, $20,270.

Corporate Funding for International Communications Forecasting Conference, National Economic Research Associates ($10,000); Taylor Nelson Sofres Telecoms ($10,000); Calendar Year 2000, $20,000 total.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS ($5,000); AT&T ($5,000); Commonwealth Edison ($5,000); Illinois Power ($5,000); MidAmerican Energy ($5,000); NICOR Energy ($5,000); People Gas Light and Coke ($5,000); Calendar Year 1999, $35,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Calendar Year 1999, $10,520.

Corporate Funding for International Communications Forecasting Conference, National Economic Research Associates ($10,000); PNR Associates ($10,000); Calendar Year 1999, $20,000 total.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS ($5,000); CILCO ($5,000); Commonwealth Edison ($5,000); Illinois Power ($5,000); MidAmerican Energy ($5,000); People Gas Light and Coke ($5,000); Calendar Year 1998, $30,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Calendar Year 1998, $44,334.

Corporate Funding for International Communications Forecasting Conference, National Economic Research Associates ($10,000); PNR Associates ($10,000); Calendar Year 1998, $20,000 total.

Corporate Funding for Institute for Regulatory Policy Studies, with L. Dean Hiebert, AmerenCIPS ($5,000); CILCO ($5,000); Commonwealth Edison ($5,000); Illinois Power ($5,000); MidAmerican Energy ($5,000); People Gas Light and Coke ($5,000); Calendar Year 1997, $30,000 total.

Workshop Surplus for Institute for Regulatory Policy Studies, with L. Dean Hiebert, Calendar Year 1997, $19,717.

Total External Funding: $2,406,565

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Economic Impact Analysis of the
Jayhawk Wind Energy Project