

THE ECONOMIC IMPACT OF BOISE CITY WIND TURBINE MANUFACTURING
FACILITY AND WIND FARM PROJECT

Dee Cooper – Northwest District Director, OCES, Enid
(580) 233-5295

Stan Ralstin - Area Extension Community Development Specialist, OSU, Enid
(580) 237-7677

Dave Shideler - Extension Economist, OSU, Stillwater
(405) 744-6170

RURAL DEVELOPMENT
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Dee Cooper, Director
Oklahoma Cooperative Extension
Northwest District Office
205 W. Maple, Suite 510
Enid, OK 73701
dee.cooper@okstate.edu

Stan Ralstin, Comm. Devel. Specialist
Oklahoma Cooperative Extension
316 E. Oxford
Enid, OK 73701-1335
stan.ralstin@okstate.edu

Dave Shideler
Extension Economist
323 Ag Hall
Oklahoma State University
Stillwater, OK 74078
dave.shideler@okstate.edu

ABSTRACT

This paper provides an impact study of new jobs created in Cimarron County due to the location of a wind turbine manufacturing facility and an associated wind farm with transmission lines. The report is based on data provided by the Oklahoma Department of Commerce concerning the number of employees and value of investment in the facility. Analysis of this project's economic impact on the county's economy utilizes IMPLAN Model multipliers.

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THE ECONOMIC IMPACT OF BOISE CITY WIND TURBINE MANUFACTURING FACILITY AND WIND FARM PROJECT

Economic development efforts are of great concern to local leaders in Oklahoma. Often, estimates of potential impacts are useful when analyzing economic development options. The overall purpose of this study is to measure the economic impact of a wind turbine manufacturing facility and associated 3,000 turbine wind farm to Cimarron County. Specific objectives of the study are to:

1. Provide basic economic data for Cimarron County;
2. Summarize the estimated direct economic impact of the wind turbine project to Cimarron County;
3. Review some basic concepts of community economics; and
4. Estimate the secondary impacts of the wind turbine project to Cimarron County.

No recommendations will be made in this report. This report addresses economic impacts of the wind turbine project to Cimarron County. There may be additional benefits and/or costs not addressed in this report. The analysis conducted is based on assumptions and data provided by the Oklahoma Department of Commerce regarding the total number of employees, average wages paid and the number of turbines to be constructed in Cimarron County.

Basic Demographic and Economic Data

Before discussing the impacts of the turbine manufacturing facility and wind farm to the Cimarron County economy, it is useful to review some basic data for Cimarron County. These data provide current economic and social trends existing in the county. Table 1, for example, provides population estimates for cities and towns in Cimarron County. Total county population is shown to have decreased from 3,301 in 1990 to 3,152 in 2000, a 4.5% decrease for the decade. The communities of Boise City and Keyes also declined in population for the decade. For 2000 to 2007, Census estimates show that the county population declined by another 15.5%. The

communities of Boise City and Keyes experienced faster declines in population decline for the last 7 years.

Table 2 lists employment by type for Cimarron County using data from the Bureau of Economic Analysis for the years 2001 through 2007. Total employment has declined slightly over the 7 years shown. The lowest value is 2,090 in 2007, and the highest value is 2,202 for 2001. Table 2 also shows that farming, government, and retail are important sectors for Cimarron County employment. Labor force data from the Bureau of Labor Statistics for Cimarron County are listed in Table 3, and labor force data for Oklahoma are listed in Table 4. Unemployment rates for Cimarron County ranged from a low of 2.2% in 2000 to a high of 3.8% in 2003, 2004 and 2007. The rate for 2008 is 3.1%. Oklahoma's unemployment rate for 2008 is shown to be 3.8%.

Table 5 provides personal income data by major source from 2001 to 2007. Per capita personal income in 2007 was \$23,941 while total personal income in 2007 was about \$63 million. Note that the "adjustment for residence" for Cimarron County is positive and growing. This indicates that some people commute out of Cimarron County to work in other counties, and thus bring their income home with them (this is why it must be added back in to the derivation of local income).

Table 6 lists sales tax collections for communities in Cimarron County. For fiscal year 2008, Boise City, for example, collected over \$324,000 at a 3.0% tax rate. Keyes collected almost \$14,500 at a 2% rate, which was a marked decrease from the previous year.

TABLE 1
POPULATION CIMARRON COUNTY, OKLAHOMA, 1990, 2000 AND 2007

	1990	2000	2007	% Change 2000-2007
Boise City	1,509	1,488	1,239	-16.7%
Keyes	454	411	344	-16.3%
Remainder of County	1,338	1,253	1,081	-13.7%
Cimarron County	3,301	3,152	2,664	-15.5%

SOURCE: Oklahoma Department of Commerce, "2007 Population Estimates by Place by County," July 10, 2008. Downloaded from www.okcommerce.gov on 9/10/2008 at 3:42 pm.

TABLE 2
EMPLOYMENT BY MAJOR SECTOR FOR CIMARRON COUNTY, 2001-2007

Item	2001	2002	2003	2004	2005	2006	2007
Total employment	2,202	2,167	2,108	2,180	2,138	2,126	2,090
Farm employment	769	737	679	725	722	714	725
Forestry, fishing, related activities, and other	(D)						
Mining	(D)	(D)	(D)	33	34	38	38
Utilities	(L)	(L)	(L)	(D)	(D)	(D)	(D)
Construction	61	54	(D)	(D)	(D)	(D)	(D)
Manufacturing	(L)	(L)	(D)	(D)	(D)	69	(D)
Wholesale trade	29	41	52	28	30	(D)	(D)
Retail Trade	226	213	228	228	220	215	(D)
Transportation and warehousing	104	84	71	(D)	(D)	77	82
Information	(D)	(D)	(D)	(D)	16	15	16
Finance and insurance	86	103	98	97	81	78	82
Real estate and rental and leasing	16	15	16	17	17	16	17
Professional and technical services	(D)	(D)	60	60	53	47	40
Management of companies and enterprises	0	0	0	0	0	0	0
Administrative and waste services	33	31	34	38	34	37	41
Educational services	(L)						
Health care and social assistance	46	47	(D)	(D)	49	46	40
Arts, entertainment, and recreation	16	(L)	13	13	13	13	13
Accommodation and food services	84	87	88	83	96	91	73
Other services, except public administration	161	163	154	145	148	155	160
Government and government enterprises	385	382	362	373	351	344	308
Federal, civilian	20	21	22	21	19	20	19
Military	19	19	18	17	16	16	16
State and local	346	342	322	335	316	308	273

SOURCE: Bureau of Economic Analysis, Regional Economic Information System, 1969-2007, v.4.1.3.

(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

(L) Less than 10 jobs, but the estimates for this item are included in the totals.

TABLE 3
LABOR FORCE DATA FOR CIMARRON COUNTY, 2000 to 2008

	Labor Force	Employment	Unemployment	Unemployment Rate
2000	1,602	1,566	36	2.2
2001	1,534	1,491	43	2.8
2002	1,470	1,414	56	3.8
2003	1,544	1,486	58	3.8
2004	1,438(e)	1,394(e)	44(e)	3.1(e)
2005	1,318(e)	1,272(e)	46(e)	3.5(e)
2006	1,273(e)	1,230(e)	43(e)	3.4(e)
2007	1,270(e)	1,222(e)	48(e)	3.8(e)
2008	1,246(e)	1,207(e)	39(e)	3.1(e)

(e): Reflects revised inputs, reestimation, and new statewide controls.

SOURCE: Bureau of Labor Statistics, Local Area Unemployment Series

TABLE 4
LABOR FORCE DATA FOR OKLAHOMA, 2000 to 2008

	Labor Force	Employment	Unemployment	Unemployment Rate
2000	1,661,045	1,609,522	51,523	3.1
2001	1,676,254	1,614,627	61,627	3.7
2002	1,683,186	1,602,118	81,068	4.8
2003	1,694,085	1,598,614	95,471	5.6
2004	1,689,746(d)	1,605,641(d)	84,105(d)	5.0(d)
2005	1,701,703(d)	1,625,062(d)	76,641(d)	4.5(d)
2006	1,719,613(d)	1,648,828(d)	70,785(d)	4.1(d)
2007	1,738,010(d)	1,667,493(d)	70,517(d)	4.1(d)
2008	1,748,416(d)	1,681,854(d)	66,562(d)	3.8(d)

(d): Reflects revised inputs, reestimation, and new statewide controls.

SOURCE: Bureau of Labor Statistics, Local Area Unemployment Series

TABLE 5
PERSONAL INCOME BY MAJOR SOURCE FOR CIMARRON COUNTY, 2001-2007

	2001	2002	2003	2004	2005	2006	2007
<u>Income by place of residence (\$000)</u>							
Personal income	64,034	61,218	63,072	60,759	60,607	58,672	62,965
Population (persons)	3,056	2,980	2,892	2,782	2,689	2,660	2,630
Per capita personal income (dollars)	20,954	20,543	21,809	21,840	22,539	22,057	23,941
<u>Derivation of personal income (\$000)</u>							
Earnings by place of work	34,034	32,107	35,442	34,089	34,411	33,016	35,415
less: Contributions for government social insurance	2,993	2,984	3,117	3,253	3,379	3,425	3,766
plus: Adjustment for residence	2,411	2,689	2,692	2,897	2,697	2,807	3,017
equals: Net earnings by place of residence	33,452	31,812	35,017	33,733	33,729	32,398	34,666
plus: Dividends, interest, and rent	19,113	16,848	15,220	13,722	13,156	11,680	12,910
plus: Personal current transfer receipts	11,469	12,558	12,835	13,304	13,722	14,594	15,389
<u>Earnings by place of work (\$000)</u>							
Components of earnings							
Wage and salary disbursements	20,717	19,050	19,819	21,632	21,797	22,257	23,557
Supplements to wages and salaries	4,832	5,010	5,226	5,701	5,932	5,960	6,087
Proprietors' income	8,485	8,047	10,397	6,756	6,682	4,799	5,771
Farm proprietors' income	1,709	2,703	4,495	314	65	-1,843	-2,220
Nonfarm proprietors' income	6,776	5,344	5,902	6,442	6,617	6,642	7,991

SOURCE: Bureau of Economic Analysis, Regional Economic Information System, 1969-2007, v.4.1.3.

TABLE 6
 SALES TAX COLLECTION BY TOWN AND CITY FOR CIMARRON COUNTY FY 2001-
 2008

	Boise City	Keyes
2001	\$334,721.90	\$37,256.79
2002	\$344,361.55	\$35,338.86
2003	\$319,656.94	\$21,323.38
2004	\$316,234.85	\$25,713.66
2005	\$312,947.70	\$23,177.88
2006	\$355,518.72	\$24,845.33
2007	\$338,230.98	\$25,016.01
2008	\$324,364.86	\$14,479.49

SOURCE: Oklahoma Tax Commission: Annual Reports, Municipal Sales Taxes. Fiscal Year Ended June 30, 2001-2008.

Some Basic Concepts of Community Economics

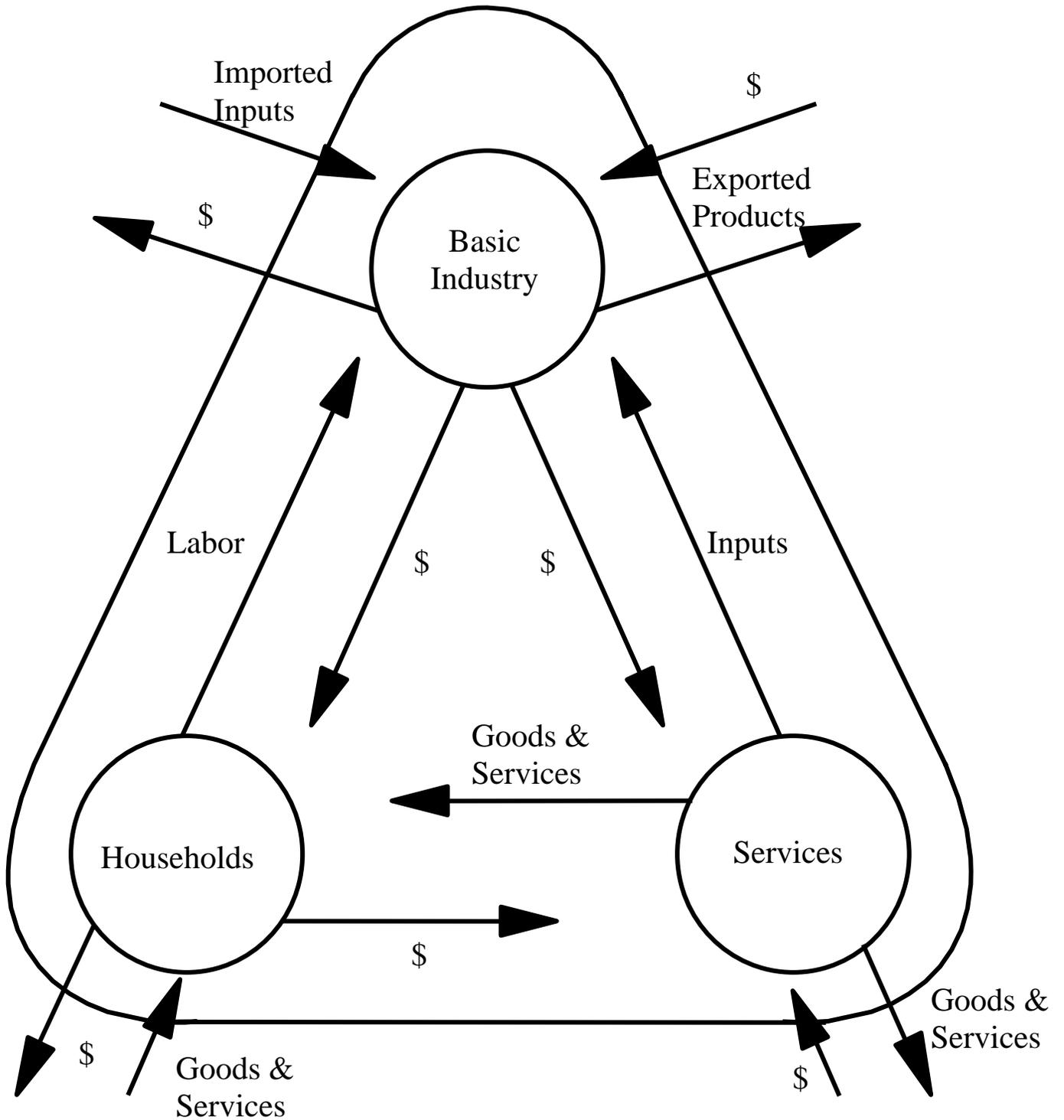
Industries or businesses that produce goods primarily for sale outside the economy are called basic industries. They are important components of all economic systems. Two other major components of economic systems are service firms and households. Figure 1 illustrates the major flows of these three sectors within any economy with respect to the basic industries in the community.

When a new basic industry enters a community, such as the wind turbine manufacturer, it purchases labor from households and reimburses them with wages and benefits. The new manufacturer may also purchase other inputs from local manufacturing and service firms. Whatever the turbine manufacturer cannot purchase locally, or produce in-house, is imported into the community. The value of output produced (or the level employment needed to produce a given amount of output) by the basic industry is called the direct impact on the local economy.

The increase in demand for products from existing manufacturing and service firms due to the new basic industry causes a secondary effect in the local economy. In order to meet the demand of the new manufacturer, the existing firms must increase their own employment and purchase of other inputs to increase their output. Thus, a new basic industry causes an indirect effect by increasing the production/employment of existing firms in the local economy.

There is a third effect that could result from the wind turbine manufacturer and wind farm project. Newly hired employees at the new firm and existing firms spend their wages to purchase goods and services from retail and service businesses in the community. This increase in household consumption could cause new retail establishments to open and existing retailers to expand by hiring more employees and buying more inventory. Increasing employment induces increased household consumption, so the third effect is known as the induced effect.

Figure 1
Overview of Community Economic System



The above discussion indicates how basic industries serve as the foundation of an economy and how households and service firms are necessary to make the economy function. Service industries account for a substantial part of the outputs of most economies. But, as Figure 1 shows, much of the service industries' output supports the local basic industries and households. Mathematical techniques can be used to measure the relationships between basic industries, households, and services.

A measure used in economics to describe the effects of an increase or decrease in economic activity is called a multiplier. A Type III multiplier is used for this study. A Type III multiplier is defined as the ratio between direct employment (or output) and the sum of the direct, indirect, and induced employment (or output). A Type III income multiplier of 1.5 indicates that if one dollar is generated by the direct activity, then 0.50 additional dollars are generated due to business (indirect) and household (induced) spending. IMPLAN is a computerized database and economic model developed by the U.S. Forest Service, and it is used to generate multipliers for this analysis. For further details regarding this methodology, see the references listed at the end of this report.

Direct, Indirect and Induced, and Total Impacts of Visitors on Cimarron County

The economic activity generated by the wind turbine manufacturer and associated wind farm in Cimarron County is described in this section. According to estimates from the Oklahoma Department of Commerce, the company will invest \$400 million in land (\$200,000), buildings (\$5 million), and equipment (\$394.8 million). Once operational, the manufacturing facility will employ 320 persons by year 3 expanding to 450 persons by year 5. The average salaries for workers in the facility will be \$40,000 plus benefits. In addition, 3,000 turbines will be built along with a transmission line. This portion of the project will require 150 technicians at an average salary of \$60,000 plus benefits. This information is summarized in Table 7.

As alluded to in Table 7, these impacts will be discussed in two phases. In the first phase, we consider the construction of the facility and the wind farm. These impacts will have limited persistence in the local economy, since the jobs associated with these tasks will disappear once construction is completed. The second phase of the analysis is to look at the impact of employment in the manufacturing facility, which will amount to an ongoing benefit as long as the facility continues to operate.

The direct and secondary (indirect and induced) impacts of this project by phase are summarized in Tables 8 and 9. The construction phase results, presented in Table 8, will persist only as long as the construction of the facility, 1-2 years. Construction activities will generate an additional \$6,295,283 through indirect and induced effects. The total effect of the construction phase is estimated to be \$458,945,284. (Since land purchases represent a transfer of wealth but no real economic activity, it will not have an indirect or induced effect in Cimarron County. Also, it is assumed that all equipment purchases are made outside of the county, so that there are also no indirect and induced effects associated with equipment purchases.)

The operations phase results of the manufacturing facility will occur annually as long as employment remains constant; these results are in Table 9. By year 3 of operations, the plant is expected to employ 320 persons and produce an estimated \$108 million of output. Additional economic activity in the amount \$7,423,013, or 76.4 full-time equivalent (FTE) jobs, will be generated in the county through indirect and induced effects in year 3. The total impact of the plant in year 3 is estimated to be \$115.5 million of output and 396 jobs. The plant is expected to reach capacity production in year 5; it will employ 450 persons and generate \$152 million of output then. In year 5, the plant will stimulate an additional \$10.4 million in output, or create 107.5 FTE jobs, via indirect and induced effects. The total effect of this facility in year 5 is estimated to be \$162.45 million in output, or 557 jobs.

This project has the potential to generate significant tax revenue for Cimarron County. In Boise City, the total property tax millage is 62.68, and property is assessed at 13% of market value. Thus, the \$400 million investment in the manufacturing facility and wind farm will gross \$3,259,360 in property tax revenue. These results are presented in Table 10.

The level of taxable sales in Cimarron County will likely be impacted by the wind turbine manufacturer and wind farm also. This, in turn, will affect local sales tax revenues for cities and the county. The estimated increase in sales tax revenue from this project is presented in Table 10. To compute these sales tax revenue estimates, it is assumed that all of the induced impact will be subject to sales tax. We further assume that only 27.9% of personal income is spent within the county, and apply this percentage to the sales subject to tax to estimate \$779,054-1,095,545 in taxable sales in Cimarron County. Based upon current sales tax rates, Cimarron County will likely gain sales tax revenues of \$23,837 from the construction phase and between \$23,372 and \$32,866 from the operation phase of the project. Boise City is estimated to receive an additional

\$10,603 and between \$10,396 and \$14,620 from the construction and operation phases, respectively. Keyes also levies a sales tax and could realize some increase in revenues due to this project.

TABLE 7
DIRECT IMPACT OF WIND TURBINE MANUFACTURER AND ASSOCIATED WIND FARM ON CIMARRON COUNTY

	Investment	Employment	Average Salaries ¹
Construction Phase:			
-- Manufacturing Facility	\$5,000,000		
-- Purchase of Equipment	\$394,800,000		
-- Land Purchase	\$200,000		
-- 3,000 Turbine Wind Farm		150	\$80,000
Operations Phase:			
-- Manufacturing Facility (Yr. 3)		320	\$53,333
-- Manufacturing Facility (Yr. 5)		450	\$53,333

Source: Information provided by Oklahoma Department of Commerce

¹ Average salaries include estimated benefits at a rate of 33.3% of wages.

TABLE 8
INDIRECT AND INDUCED IMPACTS FROM THE CONSTRUCTION PHASE OF THE WIND TURBINE MANUFACTURER AND ASSOCIATED WIND FARM ON CIMARRON COUNTY

	Employment	Indirect Impact	Induced Impact	Total Impact
Wind Farm (turbines and transmission line)	150	43.5	28.9	222.4
Manufacturing Facility Construction	52	2	3.7	57.7

	Output	Indirect Impact	Induced Impact	Total Impact
Land Purchase	\$200,000	-	-	\$200,000
Equipment Purchase	\$395,000,000	-	-	\$395,000,000
Wind Farm (turbines and transmission line)	\$52,650,000	\$3,278,985	\$2,523,304	\$58,452,289
Manufacturing Facility Construction	\$5,000,000	\$169,061	\$323,933	\$5,492,995

Source: Based upon multipliers generated using IMPLAN 2007 data and software

TABLE 9
INDIRECT AND INDUCED IMPACTS FROM THE OPERATION PHASE OF THE
WIND TURBINE MANUFACTURER AND ASSOCIATED WIND FARM ON CIMARRON
COUNTY

	Direct Employment	Indirect Impact	Induced Impact	Total Impact
Turbine Manufacturer, yr 3	320	44.1	32.3	396.4
Turbine Manufacturer, yr 5	450	62	45.5	557.5

	Direct Output	Indirect Impact	Induced Impact	Total Impact
Turbine Manufacturer, yr 3	\$108,097,000	\$4,631,374	\$2,791,639	\$115,520,013
Turbine Manufacturer, yr 5	\$152,011,408	\$6,512,875	\$3,925,743	\$162,450,026

Source: Based upon multipliers generated using IMPLAN 2007 data and software

TABLE 10
COUNTY AND CITY TAX REVENUES GENERATED BY WIND TURBINE
MANUFACTURER AND WIND FARM IN BOISE CITY, CIMARRON COUNTY

	Market Value of Property	Assessment Rate	Millage ¹	Tax Revenue
Total Property Taxes	\$400,000,000	13.0%	62.68	\$3,259,360

Construction Phase	Share of County Sales	Total Sales Subject to Tax ²	Sales Tax Rate	Sales Tax Revenue
Cimarron County	100.0%	\$794,569	3.0%	\$23,837
Boise City	66.7%	\$530,168	2.0%	\$10,603
Keyes	5.8%	\$46,377	2.0%	\$928

Operation Phase	Share of County Sales	Total Sales Subject to Tax ²		Sales Tax Rate	Sales Tax Revenue	
		Year 3	Year 5		Year 3	Year 5
Cimarron County	100.0%	\$779,054	\$1,095,545	3.0%	\$23,372	\$32,866
Boise City	66.7%	\$519,815	\$730,991	2.0%	\$10,396	\$14,620
Keyes	5.8%	\$45,472	\$63,945	2.0%	\$909	\$1,279

⁽¹⁾ Reported millage is for property located in the Boise City School District, and it includes all other county ad valorem rates.

⁽²⁾ Based on county retail sales to personal income ratio of 27.9% applied to the appropriate induced impact

Summary

The economic impacts of a proposed wind turbine manufacturing facility and associated 3,000 turbine wind farm located in Boise City, Oklahoma have been estimated in this report. Output and employment impacts to the Cimarron County economy were presented as well as estimated effects on property and sales tax revenues. Total economic impact of the construction phase of the project to Cimarron County is more than \$489 million and could generate more than \$3.2 million in property tax revenue annually. This results in sales tax collections for the county in the amount of \$23,837, and for the city of Boise City in the amount of \$10,603. During the operation phase of the project, sales tax collections for the county could range between \$23,372 and \$32,866. Boise City could see an additional \$10,396-14,620 in additional sale tax revenue during the operation phase of the project.

Other benefits and/or costs may exist which were not included in this study. An additional caveat is that the model used herein works best for small changes in local communities; the manufacturing facility, even in year 3, represents a 15% increase in total county employment, and a 30% increase in total nonfarm, private employment. Barring the availability of economic tools to model such a dramatic shift in a local economy, the methodology used in this report is the best available, but the numbers presented should be interpreted as rough estimates. It should also be noted that the estimates are based on employment and investment figures provided by the Oklahoma Department of Commerce. For further information about this report contact the authors.

Further Reading

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