Economic Impact Analysis for the Overland Pass Energy East Wind Project

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Strategic Economic Research, LLC

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Dr. Loomis has published over 40 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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Strategic Economic Research, LLC (SER) provides economic consulting for renewable energy projects across the U.S. We have produced over 200 economic impact reports in 30 states. Research Associates who performed work on this project include Paige Afram, Riley Bansch, Coryell Birchfield, Zoe Calio, Patrick Chen, Kathryn Keithley, Kate Kostrub, Ethan Loomis, Mandi Mitchell, Russell Piontek, Tim Roberts, Madison Schneider, and Morgan Stong.

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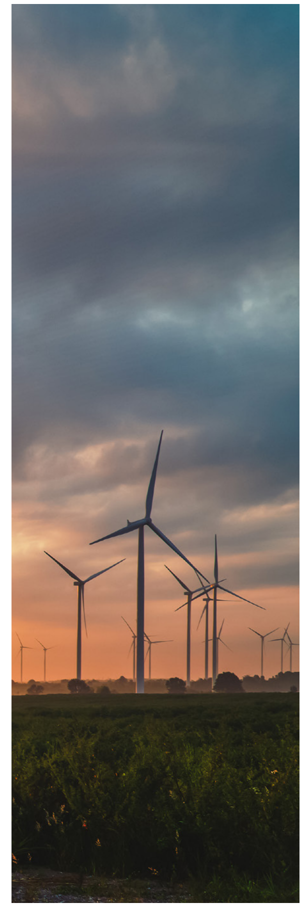

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I. Executive Summary

National Renewable Solutions is developing the Overland Pass Energy East Wind Project in Sedgwick County, Colorado. The purpose of this report is to evaluate the economic impact of this Project on Sedgwick County and the State of Colorado. The basis of this analysis is to study the direct, indirect, and induced impacts on job creation, wages, and total economic output.

The Project consists of an estimated 800 megawatts ("MW") of capacity of wind turbines and the associated access roads, transmission and communication equipment, storage areas, and control facilities (the "Project"). For purposes of this report, a total name plate capacity of 800 MW in Sedgwick County was assumed. The Project represents an investment of over $1.2 billion in Sedgwick County. The life of the Project is assumed to be 30 years. The total development is anticipated to result in the following:

Jobs

- 117 new jobs during construction for Sedgwick County
- 1,997 new jobs during construction for the State of Colorado
- 20.4 new long-term jobs for Sedgwick County
- 195.2 new long-term jobs for the State of Colorado

Earnings

- Over $9.5 million in new earnings during construction for Sedgwick County
- Over $191 million in new earnings during construction for the State of Colorado
- Over $912 thousand in new long-term earnings for Sedgwick County annually
- Over $15.8 million in new long-term earnings for the State of Colorado annually

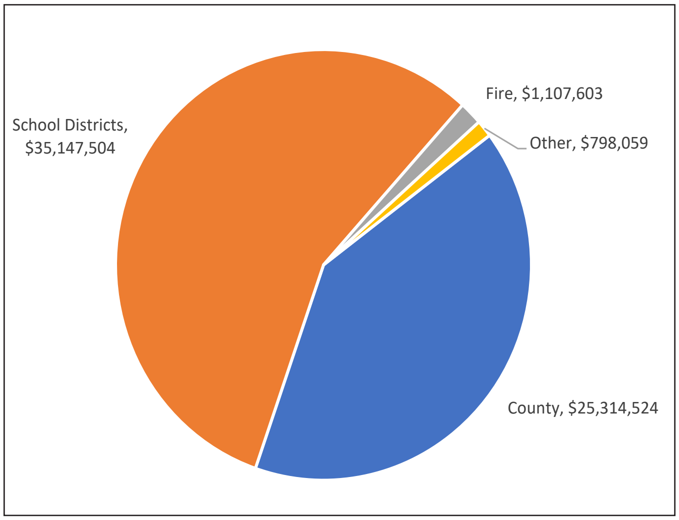
Output - the value of production in the state or local economy. It is an equivalent measure to the Gross Domestic Product.

- Over $16.2 million in new output during construction for Sedgwick County
- Over $389 million in new output during construction for the State of Colorado
- Over $5.9 million in new long-term output for Sedgwick County annually
- Over $62.0 million in new long-term output for the State of Colorado annually

Property Taxes

- Over $35.1 million in total school district revenue over the life of the Project
- Over $25.3 million in total county property taxes for Sedgwick County over the life of the Project
- Over $62.3 million in property taxes in total for all taxing districts over the life of the Project

Figure 1 – Total Property Taxes Paid by the Overland Pass Energy East Wind Project



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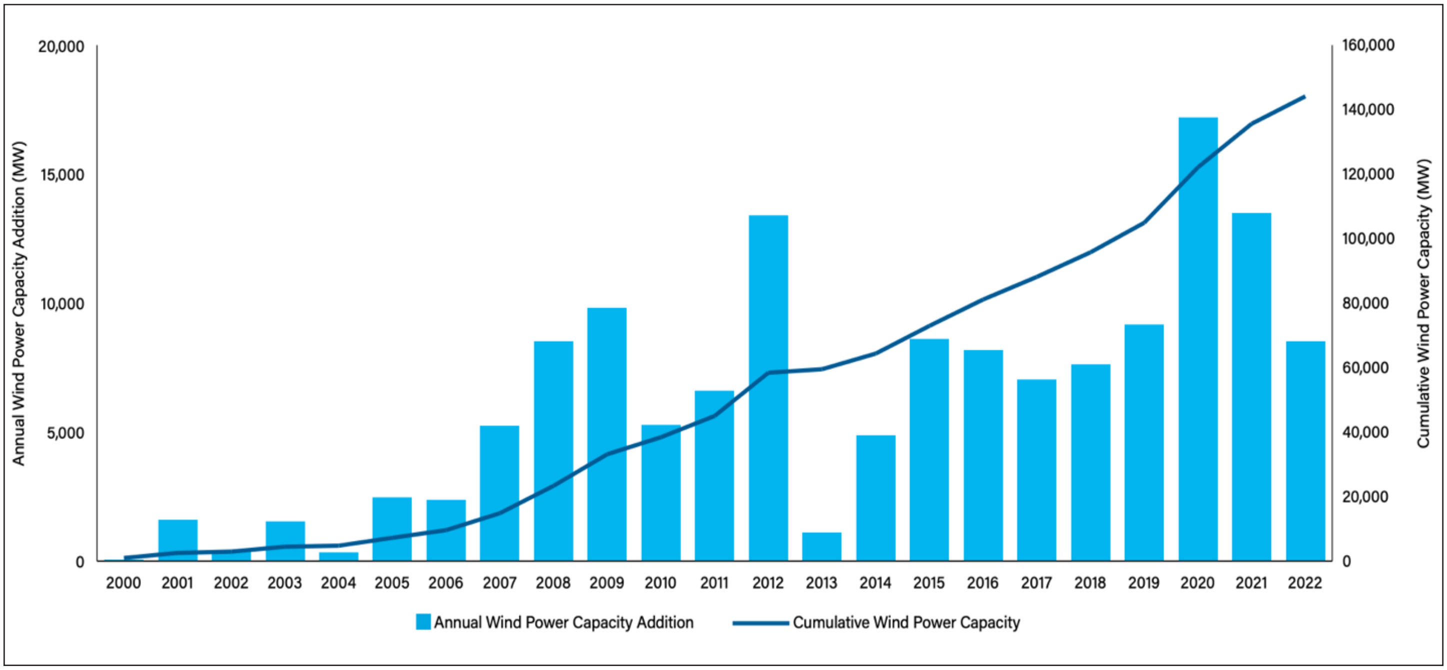
II. Wind Industry Growth and Economic Development

a. United States Wind Industry Growth

The United States wind industry grew at a rapid pace from 2006-2020, pausing only in 2013 due to federal policy uncertainty. In 2020, the U.S. set a new record of 16,913 MW far surpassing the previous annual peak of 13,131 MW of wind power installed in 2012 (American Clean Power (ACP), 2021). The total wind capacity installed in 2021 was 13,400 MW (ACP, 2022). In 2022, there was a total capacity of 8,511 MW installed which is about equal to the 2015-2019 annual installation amounts (ACP, 2023).

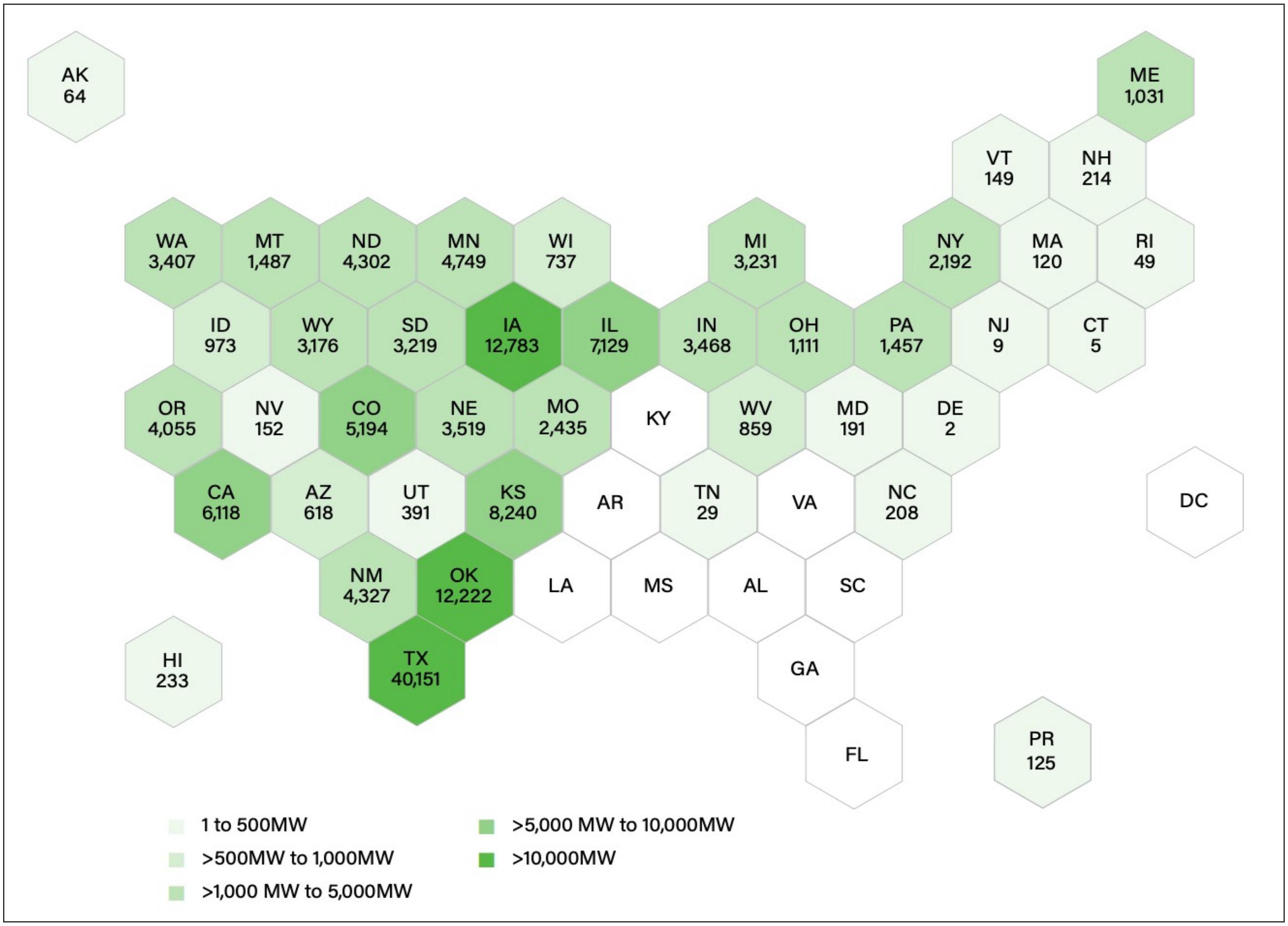
The total amount of wind capacity in the U.S. by the end of 2022 was 144,184 MW (ACP, 2023). China is the global leader with 333,998 MW of installed capacity, with Germany in third place with 58,958 MW of installed capacity (2022 figures with the United States in second place) (GWEC, 2023). Figure 2 shows the growth in installed annual capacity and cumulative capacity in the U.S. and Figure 3 shows the state-by-state breakdown of installed capacity by the end of 2022.

Figure 2 – United States Annual and Cumulative Wind Power Capacity Growth



Source: ACP Q3 Market Report 2022

Figure 3 – Total Wind Capacity by State



Source: ACP Annual Market Report 2022

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. Finally, several large corporate buyers increased the demand for wind energy beyond the traditional electric utility market.

b. Colorado Wind Industry Growth

Colorado is a national leader in the wind energy industry (American Clean Power, 2022). As of February 2023, Colorado is ranked 8th in the United States in existing wind, solar, and energy storage capacity with over 6,507 MW (ACP, 2023). Table 1 has a list of the operational wind farms in Colorado through 2023 (some small projects below 50 MW were omitted from the table). The year-by-year and cumulative growth in Colorado's wind energy capacity is shown in Figure 4. In 2007, Colorado had four projects completed with the second largest annual total installed capacity of 789.3 MW. Two projects were completed in 2018 with an annual total installed capacity of 600 MW. Growth exploded in 2020 with three projects completed with the largest total annual installed capacity of 967.5 MW.

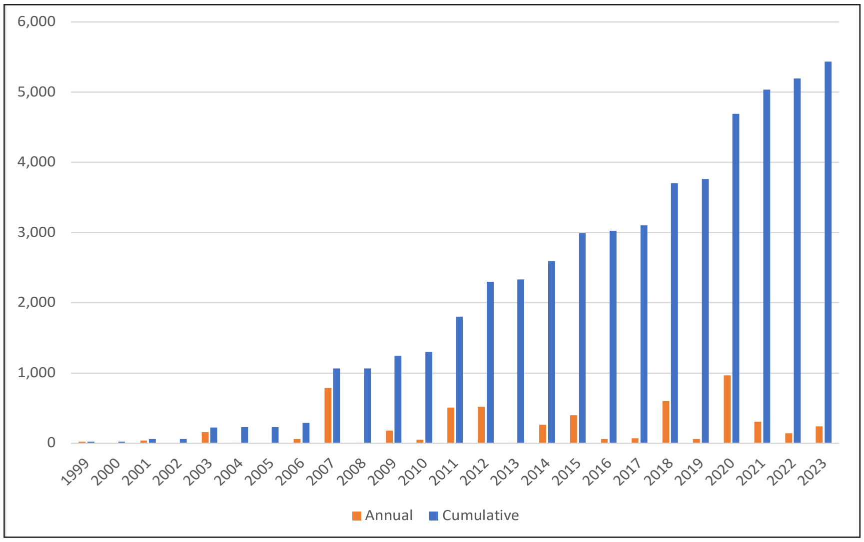
The Energy Information Administration (EIA) calculated the number of megawatt-hours generated from different energy sources in 2022. As shown in Figure 5, the greatest percentage of electricity generated in Colorado comes from coal with 41.6% followed by wind with 26.5% and natural gas with 25.5%.

The U.S. Department of Energy sponsors the U.S. Energy and Employment Report each year. Electric Power Generation covers all utility and non-utility employment across electric generating technologies, including fossil fuels, nuclear, and renewable technologies. It also includes employees engaged in facility construction, turbine and other generation equipment manufacturing, operations and maintenance, and wholesale parts distribution for all electric generation technologies. According to Figure 6, employment in Colorado in the wind energy industry (7,741) trails behind solar energy generation (8,473) but is greater than coal generation (2,179), traditional hydroelectric generation (955) and natural gas generation (922).

Table 1 – Colorado Wind Farm Projects

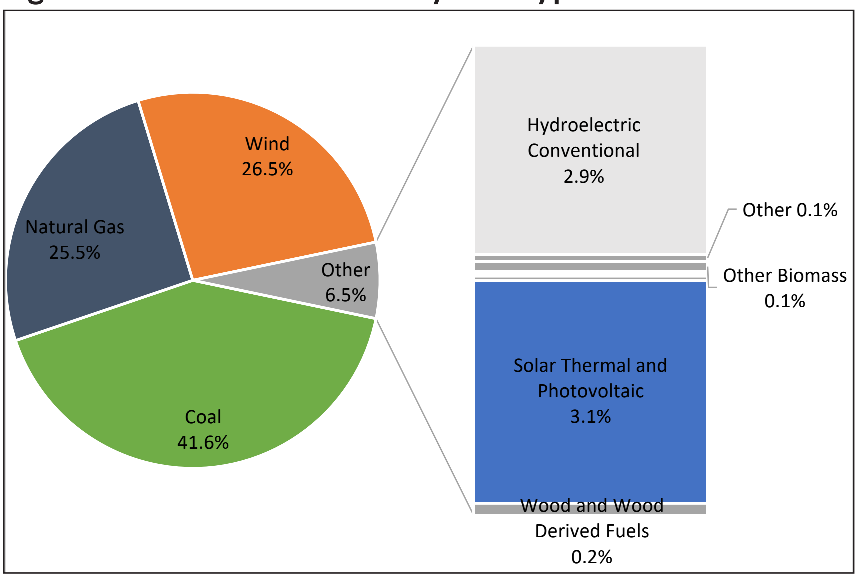
Wind Farm	Capacity (MW)	Year Online
Bronco Plains	299.4	2020
Busch Ranch	88.2	2012
Carousel	149.7	2015
Cedar Creek	551.3	2011
Cedar Point Wind	252.3	2011
Chevelon Butte Wind Farm	239	2023
Cheyenne Ridge	496.4	2020
Colorado Green Wind	162	2003
Colorado Highlands	91	2012
Crossing Trails	104	2021
Golden West Wind Farm	249.2	2015
Kit Carson Project	51	2010
Limon	600.6	2012
Logan Wind	201	2007
Mountain Breeze	171.7	2020
Niyol	200.8	2021
Northern Colorado	175.8	2009
Panorama Wind	145	2022
Peak View Wind	60.9	2016
Peetz Table	212.8	2007
Rush Creek	600	2018
Spring Canyon	122.7	2006
Twin Buttes	150	2007

Figure 4 – Installed Capacity of Colorado Wind Projects



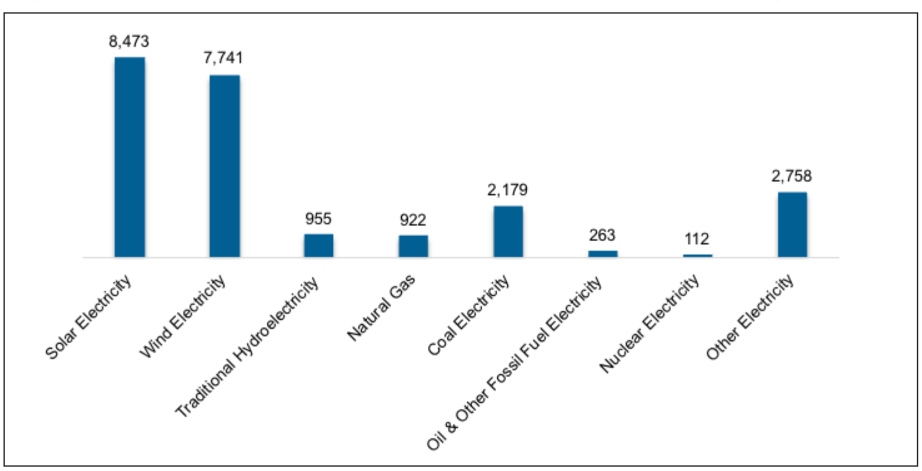
Source: American Clean Power, June 2023, Colorado

Figure 5 – Electric Generation by Fuel Type for Colorado in 2022



Source: U.S. Energy Information Association (EIA): Colorado, 2022

Figure 6 – Electric Generation Employment by Technology



Source: U.S. Energy and Employment Report 2023: Colorado

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c. Economic Benefits of Wind Farms

Wind farms create numerous economic benefits that continue to last for decades. Wind farms create 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, and supply chain jobs.

Wind developers typically lease the land for the turbines from local landowners without materially affecting ongoing agricultural uses. Only a small portion of the total project footprint is used for the turbines, access roads, feeder lines, and substations. For most wind projects, it is anticipated that approximately 1-2% of the total leased land will actually contain facilities. Each turbine and the associated access road will use approximately half an acre to one acre of farmland. Lease payments made to landowners provide a reliable source of long-term income which offsets the fluctuating prices received from crops or the impact of weather events on production. Landowners then have additional funds to make purchases in the local economy and elsewhere.

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, therefore, strengthen the local tax base helping to improve county services, schools, police and fire departments and fund infrastructure improvements such as public roads.

Numerous studies have quantified the economic benefits across the United States. The National Renewable Energy Laboratory has produced economic impact reports for the State of Arizona (NREL, 2008a), State of Idaho (NREL, 2008b), State of Indiana (NREL, 2014), State of Iowa (NREL, 2013), State of Maine (NREL, 2008c), State of Montana (NREL, 2008d), State of New Mexico (NREL, 2008e), State of Nevada (NREL, 2008f), State of Pennsylvania (NREL, 2008g), State of South Dakota (NREL, 2008h), State of Utah (NREL 2008i), State of West Virginia (NREL, 2008j), State of Wisconsin (NREL, 2008k), and the State of North Carolina (NREL, 2009).

The Center for Renewable Energy at Illinois State University released a report examining the economic impact of Illinois' wind farms and the economic impact of the related wind turbine supply chain in Illinois (see https://renewableenergy.illinoisstate.edu/wind/pubs.php). According to the Economic Impact: Wind Energy Development in Illinois (June 2016), "the 25 largest wind farms in Illinois:

- Created approximately 20,173 full-time equivalent jobs during construction periods
- Support approximately 869 permanent jobs in rural Illinois areas
- Support local economies by generating $30.4 million in annual property taxes
- Generate $13.8 million annually in extra income for Illinois landowners who lease their land to the wind farm developer
- Will generate a total economic benefit of $6.4 billion over the life of the projects."

Loomis (2020) estimates the economic impact of wind and solar energy in Illinois resulting from the proposed Path to 100 legislation. The legislation is expected to result in constructing over 15,000 MW of wind and solar over the next 15 years yielding over 53,000 jobs during construction and over 3,200 jobs during operations. The analysis also looks at the 39 largest existing wind farms in Illinois and finds that they supported 29,295 jobs during construction and 1,307 jobs during operations for a total economic benefit of $10.2 billion over the life of the projects. In addition, a review of historical property tax records finds that existing utility-scale wind and solar projects paid over $305 million in property taxes statewide since 2003 and over $41.4 million in 2019 alone.

More recently, Jenniches (2018) performed a review of the literature assessing the regional economic impacts of renewable energy sources. After reviewing all of the different techniques for analyzing the economic impacts, he concludes "for assessment of current renewable energy developments, beyond employment in larger regions, IO [Input-Output] tables are the most suitable approach" (Jenniches, 2018, 48). Input-Output analysis is the basis for the methodology used in the economic impact analysis of this report.

Finally, Brunner and Schwegman (2022) examined the economic impacts of wind installations across the United States from 1995 to 2018. They found that wind energy projects resulted in "economically meaningful increases in county GDP per-capita, income per-capita, median household income, and median home values" (p. 165).

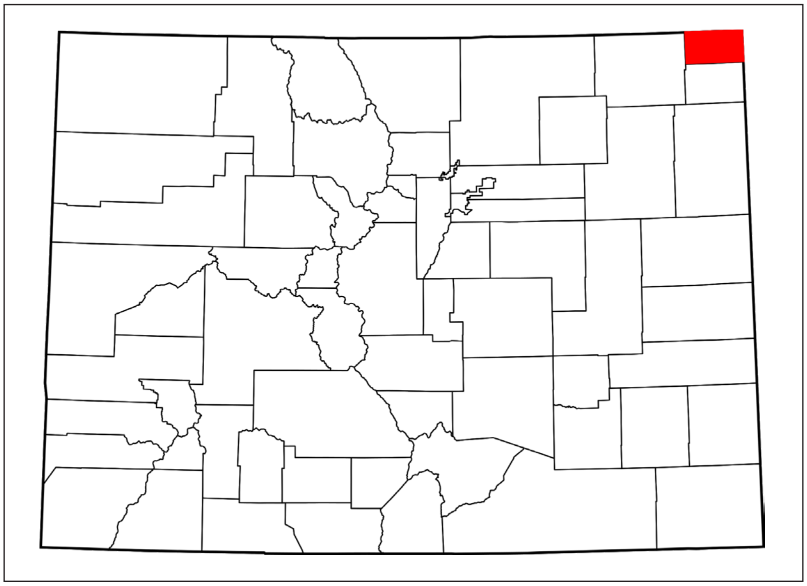
III. Project Description and Location

a. Overland Pass Energy East Wind Project

National Renewable Solutions is developing the Overland Pass Energy East Wind Project in Sedgwick County, Colorado. The Project consists of an estimated 800 megawatts ("MW") of capacity of wind turbines and the associated access roads, transmission and communication equipment, storage areas, and control facilities. The Project represents an investment of over $1.2 billion.

b. Sedgwick County, Colorado

Figure 7 – Location of Sedgwick County, Colorado



Sedgwick County is located in the northeastern part of Colorado (see Figure 7). It has a total area of 549 square miles, and the U.S. Census estimates that the 2022 population was 2,295 with 1,344 housing units. The county has a population density of 4.4 (persons per square mile) compared to 56.25 for the State of Colorado. Median household income in the county was $44,405 (U.S. Census Bureau).

Table 2 – Employment by Industry in Sedgwick County

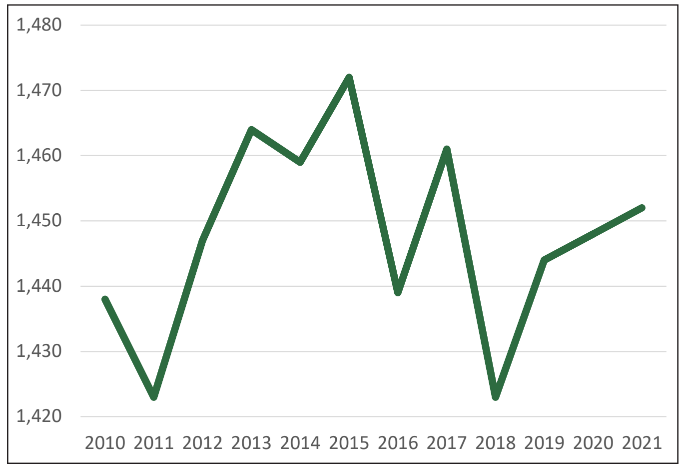
Industry	Number	Percent
Agriculture, Forestry, Fishing and Hunting	447	32.2%
Administrative Government	234	16.9%
Retail Trade	94	6.8%
Transportation and Warehousing	84	6.1%
Finance and Insurance	68	4.9%
Manufacturing	66	4.7%
Construction	59	4.3%
Accommodation and Food Services	56	4.0%
Health Care and Social Assistance	50	3.6%
Arts, Entertainment, and Recreation	35	2.5%
Administrative and Support and Waste Management and Remediation Services	34	2.5%
Professional, Scientific, and Technical Services	34	2.4%
Wholesale Trade	33	2.4%
Other Services (except Public Administration)	29	2.1%
Government Enterprises	16	1.1%
Utilities	13	0.9%
Information	9	0.6%
Mining, Quarrying, and Oil and Gas Extraction	9	0.6%
Educational Services	8	0.6%
Real Estate and Rental and Leasing	7	0.5%
Management of Companies and Enterprises	0	0.0%

Source: Impact Analysis for Planning (IMPLAN), County Employment by Industry, 2021

As shown in Table 2, the largest industries in the county are “Agriculture, Forestry, Fishing and Hunting” followed by “Administrative Government,” “Retail Trade” and “Transportation and Warehousing.” These data for Table 2 come from IMPLAN covering the year 2021 (the latest year available).

Table 2 provides the most recent snapshot of total employment but does not examine the historical trends within the county. Figure 8 shows employment from 2010 to 2021. Total employment in Sedgwick County was at its highest at 1,472 in 2015 and its lowest at 1,423 in 2018 (BEA, 2023). Since 2018, employment in the county has increased.

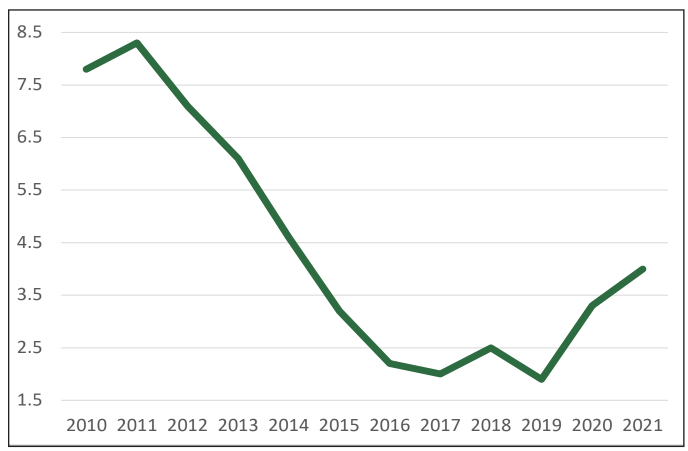
Figure 8 – Total Employment in Sedgwick County from 2010 to 2021



Source: Bureau of Economic Analysis, Regional Data, GDP and Personal Income, 2010-2021

The unemployment rate signifies the percentage of the labor force without employment in the county. Figure 9 shows the unemployment rates from 2010 to 2021. Unemployment in Sedgwick County was at its highest at 8.3% in 2011 and its lowest at 1.9% in 2019 (FRED, 2023).

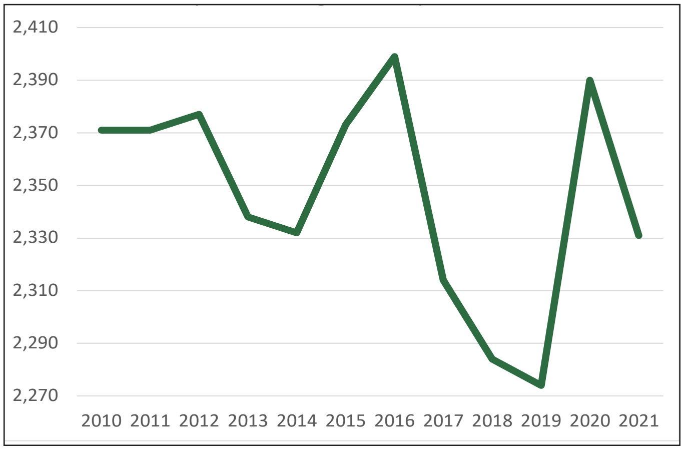
Figure 9 – Unemployment Rate in Sedgwick County from 2010 to 2021



Source: Federal Reserve Bank of St. Louis Economic Data, U.S. Census Bureau, Unemployment Rates, 2010-2021

The overall population in the county has fluctuated slightly, as shown in Figure 10. Sedgwick County's population was 2,371 in 2010 and 2,331 in 2021, a loss of 40 people (FRED, 2023). The average annual population decrease over this time period was 3 people.

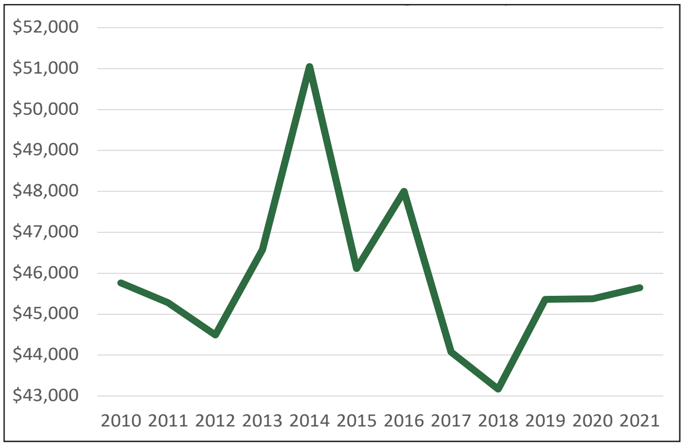
Figure 10 – Population in Sedgwick County from 2010 to 2021



Source: Federal Reserve Bank of St. Louis Economic Data, U.S. Census Bureau, Population Estimates, 2010-2021

Similar to the population trend, household income has fluctuated in the county. Figure 11 shows the real median household income in Sedgwick County from 2010 to 2021. Using the national Consumer Price Index (CPI), the nominal median household income for each year was adjusted to 2021 dollars. Household income was at its highest at $51,049 in 2014 and its lowest at $43,168 in 2018 (FRED, 2023).

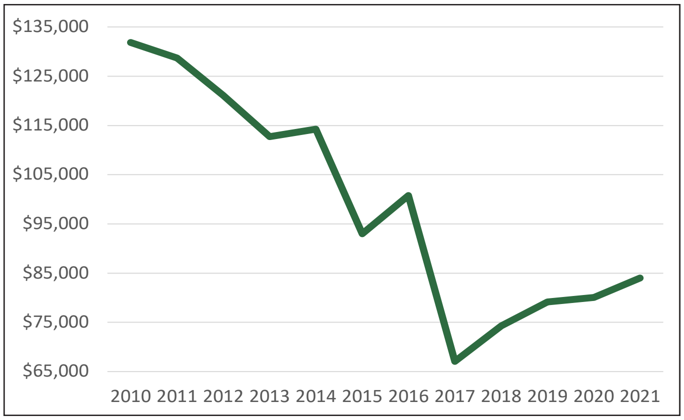
Figure 11 – Median Household Income in Sedgwick County from 2010 to 2021



Source: Federal Reserve Bank of St. Louis Economic Data, U.S. Census Bureau, Estimate of Median Household Income, 2010-2021

Real Gross Domestic Product (GDP) is a measure of the value of goods and services produced in an area and adjusted for inflation over time. The Real GDP for Sedgwick County has increased since hitting a low in 2017, as shown in Figure 12 (BEA, 2023).

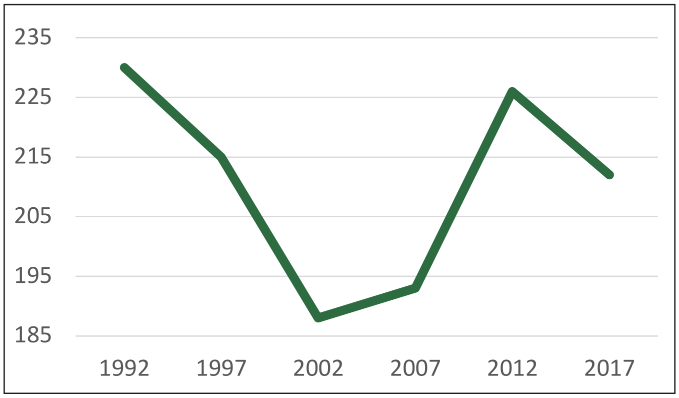
Figure 12 – Real Gross Domestic Product (GDP) in Sedgwick County from 2010 to 2021



Source: Bureau of Economic Analysis, Regional Data, GDP and Personal Income , 2010-2021

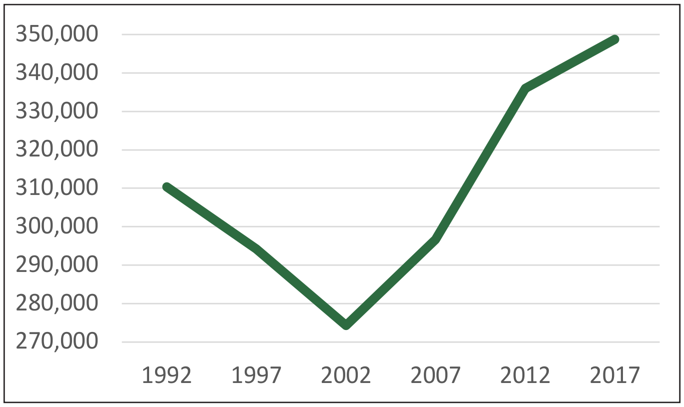
The farming industry has fluctuated in Sedgwick County. As shown in Figure 13, the number of farms hit a high of 230 in 1992 and a low of 188 in 2002. The amount of land in farms has increased significantly. The county farmland hit a low of 274,243 acres in 2002 and a high of 348,739 acres in 2017, according to Figure 14.

Figure 13 – Number of Farms in Sedgwick County from 1992 to 2017



Source: USDA National Agricultural Statistics Service, Census of Agriculture, 1992-2017

Figure 14 – Land in Farms in Sedgwick County from 1992 to 2017



Source: USDA National Agricultural Statistics Service, Census of Agriculture, 1992-2017

IV. Methodology

The economic analysis of the 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 an input-output 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, etc. Therefore, purchases of wind turbines impact the demand for these components. 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 on goods and services within their community. 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. It analyzes the gross jobs that the new wind farm development supports.

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, 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 wind turbine technicians.

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 substation and 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. 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, e-mail 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, 2023).

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, 2023).

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 during that time which is consistent with the JEDI results at the county level (Brown, 2012).

V. Results

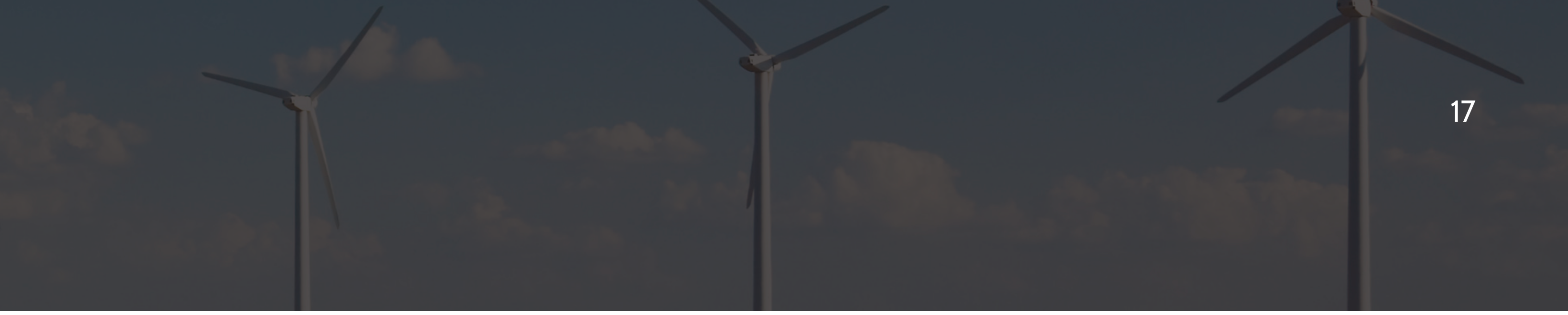
The results were derived from project cost estimates supplied by National Renewable Solutions. In addition, National Renewable Solutions helped estimate the percentages of project materials and labor that will be coming from within Sedgwick County and the State of Colorado.

Two separate JEDI models were run to show the economic impact of the Project. The first JEDI model used the 2021 Sedgwick County multipliers from IMPLAN. The second JEDI model used the 2021 State of Colorado multipliers from IMPLAN and the same project costs. Because the multipliers and the local content percentage are different for the two models, the results are independent from one another. However, any local content coming from Sedgwick County obviously comes from the State of Colorado as well. Similarly, the State of Colorado multipliers will generally be larger than Sedgwick County multipliers, but some individual sectors of the economy could be stronger.

The output from these models is shown in Tables 3 to 5. Table 3 lists the total employment impact from the Project for Sedgwick County and the State of Colorado. Table 4 shows the impact on total earnings, and Table 5 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 25-40 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 3 – Total Employment Impact from the Overland Pass Energy East Wind Project

	Sedgwick County Jobs	State of Colorado Jobs
Construction		
Project Development and Onsite Labor Impacts	51	590
Turbine and Supply Chain Impacts	43	848
Induced Impacts	23	559
New Local Jobs during Construction	*117*	*1,997*
Operations		
Onsite Labor Impacts	2.8	32.2
Local Revenue and Supply Chain Impacts	13.9	56.2
Induced Impacts	3.7	106.8
New Local Long-Term Jobs	*20.4*	*195.2*

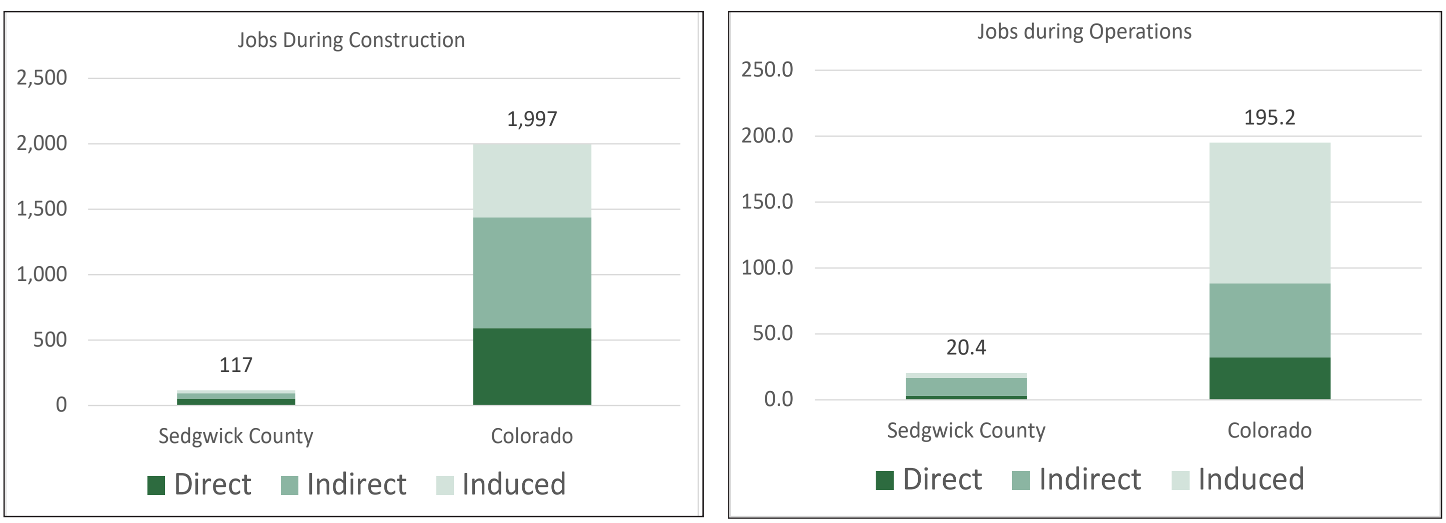


The results from the JEDI model show significant employment impacts from the Overland Pass Energy East Wind Project. Employment impacts can be broken down into several different components. Direct jobs created during the construction phase typically last anywhere from 6 months to over a year depending on the size of the project; however, the direct job numbers present in Table 3 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. For example, the JEDI model results show 51 new onsite jobs during construction in Sedgwick County, though the construction of the Project could actually involve hiring closer to 102 workers for 6 months.

As shown in Table 3, new local jobs created or retained during construction total 117 for Sedgwick County and 1,997 for the State of Colorado. New local long-term jobs created from the Project total 20.4 for Sedgwick County and 195.2 for the State of Colorado.

Direct jobs created during the operational phase last the life of the wind farm, typically 25-40 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).

Figure 15 – Total Employment Impact for the Overland Pass Energy East Wind Project

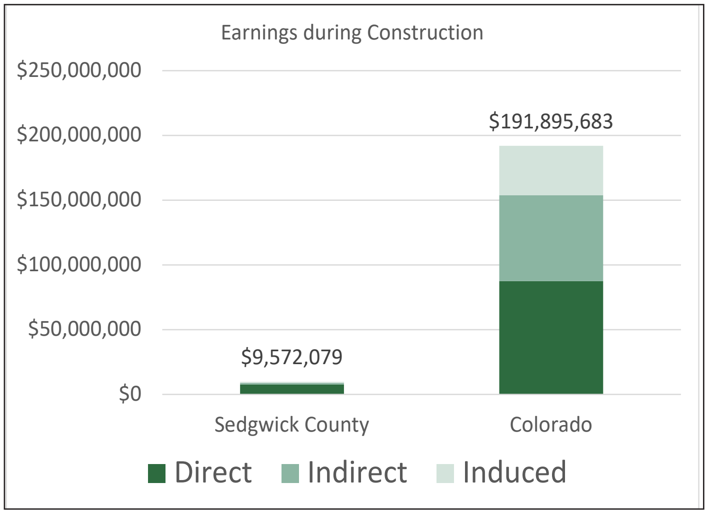


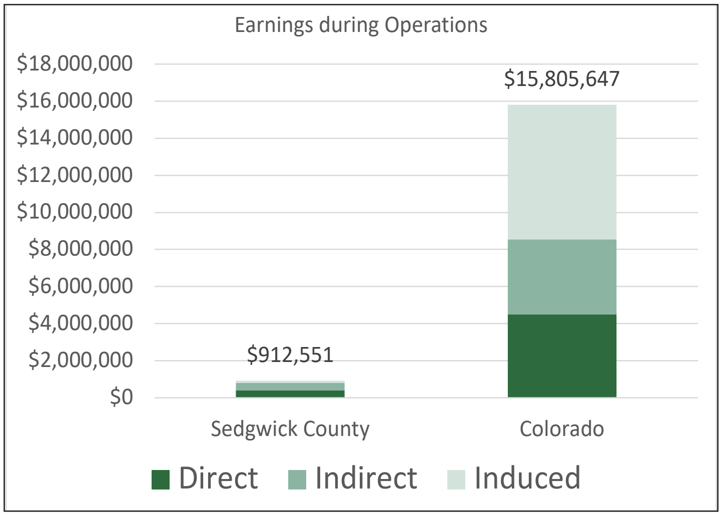
Accordingly, it is important to not just look at the number of jobs but also the earnings that they produce. The earnings impacts from the Project are shown in Table 4 and are categorized by construction impacts and operations impacts. The new local earnings during construction total over $9.5 million for Sedgwick County and over $191 million for the State of Colorado. The new local long-term earnings total over $912 thousand for Sedgwick County and over $15.8 million for the State of Colorado.

Table 4 – Total Earnings Impact from the Overland Pass Energy East Wind Project

	Sedgwick County	State of Colorado
Construction		
Project Development and Onsite Earnings Impacts	$7,691,149	$87,415,446
Turbine and Supply Chain Impacts	$1,191,948	$66,493,955
Induced Impacts	$688,982	$37,986,282
New Local Earnings during Construction	*$9,572,079*	*$191,895,683*
Operations (Annual)		
Onsite Labor Impacts	$401,499	$4,503,906
Local Revenue and Supply Chain Impacts	$398,891	$4,041,984
Induced Impacts	$112,161	$7,259,757
New Local Long-Term Earnings	*$912,551*	*$15,805,647*

Figure 16 – Total Earnings Impact for the Overland Pass Energy East Wind Project





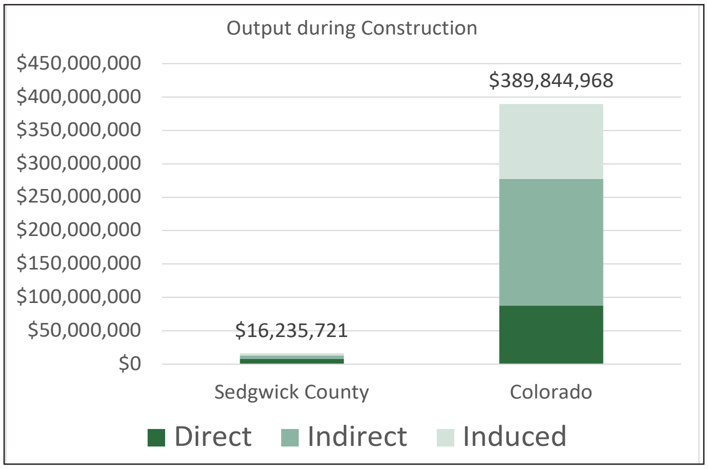
Output refers to economic activity or the value of production in the state or local economy. Economic output includes the earnings reported in Table 4 but also measures other factors such as landowner payments, property taxes, and other economic activity that is not earnings and benefits from employment. Local Revenue and Supply Chain Impacts include ongoing property taxes and are detailed in the next section.

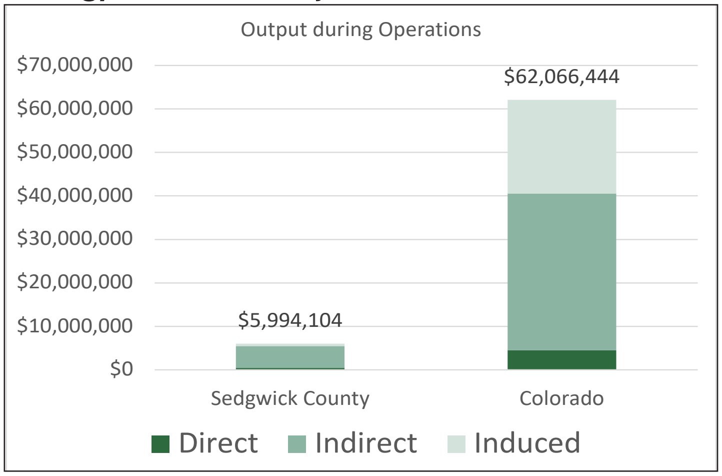
According to Table 5, the new local output during construction totals over $16.2 million for Sedgwick County and over $389 million for the State of Colorado. The new local long-term output totals over $5.9 million for Sedgwick County and over $62.0 million for the State of Colorado.

Table 5 – Total Output Impact from the Overland Pass Energy East Wind Project

	Sedgwick County	State of Colorado
Construction		
Project Development and Onsite Jobs Impacts on Output	$7,691,149	$87,477,195
Turbine and Supply Chain Impacts	$5,159,955	$189,703,801
Induced Impacts	$3,384,617	$112,663,972
New Local Output during Construction	*$16,235,721*	*$389,844,968*
Operations (Annual)		
Onsite Labor Impacts	$401,499	$4,503,906
Local Revenue and Supply Chain Impacts	$5,041,627	$36,038,573
Induced Impacts	$550,978	*$21,523,965*
New Local Long-Term Output	*$5,994,104*	*$62,066,444*

Figure 17 – Total Output Impact for the Overland Pass Energy East Wind Project





VI. Property Taxes

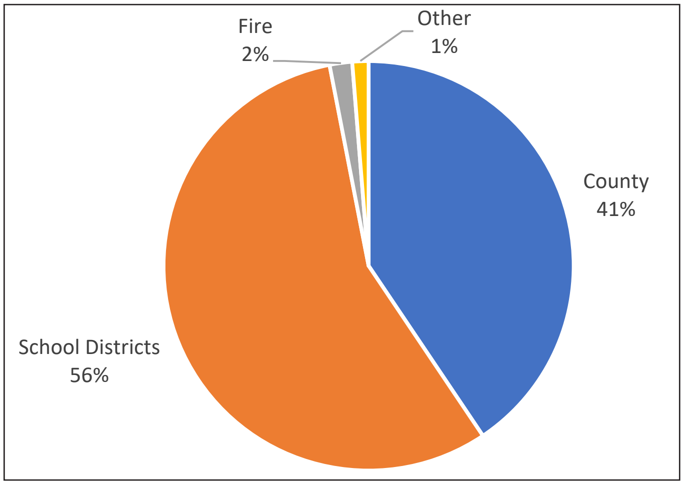
Wind power projects increase the property tax base of a county, creating a new revenue source for education and other local government services, such as fire protection, park districts, and road maintenance.

Tables 6 to 9 detail the tax implications of the Overland Pass Energy East Wind Project. There are several important assumptions built into the analysis in these tables.

- First, this analysis uses the depreciation schedule and valuation method laid out in Colorado's Renewable Energy Tax Factor Template provided by the Colorado Department of Local Affairs.
- Second, the analysis assumes a personal property value of $245 million based on a project size of 800 MWac and a capital cost threshold of $307/KW as laid out by the above guidance from the state.
- Third, the tables use an assessment rate of 26.4% for the first 2 years and 29% for years 3-30 as laid out in the above guidance.
- Fourth, all tax rates are assumed to stay constant at their 2023 (2022 tax year) rates. For example, the Sedgwick County General millage rate is assumed to stay constant at 20.275 through 2056.
- Fifth, the analysis assumes that the Project is placed in service on January 1, 2027.
- Sixth, it assumes that the Project is decommissioned in 30 years and pays no more taxes after that date.
- Seventh, no comprehensive tax payment was calculated, and these calculations are only to be used to illustrate the economic impact of the Project.

[1]https://cdola.colorado.gov/renewable-energy

Figure 18 – Percentages of Property Taxes Paid to Taxing Jurisdictions



As shown in Table 6, a conservative estimate of the total property taxes paid by the Project starts out at over $1.9 million for the first two years and then increases to over $2.0 million for the remaining years. The expected total property taxes paid over the 30-year lifetime of the Project are over $62.3 million, and the average annual property taxes paid will be over $2.0 million.

Table 6 – Total Tax Revenue from the Overland Pass Energy East Wind Project

Year	Total Taxes Paid
2027	$1,903,916
2028	$1,903,916
2029	$2,091,424
2030	$2,091,424
2031	$2,091,424
2032	$2,091,424
2033	$2,091,424
2034	$2,091,424
2035	$2,091,424
2036	$2,091,424
2037	$2,091,424
2038	$2,091,424
2039	$2,091,424
2040	$2,091,424
2041	$2,091,424
2042	$2,091,424
2043	$2,091,424
2044	$2,091,424
2045	$2,091,424
2046	$2,091,424
2047	$2,091,424
2048	$2,091,424
2049	$2,091,424
2050	$2,091,424
2051	$2,091,424
2052	$2,091,424
2053	$2,091,424
2054	$2,091,424
2055	$2,091,424
2056	$2,091,424
TOTAL	**$62,367,690**
AVG ANNUAL	**$2,078,923**

Table 7 – Tax Revenue from the Overland Pass Energy East Wind Project for the County[2]

Year	Sedgwick County General Fund	Road & Bridge Fund	Public Hospital Fund	Human Services Fund
2027	$521,838	$167,297	$57,910	$25,738
2028	$521,838	$167,297	$57,910	$25,738
2029	$573,231	$183,773	$63,614	$28,273
2030	$573,231	$183,773	$63,614	$28,273
2031	$573,231	$183,773	$63,614	$28,273
2032	$573,231	$183,773	$63,614	$28,273
2033	$573,231	$183,773	$63,614	$28,273
2034	$573,231	$183,773	$63,614	$28,273
2035	$573,231	$183,773	$63,614	$28,273
2036	$573,231	$183,773	$63,614	$28,273
2037	$573,231	$183,773	$63,614	$28,273
2038	$573,231	$183,773	$63,614	$28,273
2039	$573,231	$183,773	$63,614	$28,273
2040	$573,231	$183,773	$63,614	$28,273
2041	$573,231	$183,773	$63,614	$28,273
2042	$573,231	$183,773	$63,614	$28,273
2043	$573,231	$183,773	$63,614	$28,273
2044	$573,231	$183,773	$63,614	$28,273
2045	$573,231	$183,773	$63,614	$28,273
2046	$573,231	$183,773	$63,614	$28,273
2047	$573,231	$183,773	$63,614	$28,273
2048	$573,231	$183,773	$63,614	$28,273
2049	$573,231	$183,773	$63,614	$28,273
2050	$573,231	$183,773	$63,614	$28,273
2051	$573,231	$183,773	$63,614	$28,273
2052	$573,231	$183,773	$63,614	$28,273
2053	$573,231	$183,773	$63,614	$28,273
2054	$573,231	$183,773	$63,614	$28,273
2055	$573,231	$183,773	$63,614	$28,273
2056	$573,231	$183,773	$63,614	$28,273
TOTAL	**$17,094,154**	**$5,480,247**	**$1,897,008**	**$843,115**
AVG ANNUAL	**$569,805**	**$182,675**	**$63,234**	**$28,104**

Table 7 shows an estimate of the likely taxes paid to the Sedgwick County General Fund, Road & Bridge Fund, Public Hospital Fund, and Human Services Fund.

According to Table 7, the total amounts paid are over $17.0 million for the Sedgwick County General Fund, over $5.4 million for the Road & Bridge Fund, over $1.8 million for the Public Hospital Fund, and over $843 thousand for the Human Services Fund over the life of the Project.

Table 8 shows an estimate of the likely taxes paid to the Sedgwick Fire Protection District, Ovid Fire Protection District, Julesburg Fire Protection District, Sedgwick Cemetery District, Ovid Cemetery District, Julesburg Cemetery District, and Marks Butte Groundwater Management District.

According to Table 8, the total amounts paid are over $283 thousand for Sedgwick Fire Protection District, over $168 thousand for Ovid Fire Protection District, over $655 thousand for Julesburg Fire Protection District, over $20.5 thousand for Sedgwick Cemetery District, over $168 thousand for Ovid Cemetery District, over $337 thousand for Julesburg Cemetery District, and over $271 thousand for Marks Butte Groundwater Management District over the life of the Project.

[2]The assumed millage rates are 20.275 for the Sedgwick County General Fund, 6.5 for the Road & Bridge Fund, 2.25 for the Public Hospital Fund, and 1 for the Human Services Fund.

Table 8 – Tax Revenue from the Overland Pass Energy East Wind Project for Other Taxing Bodies[3]

Year	Sedgwick Fire Protection District	Ovid Fire Protection District	Julesburg Fire Protection District	Sedgwick Cemetery District	Ovid Cemetery District	Julesburg Cemetery District	Marks Butte Groundwater Management District
2027	$8,657	$5,151	$20,004	$626	$5,151	$10,298	$8,288
2028	$8,657	$5,151	$20,004	$626	$5,151	$10,298	$8,288
2029	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2030	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2031	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2032	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2033	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2034	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2035	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2036	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2037	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2038	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2039	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2040	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2041	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2042	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2043	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2044	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2045	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2046	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2047	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2048	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2049	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2050	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2051	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2052	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2053	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2054	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2055	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
2056	$9,510	$5,658	$21,974	$688	$5,658	$11,312	$9,104
TOTAL	**$283,592**	**$168,730**	**$655,281**	**$20,513**	**$168,730**	**$337,334**	**$271,483**
AVG ANNUAL	**$9,453**	**$5,624**	**$21,843**	**$684**	**$5,624**	**$11,244**	**$9,049**

[3]The assumed millage rates are 3.401 for Sedgwick Fire Protection District, 0.513 for Ovid Fire Protection District, 1.521 for Julesburg Fire Protection District, 0.246 for Sedgwick Cemetery District, 0.513 for Ovid Cemetery District, 0.783 for Julesburg Cemetery District, and 0.322 for Marks Butte Groundwater Management District.

The largest taxing jurisdictions for property taxes are local school districts. However, the tax implications for school districts are more complicated than for other taxing bodies. School districts receive state aid based on the assessed value of the taxable property within its district. As assessed value increases, the state aid to the school district is decreased.

Table 9 shows the direct property tax revenue coming from the Project to Platte Valley RE-3 School District, Haxtun RE-2J School District, and Julesburg RE-1 School District. This tax revenue uses the assumptions outlined earlier to calculate the other tax revenue and assumes that 37.36% of the turbines are in the Platte Valley RE-3 School District, 0.55% in the Haxtun RE-2J School District, and 62.09% in the Julesburg RE-1 School District. Over the 30-year life of the Project, the school districts are expected to receive over $35.1 million in tax revenue.

Table 9 – Tax Revenue from the Overland Pass Energy East Wind Project for the School Districts[4]

Year	Platte Valley RE-3 School District	Haxtun RE-2J School District	Julesburg RE-1 School District
2027	$400,696	$5,600	$666,661
2028	$400,696	$5,600	$666,661
2029	$440,159	$6,152	$732,318
2030	$440,159	$6,152	$732,318
2031	$440,159	$6,152	$732,318
2032	$440,159	$6,152	$732,318
2033	$440,159	$6,152	$732,318
2034	$440,159	$6,152	$732,318
2035	$440,159	$6,152	$732,318
2036	$440,159	$6,152	$732,318
2037	$440,159	$6,152	$732,318
2038	$440,159	$6,152	$732,318
2039	$440,159	$6,152	$732,318
2040	$440,159	$6,152	$732,318
2041	$440,159	$6,152	$732,318
2042	$440,159	$6,152	$732,318
2043	$440,159	$6,152	$732,318
2044	$440,159	$6,152	$732,318
2045	$440,159	$6,152	$732,318
2046	$440,159	$6,152	$732,318
2047	$440,159	$6,152	$732,318
2048	$440,159	$6,152	$732,318
2049	$440,159	$6,152	$732,318
2050	$440,159	$6,152	$732,318
2051	$440,159	$6,152	$732,318
2052	$440,159	$6,152	$732,318
2053	$440,159	$6,152	$732,318
2054	$440,159	$6,152	$732,318
2055	$440,159	$6,152	$732,318
2056	$440,159	$6,152	$732,318
TOTAL	**$13,125,835**	**$183,447**	**$21,838,222**
AVG ANNUAL	**$437,528**	**$6,115**	**$727,941**

[4]The assumed millage rates are 41.668 for Platte Valley RE-3 School District, 39.6 for Haxtun RE-2J School District, and 41.718 for Julesburg RE-1 School District.

VII. Glossary

Bb

Battery Energy Storage Systems (BESS)

An array of hundreds or thousands of small batteries that enable energy from renewables, like solar and wind, to be stored and released at a later time.

Cc

Consumer Price Index (CPI)

An index of the changes in the cost of goods and services to a typical consumer, based on the costs of the same goods and services at a base period.

Dd

Direct impacts

During the construction period: the changes that occur in the onsite construction industries in which the direct final demand change is made.

During operating years: the final demand changes that occur in the onsite spending for the solar operations and maintenance workers.

Ee

Equalized Assessed Value (EAV)

The product of the assessed value of property and the state equalization factor. This is typically used as the basis for the value of property in a property tax calculation.

Ff

Farming profit

The difference between total revenue (price multiplied by yield) and total cost regarding farmland.

Full-time equivalent (FTE)

A unit that indicates the workload of an employed person. One FTE is equivalent to one worker working 2,080 hours in a year. One half FTE is equivalent to a half-time worker or someone working 1,040 hours in a year.

Hh

HV line extension

High-voltage electric power transmission links used to connect generators to the electric transmission grid.

Ii

IMPLAN (IMpact analysis for PLANning)

A business who is the leading provider of economic impact data and analytic applications. IMPLAN data is collected at the federal, state, and local levels and used to create state-specific and county-specific industry multipliers.

Indirect impacts

Impacts that occur in industries that make up the supply chain for that industry.

During the construction period: the changes in inter- industry purchases resulting from the direct final demand changes, including construction spending on materials and wind farm equipment and other purchases of good and offsite services.

During operating years: the changes in inter-industry purchases resulting from the direct final demand changes.

Induced impacts

The changes that occur in household spending as household income increases or decreases as a result of the direct and indirect effects of final demand changes.

Inflation

A persistent rise in the general level of prices related to an increase in the volume of money and resulting in the loss of value of currency. Inflation is typically measured by the CPI.

Mm

Median Household Income (MHI)

The income amount that divides a population into two equal groups, half having an income above that amount, and half having an income below that amount.

Millage rate

The tax rate, as for property, assessed in mills per dollar.

Multiplier

A factor of proportionality that measures how much a variable changes in response to a change in another variable.

MW

A unit of power, equal to one million watts or one thousand kilowatts.

MWac (megawatt alternating current)

The power capacity of a utility-scale solar PV system after its direct current output has been fed through an inverter to create an alternating current (AC). A solar system's rated MWac will always be lower than its rated MWdc due to inverter losses. AC is the form in which electric energy is delivered to businesses and residences and that consumers typically use when plugging electric appliances into a wall socket.

MWdc (megawatt direct current)

The power capacity of a utility-scale solar PV system before its direct current output has been fed through an inverter to create an alternating current. A solar system's rated MWdc will always be higher than its rated MWac.

Nn

Net economic impact

Total change in economic activity in a specific region, caused by a specific economic event.

Net Present Value (NPV)

Cash flow determined by calculating the costs and benefits for each period of investment.

NREL's Jobs and Economic Development Impacts (JEDI) Model

An input-output model that measures the spending patterns and location-specific economic structures that reflect expenditures supporting varying levels of employment, income, and output.

Oo

Output

Economic output measures the value of goods and services produced in a given area. Gross Domestic Product is the economic output of the United States as a whole.

Rr

Real Gross Domestic Product (GDP)

A measure of the value of goods and services produced in an area and adjusted for inflation over time.

Real-options analysis

A model used to look at the critical factors affecting the decision to lease agricultural land to a company installing a solar powered electric generating facility.

Ss

Stochastic

To have some randomness.

Tt

Tax rate

The percentage (or millage) of the value of a property to be paid as a tax.

Total economic output

The quantity of goods or services produced in a given time period by a firm, industry, county, or country.

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IX. Curriculum Vitae (Abbreviated)

David G. Loomis
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Education

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

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

Experience

2011-present Strategic Economic Research, LLC
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.

1996-2023 Illinois State University, Normal, IL
Professor Emeritus – Department of Economics (2023 - present)
Full Professor – Department of Economics (2010-2023)
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 5 graduate students in research projects each semester.
- Served on numerous departmental committees.

1997-2023 Institute for Regulatory Policy Studies, Normal, IL
Executive Director (2005-2023)
Co-Director (1997-2005)

- Grew contributing membership from 5 companies to 16 organizations.
- Doubled the number of workshop/training events annually.
- Supervised 2 Directors, Administrative Staff and internship program.
- Developed and implemented state-level workshops concerning regulatory issues related to the electric, natural gas, and telecommunications industries.

2006-2018 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

2007-2018 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 4 professional staff members and supervised 3 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.

- Published 40 articles in leading journals such as AIMS Energy, Renewable Energy, National Renewable Energy Laboratory Technical Report, Electricity Journal, Energy Economics, Energy Policy, and many others
- Testified over 80 times in formal proceedings regarding wind, solar and transmission projects
- Raised over $7.7 million in grants
- Raised over $2.7 million in external funding

Bryan A. Loomis
Strategic Economic Research, LLC
Vice President

Education

Master of Business Administration (M.B.A.), Marketing and Healthcare, Belmont University, Nashville, Tennessee, 2017.

Experience

2019-present Strategic Economic Research, LLC, Bloomington, IL
Vice President
(2021-present)
Property Tax Analysis and Land Use Director
(2019-2021)

- Directed the property tax analysis by training other associates on the methodology and overseeing the process for over twenty states
- Improved the property tax analysis methodology by researching various state taxing laws and implementing depreciation, taxing jurisdiction millage rates, and other factors into the tax analysis tool
- Executed land use analyses by running Monte Carlo simulations of expected future profits from farming and comparing that to the solar lease
- Performed economic impact modeling using JEDI and IMPLAN tools
- Improved workflow processes by capturing all tasks associated with economic modeling and report-writing, and created automated templates in Asana workplace management software

2019-2021 Viral Healthcare Founders LLC, Nashville, TN
CEO and Founder

- Founded and directed marketing agency for healthcare startups
- Managed three employees
- Mentored and worked with over 30 startups to help them grow their businesses
- Grew an email list to more than 2,000 and LinkedIn following to 3,500
- Created a Slack community and grew to 450 members
- Created weekly video content for distribution on Slack, LinkedIn and Email

Christopher Thankan
Strategic Economic Research, LLC
Economic Analyst

Education

Bachelor of Science in Sustainable & Renewable Energy (B.A.), Minor in Economics, Illinois State University, Normal, IL, 2021

Experience

2021-present Strategic Economic Research, LLC, Bloomington, IL
Economic Analyst

- Create economic impact results on numerous renewable energy projects Feb 2021-Present
- Utilize IMPLAN multipliers along with NREL's JEDI model for analyses
- Review project cost Excel sheets
- Conduct property tax analysis for different US states
- Research taxation in states outside research portfolio
- Complete ad hoc research requests given by the president
- Hosted a webinar on how to run successful permitting hearings
- Research school funding and the impact of renewable energy on state aid to school districts
- Quality check coworkers JEDI models
- Started more accurate methodology for determining property taxes that became the main process used

Strategic Economic Research, LLC

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