

# Economic Impact Analysis of the Southern Spirit Transmission Project on the State of Mississippi



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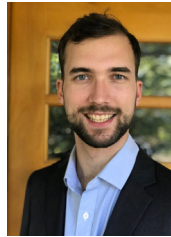


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# I. Executive Summary of Findings

The Southern Spirit Transmission Project (the Project) is a high voltage direct current (HVDC) 525-kilovolt transmission line that includes a converter station in De Soto Parish, LA and dedicated HVDC transmission line with connection to a converter station in Choctaw County, MS. Although the exact route has not been chosen, the line runs approximately 323 miles across De Soto, Red River, Bienville, Jackson, Ouachita, Richland, Franklin, and East Carroll Parishes in Louisiana, and Issaquena, Washington, Sharkey, Humphreys, Holmes, Carroll, Montgomery, and Choctaw Counties in Mississippi.

The purpose of this report is to aid decision makers in evaluating the economic impact of this Project on the State of Mississippi. This analysis estimates the direct, indirect, and induced impacts on job creation, wages, and total economic output of the transmission line itself.

The Southern Spirit Transmission Line represents an investment of over \$2.68 billion in total by Pattern Energy. The total development is anticipated to result in the following:

## Jobs<sup>1</sup>

- 7,940 new job-years during the construction and first 40 years of operation for the State of Mississippi
- 1,404 new jobs during construction for the State of Mississippi
- 163 new local long-term jobs for the State of Mississippi

## Worker Earnings<sup>2</sup>

- Over \$424 million in new earnings during the construction and first 40 years of operation for the State of Mississippi
- Over \$146 million in new earnings during construction for the State of Mississippi
- Over \$6.9 million in new local long-term earnings for the State of Mississippi annually

## Economic Output<sup>3</sup>

- Over \$1.6 billion in new output during the construction and first 40 years of operation for the State of Mississippi
- Over \$231 million in new output during construction for the State of Mississippi
- Over \$34.8 million in new local long-term output for the State of Mississippi annually

<sup>1</sup> All jobs numbers are full-time equivalent jobs and include direct, indirect, and induced jobs. With a two-year construction period, the Project construction job figures would be divided in half for the number of jobs supported in any given year.

<sup>2</sup> Worker Earnings include the wages, salary and benefits associated with these jobs.

<sup>3</sup> Economic Output is the value of goods and services produced in the state or local economy. It is an equivalent measure to the Gross Domestic Product. Economic Output includes Worker Earnings.

## II. Economic Benefits to Transmission Lines

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Most consumers of electricity do not give much thought to how their electricity gets delivered to their home or business. A vital piece of this delivery system is the electric transmission system. The transmission system connects large electric generators to the local distribution grid using HV transmission lines. Historically, public utilities built transmission lines to connect their own large-scale generators to their distribution system. Such transmission lines helped individual utilities to service their load but were not optimized to the modern realities of an interconnected grid that trades electricity across utility, state and even international borders. Today, transmission lines are necessary to ensure reliability allowing electricity to flow from one area to another to ensure that the supply is balanced with demand.

The total job growth from any infrastructure project, including transmission projects, can be divided into direct, indirect, and induced jobs:

- **Direct Jobs.** These are workers directly involved in the construction and maintenance of the project.
- **Indirect Jobs.** Numerous other jobs are supported through indirect supply chain purchases. For example, materials like wire, steel, and aggregate sourced within the state will support jobs for those suppliers.
- **Induced Jobs.** Higher spending by direct and indirect workers results in additional spending and jobs that are referred to as “induced” spending and jobs. As an example, grocery store workers, waiters and waitresses would be supported through spending from other workers.



In addition to job creation, transmission projects typically pay significant property taxes. As such, they strengthen the local tax base and help improve county services and local infrastructure, such as public roads.

It is important to measure the earnings associated with the jobs that are created or supported by a project to ensure that they are good-paying jobs. Throughout this report, we will refer to earnings that result from this Project. Earnings include wages, salary and associated benefits. Earnings are only payments that are associated with employment. But the Project will also make property tax payments and landowner easement payments that are not associated with a job. To capture the economic impact of those payments, we use the broadest measure of economic impact – economic output. Economic output measures the value of goods and services in an economy. Gross Domestic Product (GDP) is the economic output of the U.S. as a whole.

Several studies have examined the economic impact of transmission line construction.

- The author studied the economic impact of the proposed Rock Island Clean Line transmission line across Iowa and Illinois costing \$1.5 billion (Carlson, Loomis, and Solow, 2011). They found that the line would result in 1,451 jobs, \$86.8 million in labor income and \$256 million in output for Illinois and 2,718 jobs, \$120 million in labor income and \$394.2 million in output for Iowa annually over a three-year construction period.
- NREL found that four HV transmission lines designed to export electricity from Wyoming would result in an average of 4,000-5,000 jobs per year for 10 years (Lantz & Tegen, 2011).
- Strategic Economics Group (2013) examined the economic impacts of ITC Midwest Transmission Multi Value Projects (MVP) #3 and #4, both 345 kV transmission lines totaling 198.25 miles across Minnesota and Iowa. They were expected to cost \$255.5 million for MVP 3 and \$305.3 million for MVP 4. The combined impact of the projects was estimated to be 4,275 job-years resulting in \$207.8 million in labor income and \$723.2 million in output.
- MISO studied the economic impact of in-service transmission projects from 2002 to 2015 totaling \$9.4 billion and found that 16,700 to 25,800 total jobs were created or supported in peak year 2014 with \$5 to \$8 billion in labor income and \$6.7 to \$11.3 billion of value-added impacts (MISO, 2015).
- Iowa State University calculated direct and indirect estimates of job creation over a 30-year time frame due to construction and operation of a large-scale transmission expansion. The expansion increased employment for generation of energy from renewables from 650,000 to 950,000 (Swenson, 2018).
- The lead author studied the economic impact of the proposed SOO Green HVDC Link Transmission Project that is to run from Mason City, Iowa to Plano, Illinois and is expected to cost almost \$2.5 billion. This project is expected to support 6,799 jobs during construction in Iowa and an additional 5,614 jobs during construction in Illinois over a three-year period (Loomis, 2020a; Loomis, 2020b).
- The authors examined the 345-kilovolt, 95-mile Wolf Creek-Blackberry Transmission Project between Coffey County, Kansas and Jasper County, Missouri. The \$85.1 million project was found to support 998 jobs during construction in Kansas and 203.5 jobs during construction in Missouri (Loomis, Loomis and Thankan, 2022a and 2022b).
- The authors studied the economic impact of the proposed 700-mile, \$5.7 B Grain Belt Express Transmission Project going from Western Kansas to Western Indiana (Loomis, Loomis and Thankan, 2022c). They found that the line would result in 4,999 jobs, \$565.5 million in labor income and \$942.3 million in output for Illinois; 8,628 jobs, \$936.2 million in labor income and \$1.53 billion in output for Kansas; and 5,747 jobs, \$586.1 million in labor income and \$986.1 million in output for Missouri annually over a three-year construction period.

## III. State and County Economics

### 3.1 State of Mississippi

Mississippi is located in the southern part of the United States (see Figure 3.1). It has a total area of 48,430 square miles and the U.S. Census estimates that the 2021 population was 2,949,965 with 1,339,021 housing units. The state has a population density of 63.5 (persons per square mile) compared to 87 for the United States. Median household income in the state was \$45,081 (U.S. Census Bureau).

**Figure 3.1 – Location of Mississippi**



#### i. Economic and Demographic Statistics

As shown in Table 3.1, the largest industry is “Administrative Government” followed by “Health Care and Social Assistance,” “Retail Trade” and “Manufacturing.” These data for Table 3.1 come from IMPLAN covering the year 2020 (the latest year available).

**Table 3.1 – Employment by Industry in Mississippi**

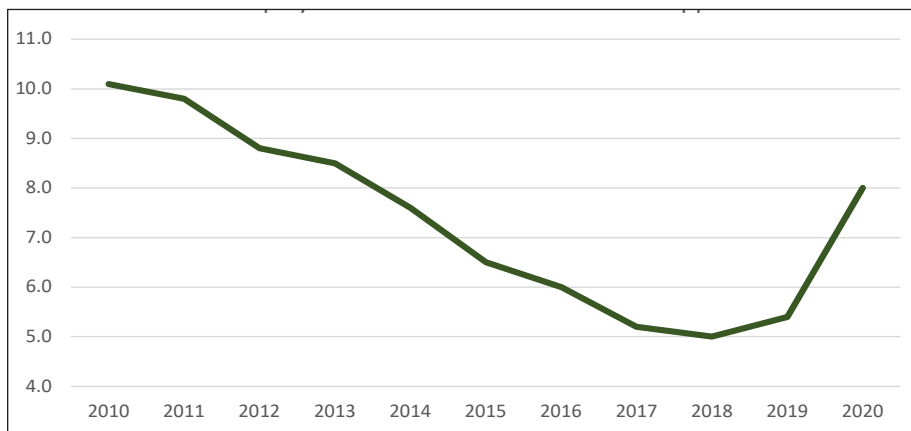
Industry	Number	Percent
Administrative Government	238,135	15.2%
Health Care and Social Assistance	156,694	10.0%
Retail Trade	146,666	9.3%
Manufacturing	146,329	9.3%
Accommodation and Food Services	129,548	8.3%
Other Services (except Public Administration)	110,420	7.0%
Administrative and Support and Waste Management and Remediation Services	102,111	6.5%
Construction	90,904	5.8%
Transportation and Warehousing	72,993	4.6%
Professional, Scientific, and Technical Services	72,022	4.6%
Finance and Insurance	61,089	3.9%
Real Estate and Rental and Leasing	57,212	3.6%
Agriculture, Forestry, Fishing and Hunting	51,706	3.3%
Wholesale Trade	38,586	2.5%
Arts, Entertainment, and Recreation	21,086	1.3%
Educational Services	18,176	1.2%
Government Enterprises	13,246	0.8%
Management of Companies and Enterprises	13,210	0.8%
Information	12,754	0.8%
Mining, Quarrying, and Oil and Gas Extraction	8,850	0.6%
Utilities	8,099	0.5%

Source: Impact Analysis for Planning (IMPLAN), State Employment by Industry, 2020



Table 3.1 provides the most recent snapshot of total employment but does not examine the historical trends within the state. Figure 3.2 shows the unemployment rate from 2010 to 2020. Unemployment in Mississippi was at its highest at 10.1% in 2010 and its lowest at 5% in 2018 (BEA, 2021).

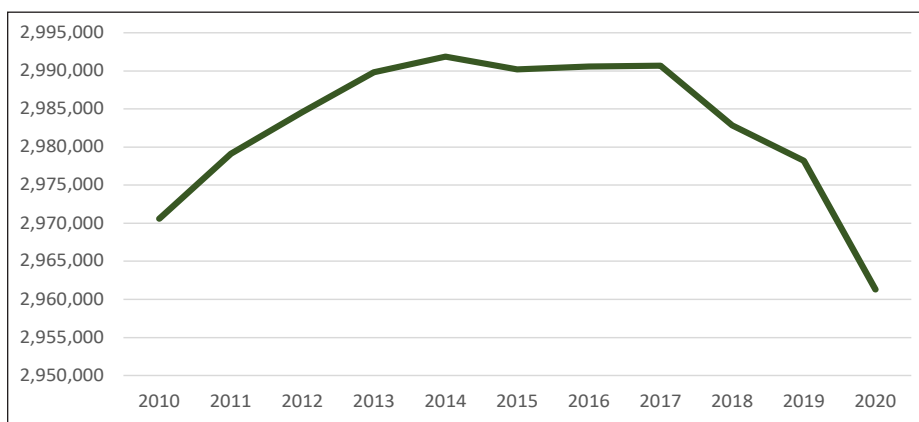
**Figure 3.2 – Unemployment Rate in Mississippi from 2010 to 2020**



Source: Federal Reserve Bank of St. Louis Economic Data, U.S. Census Bureau, Unemployment Rate, 2010-2020

The overall population in the state has decreased recently, as shown in Figure 3.3. Mississippi population was 2,970,615 in 2010 and 2,961,279 in 2020, a loss of 9,336 (FRED, 2021).<sup>4</sup> The average annual population decrease over this time period was 933.

**Figure 3.3 – Population in Mississippi from 2010 to 2020**

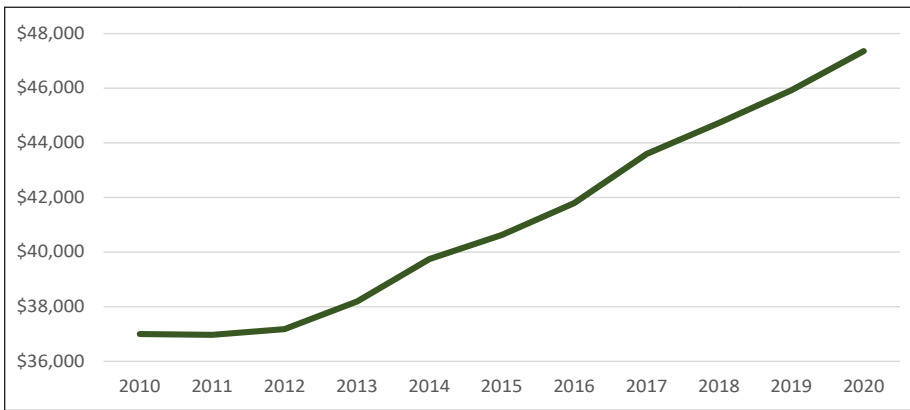


Source: Federal Reserve Bank of St. Louis Economic Data, U.S. Census Bureau, Population Estimates, 2010-2020

<sup>4</sup> Mississippi was one of six states in which the U.S. Census reported significant undercounting. The Mississippi undercount was estimated at 4.11%. See <https://www.yahoo.com/now/census-report-shows-mississippi-significantly-010800017.html> for more detail.

Unlike the population trend, household income has been increasing in Mississippi. Figure 3.4 shows the median household income in Mississippi from 2010 to 2020. Household income was at its lowest at \$39,963 in 2011 and its highest at \$47,368 in 2020 (FRED, 2021).

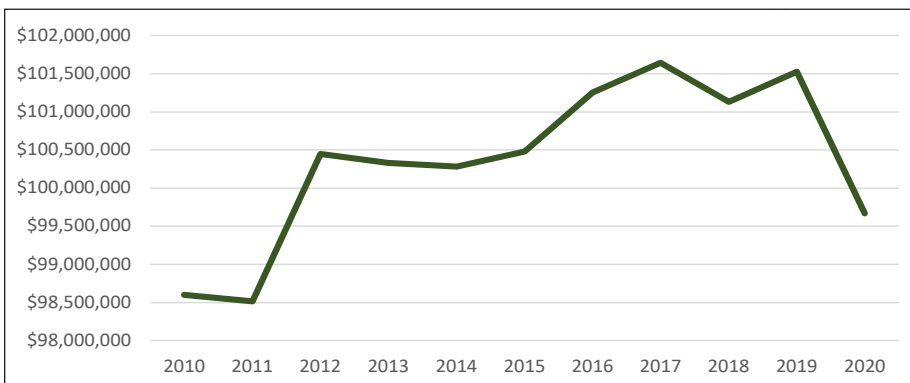
**Figure 3.4 – Median Household Income in Mississippi from 2010 to 2020**



Source: Federal Reserve Bank of St. Louis Economic Data, U.S. Census Bureau, Estimate of Median Household Income, 2010-2020

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 Mississippi has been fluctuating since hitting a low in 2011, as shown in Figure 3.5 (BEA, 2021).

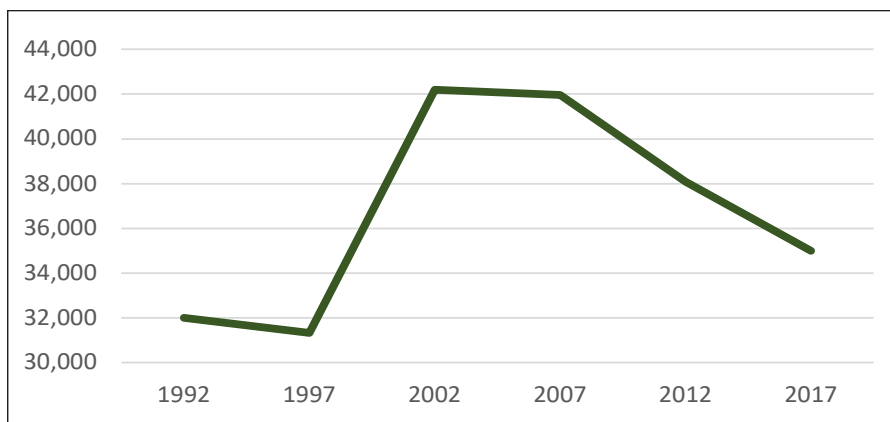
**Figure 3.5 – Real Gross Domestic Product (GDP) in Mississippi from 2010 to 2020**



Source: Bureau of Economic Analysis, Regional Data, GDP and Personal Income, 2010-2020

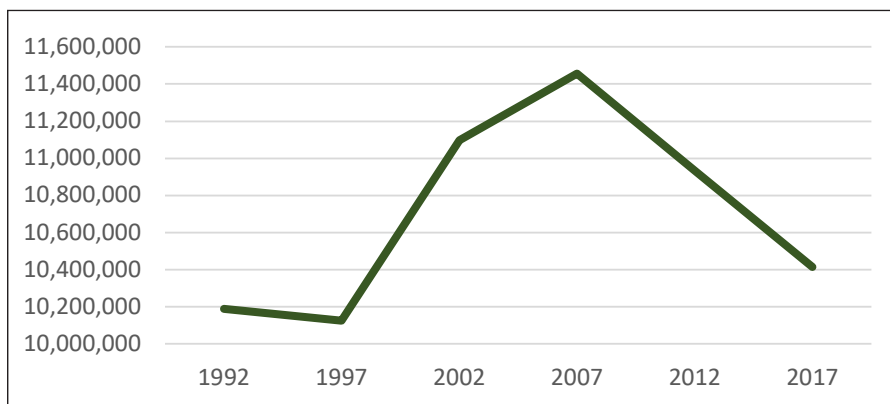
The farming industry has fluctuated in Mississippi. As shown in Figure 3.6, the number of farms has increased from 31,998 in 1992 to 34,988 in 2017. The amount of land in farms has fluctuated as well. The state farmland hit a low of 10,124,822 acres in 1997 and a high of 11,456,241 acres in 2007 according to Figure 3.7. Since 2007, the amount of land in farms in the state has declined.

**Figure 3.6 – Number of Farms in Mississippi from 1992 to 2017**



Source: Census of Agriculture, 1992-2017

**Figure 3.7 – Land in Farms in Mississippi from 1992 to 2017**

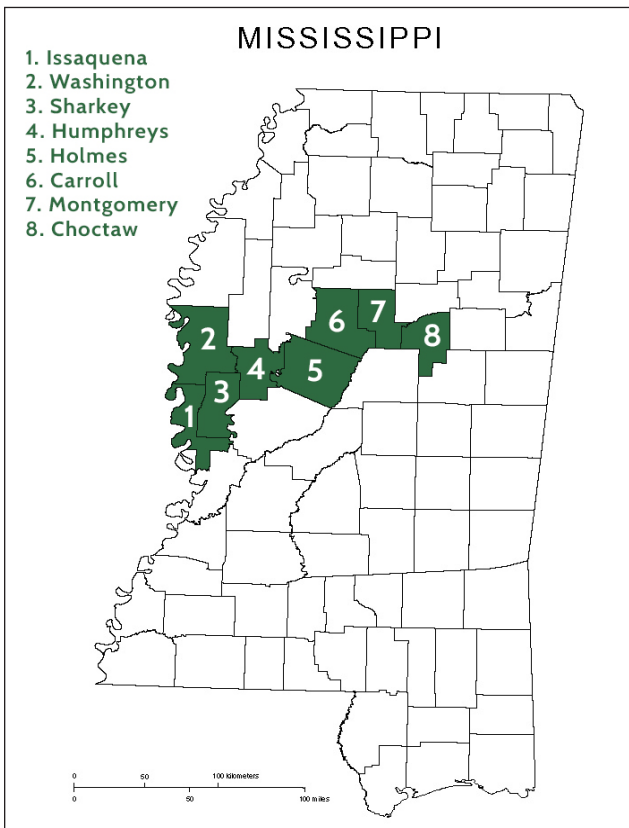


Source: Census of Agriculture, 1992-2017

## 3.2 County Economics

The economic and demographic statistics of all of the host Mississippi counties are contained in this section. As listed in Table 3.2, the population and population density for Washington County is much higher than the other counties. Because they it is so different, that county's unemployment rate, population, and GDP data are graphed separately from the rest of the counties. Figure 3.8 shows the location of each of the counties across the State of Mississippi.

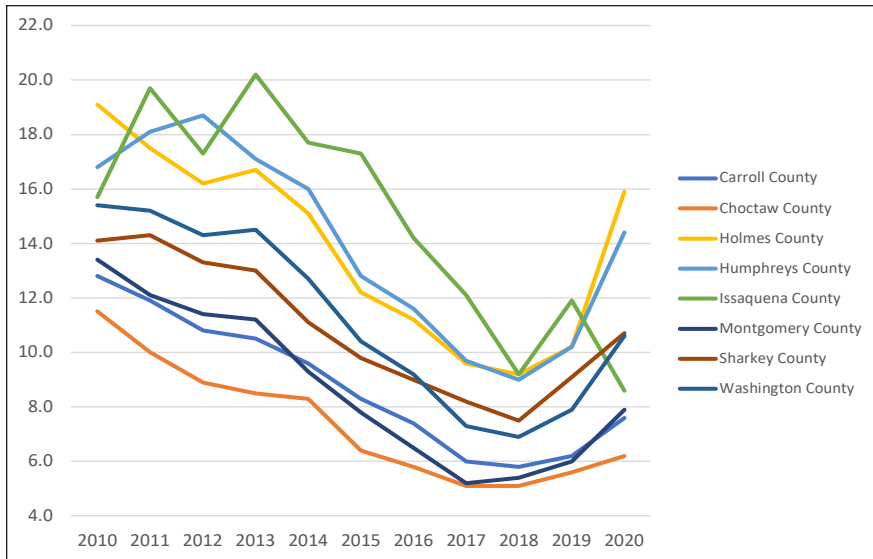
**Figure 3.8 – Location of Counties in Mississippi**



**Table 3.2 – Demographic Statistics for County Locations of the Southern Spirit Transmission Line**

County	Total Area (square miles)	2020 Census Population	2019 Census housing units	Population Density	Median Household Income
Carroll County	635	9,998	5,228	17	\$46,052
Choctaw County	420	8,246	4,230	20	\$36,777
Holmes County	765	17,000	8,643	25	\$21,504
Humphreys County	431	7,785	3,810	22	\$28,962
Issaquena County	441	1,338	573	3	\$24,208
Montgomery County	408	9,822	5,876	27	\$39,840
Sharkey County	435	3,800	2,158	11	\$29,394
Washington County	761	44,922	21,594	67	\$29,705

**Figure 3.9 – Unemployment Rate in All Counties from 2010 to 2020**

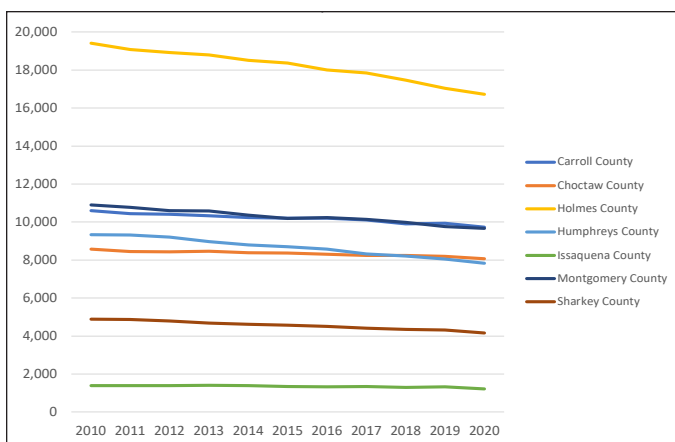


Source: Bureau of Economic Analysis, Regional Data, GDP and Personal Income

Figure 3.9 shows the historical trends of the unemployment rate from 2010 to 2020 within the counties. The unemployment rate was declining until 2018 when most of the counties saw an increase in the unemployment rate. Issaquena County is the only county that saw a decline in unemployment after 2019.

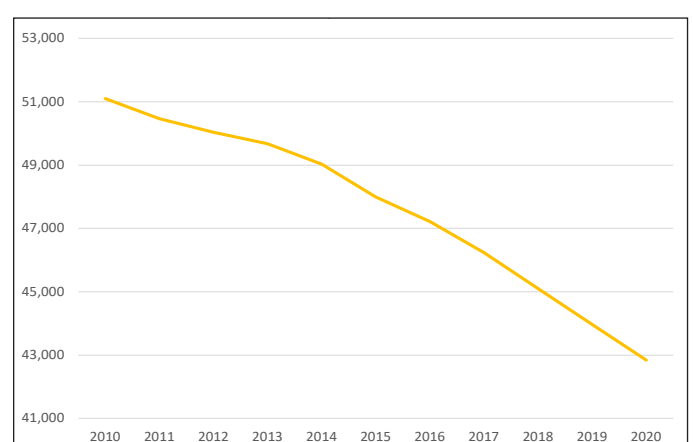
Similar to the unemployment rates, the overall population in most of the counties has declined, as shown in Figures 3.10 and 3.11. None of the counties have had an increase in population over the last decade. Washington County has seen the greatest decrease in population, a loss of 8,261 people since 2010.

**Figure 3.10 – Population in Counties from 2010 to 2020**



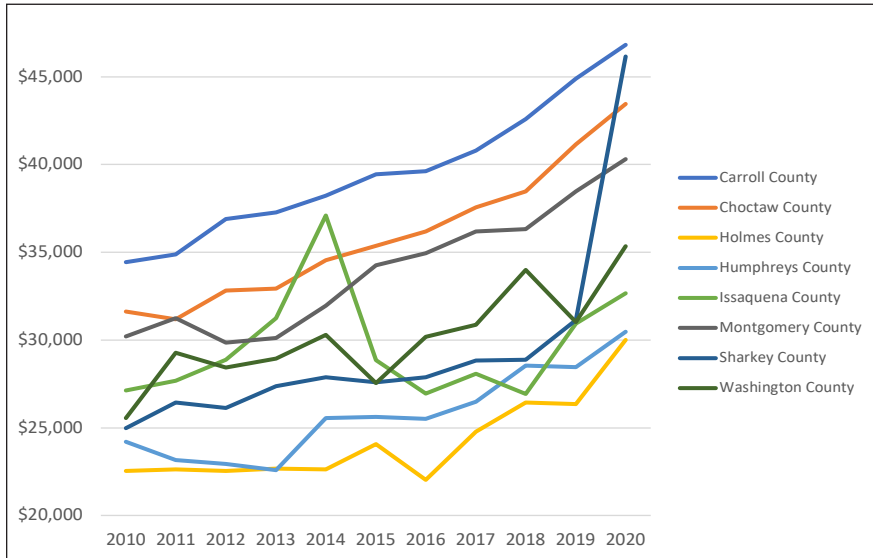
Source: Federal Reserve Bank of St. Louis Economic Data, U.S. Census Bureau, Population Estimates

**Figure 3.11 – Population in Washington County from 2010 to 2020**



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

**Figure 3.12 – Median Household Income in All Counties from 2010 to 2020**

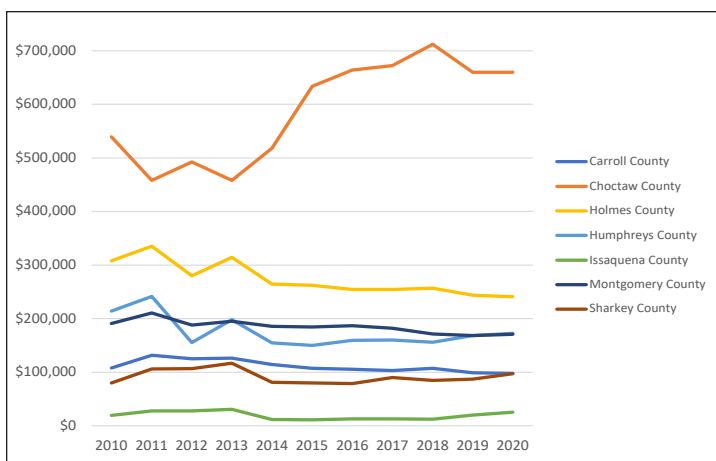


Source: Federal Reserve Bank of St. Louis Economic Data, U.S. Census Bureau, Estimate of Median Household Income

Figure 3.12 shows the median household income in all of the counties from 2010 to 2020. Household income has increased in all of the counties.

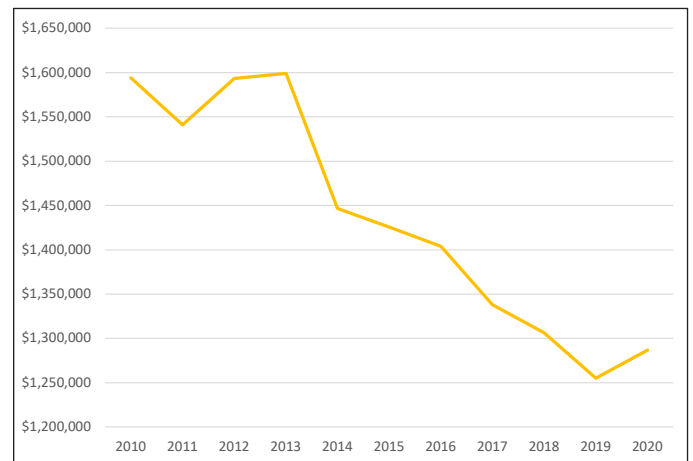
Real Gross Domestic Product (GDP) is a measure of the value of goods and services produced in an area and adjusted for inflation over time. The Real GDP for has fluctuated in all of the counties over the last decade, as shown in Figures 3.13 and 3.14.

**Figure 3.13 – Real Gross Domestic Product (GDP) in Counties from 2010 to 2020**



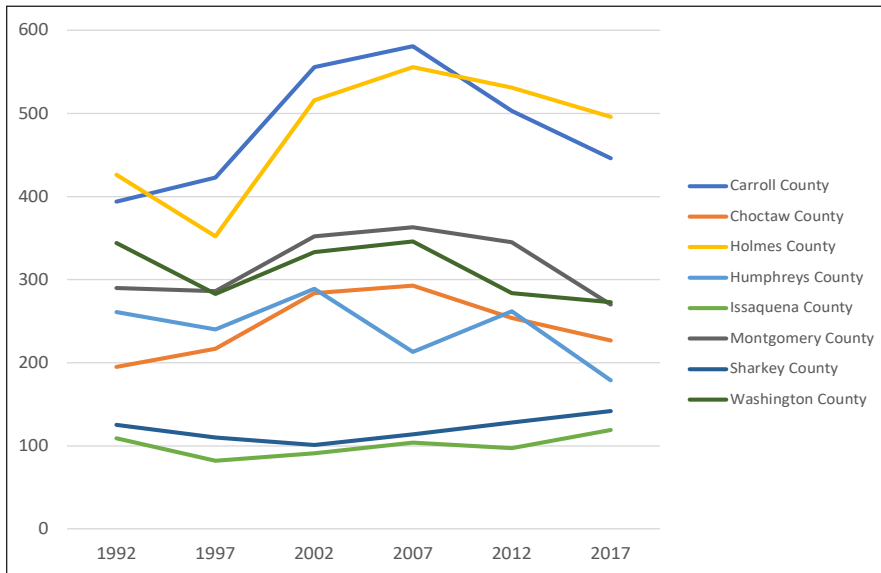
Source: Bureau of Economic Analysis, Regional Data, GDP and Personal Income

**Figure 3.14 – Real Gross Domestic Product (GDP) in Washington County from 2010 to 2020**



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

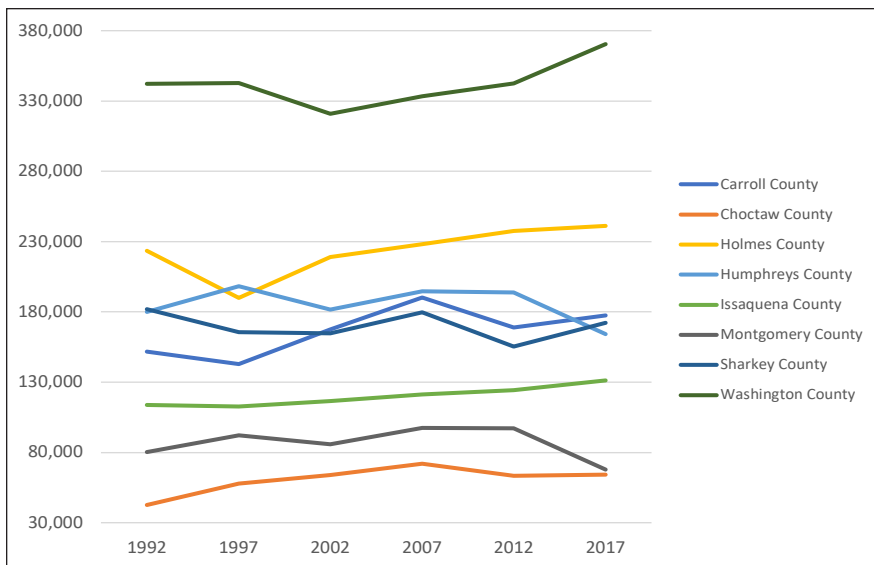
**Figure 3.15 – Number of Farms in All Counties from 1992 to 2017**



Source: Census of Agriculture, 1992-2017

The farming industry has fluctuated in the counties. As shown in Figure 3.15, all of the counties increased in the number of farms since 1992, except Humphreys, Montgomery and Washington Counties. The amount of land in farms has fluctuated greatly as well. All of the counties, except for Humphreys, Montgomery, and Sharkey Counties, have seen an increase in the amount of farmland since 1992, according to Figure 3.16.

**Figure 3.16 – Land in Farms in All Counties from 1992 to 2017**



Source: Census of Agriculture, 1992-2017

## IV. Economic Impact Methodology

The impacts of construction and operation of the transmission line were estimated using the IMPLAN model. The specific impacts analyzed include direct, indirect, and induced effects on employment, labor income, and output for the State of Louisiana and the State of Mississippi.

### 4.1 IMPLAN

The economic impacts of the manufacture of the required components, construction of the line, and operation and maintenance expenses were estimated using the IMPLAN model and 2021 data for Mississippi and the individual counties. Stated briefly, the model is used to estimate the total impacts of an increase in spending in a particular industry. IMPLAN is an on-line program that allows construction of regional input-output models for areas ranging in size from a single zip code region to the entire United States. The model allows aggregation of individual regional - e.g., parish - databases for multi-region analysis.



Total impacts are calculated as the sum of direct, indirect, and induced effects. Direct effects are production changes associated with the immediate effects of final demand changes, such as an increase in spending for the manufacture of new structures that will be used to support a new transmission line. Indirect effects are production changes in backward-linked industries caused by the changing input needs of the directly affected industry, e.g., additional purchases to produce additional output such as the steel used in the construction of the new transmission structures. Induced effects are the changes in regional household spending patterns caused by changes in household income generated from the direct and indirect effects. An example of the latter is the increased spending of incomes earned by newly hired steel workers.

The analysis summarized here focuses on the impacts of increased manufacturing of the different components of the transmission line, as well as construction of the line, on employment, employee compensation, and total expenditures (output). Employment includes total wage and salary employees as well as self-employed jobs in the region of interest. All of the employment figures reported here are full-time equivalents<sup>5</sup> (FTE). Employee compensation represents income, including benefits, paid to workers by employers, as well as income earned by sole proprietors. Total output represents sales (including additions to inventory), i.e., it is a measure of the value of output produced. Impacts are estimated on a state-wide basis for Louisiana, Mississippi, and for individual parishes.

<sup>5</sup> IMPLAN jobs include all full-time, part time, and temporary positions. When employment is counted as full and part-time, one cannot tell from the data the number of hours worked or the proportion that is full or part-time. A full-time-employed (FTE) worker is assumed to work 2,080 hours (= 52 weeks x 40 hours/week) in a standard year. Employment impacts have been rescaled to reflect the change in the number of FTEs.



## 4.2 Project Cost and Transmission Modeling Assumptions

To estimate the economic impact of Project construction, we estimated construction costs by budget category and the geographic location where those costs will be incurred. Table 4.1 shows the estimated costs provided by the client. These budget categories are then translated into IMPLAN Sector Codes and allocated into the appropriate geographic boundaries. The total Project costs modeled were \$2.68 billion. All construction spending was assumed to be spread evenly over the two-year construction period from 2025 to 2026.

**Table 4.1 – Estimated Total Transmission Construction Cost (\$M)**

Budget Category	Total
Converter Stations	\$1,216
DC Transmission Line	\$1,030
AC Transmission Line	\$125
Switching Stations and Crossings	\$49
Development	\$263
<b>Grand Total</b>	<b>\$2,684</b>

**Table 4.2 – Total Construction Costs Incurred in Mississippi**

IMPLAN Code	IMPLAN Description	Mississippi
	Direct Labor	\$113,117,127
	Landowner Payments	\$13,462,861
52	New Power and communication structures	\$8,682,201
3029	Sand and Gravel Mining	\$6,982,060
3236	Fabricated structural metal manufacturing	\$10,741,934
3329	Power, distribution, and specialty transformer manufacturing	\$12,783,849
3336	Other communication and energy wire manufacturing	\$19,419,087
3339	All other miscellaneous electrical equipment and component manufacturing	\$5,693,566
3447	Other real estate	\$7,293,135
3455	Legal Services	\$4,078,046
3457	Architectural, engineering, and related services	\$2,444,883
3463	Environmental and other technical consulting services	\$9,359,538
3465	Advertising, public relations, and related services	\$1,376,876
3507	Hotels and motels, including casino hotels	\$46,395,697
3509	Full-service restaurants	\$13,034,982
3510	Limited-service restaurants	\$13,034,982
3534	Local governments category	\$114,498
3480	Elementary and Secondary Schools	\$114,498
<b>TOTAL</b>		<b>\$288,129,819</b>

Though the grand total capital expenditures exceed \$2.6 billion, Strategic Economic Research used far smaller numbers for total construction costs in Mississippi as inputs into the economic model. A non-exhaustive list of costs that were excluded follows: \$579 million for converter station materials purchased outside the country, \$131 million for other non-local materials costs, \$991 million for out of state labor costs, \$124 million for AC line costs, and \$337 million for costs allocated to the State of Louisiana. Table 4.2 shows the statewide total construction costs broken out by IMPLAN sector that is expected to be spent over two years starting in 2025 in Mississippi.<sup>6</sup>

<sup>6</sup>The construction period may extend beyond 2026 but the total construction costs will remain the same. If the timing changes on the final construction plans, the model will be updated accordingly and final estimates will be ready at the time of the notice to proceed.

The construction costs above were generally allocated to the counties proportional to the number of miles estimated to be in that county. River crossings, converter stations, substations and other costs that are known to be in a specific county were allocated to that county. These inputs are modeled using Analysis By Parts (ABP). Under this method, direct jobs, earnings and output are calculated outside of IMPLAN. Direct labor income and household spending (by income level within the state) are input into IMPLAN to show the induced impacts that would result from these expenditures. Converter stations are assumed to be purchased from overseas but the labor to install them is assumed to be sourced locally.

Table 4.3 shows the operations and maintenance costs broken out by IMPLAN sector and state.

**Table 4.3 – Estimated Annual Operations Cost by IMPLAN Category in Mississippi**

IMPLAN Code	IMPLAN Description	Mississippi Annual Spending
47	Electric power transmission and distribution - Converter Stations	\$5,610,375
47	Electric power transmission and distribution - T-Line	\$4,781,103
445	Insurance agencies, brokerages, and related activities	\$173,250
480	Elementary and secondary schools	\$3,397,424
495	Community food, housing, and other relief services, including rehabilitation services	\$54,271
522	Grantmaking, giving, and social advocacy organizations	\$54,271
534	Other local government	\$3,397,424
	<b>Total Annual Spending</b>	<b>\$17,468,119</b>

These expenses are also modeled in IMPLAN using ABP and allocated to the counties by line-mile except for the converter station labor. Converter station labor is allocated to the county in which the converter station will be located.

Other methods can be used to measure the economic impact of transmission projects but the ABP method provides the most accurate result. Other methods include (1) measuring the total expenditures in the state and (2) estimating the impact using the general category of “Construction of New Power and Communication Structures.” Using total expenditures to measure the economic impact will tend to overestimate the economic impact because some of those expenditures will be made centrally. For example, the transmission wire may be purchased centrally for the whole project and manufactured in another state. Technically, the wire was not an expenditure in the state in question and so it should not be counted for economic impact purposes. It is counted as an investment in the state but not an expenditure that will have a multiplier effect. Table 4.2 above takes care to only measure expenditures that are expected to take place in Mississippi. Although it totals \$228 million, it is a small portion of the overall construction costs of \$2.684 million as shown in Table 4.1. Using the methodology in this report provides more accurate and more conservative estimates of the true economic impact of the Project on the county and state economies.

Modeling the economic impacts using the general construction category is also less accurate than the method used in this report. The general construction category uses historical data for other projects to measure the inter-industry linkages involved in the economic impact analysis. The method in this report uses specific knowledge of the budgeting of costs by category derived from information from Pattern to measure these expenditures. In addition, this construction category includes all power line construction and communications structures. While the direct-current transmission line is certainly included in this category, so would cellphone towers, electric distribution lines and many other dissimilar construction projects be assigned to this category. Furthermore, since this will be the first direct-current transmission line built across the state, the historical data within IMPLAN will have no history of inter-industry linkages for this type of construction project. Using ABP, the specific industries and specific spending is used as inputs into the model and there will be historical data on these types of inter-industry linkages.

## V. Economic Impact Results

The economic impact results were derived from detailed project cost estimates supplied by Pattern Energy and the assumptions detailed in the previous section. Tables 5.1 to 5.6 show the economic impact of the Project using the IMPLAN model. The tables report the employment, earning and output results at the county level during construction. Because these results only look at the effects of the expenditures within the county, they do not add up to the state totals in the previous section. As mentioned in the previous section, other expenditures such as out of state labor, imported materials for the converter stations, and expenditures on the Louisiana portion of the Project make up the remaining balance of the total costs of the Project.

Tables 5.1 and 5.2 show the employment impacts from the transmission line on the counties in Mississippi during construction and operations. The new local jobs created or retained during construction total 113 for Carroll County, 442 for Choctaw County, 176 for Holmes County, 123 for Humphreys County, 82 for Issaquena County, 65 for Montgomery County, 167 for Sharkey County, 17 for Washington County, and 1,404 for the State of Mississippi. New local long-term jobs created from the Project total 5.5 for Carroll County, 57.9 for Choctaw County, 35.3 for Holmes County, 18.2 for Humphreys County, 1.3 for Issaquena County, 7.7 for Montgomery County, 2.2 for Sharkey County, 9.5 for Washington County, and over 163 for the State of Mississippi.

**Table 5.1 – Total Employment Impact from the Southern Spirit Transmission Line for Mississippi Counties**

	Carroll County	Choctaw County	Holmes County	Humphreys County	Issaquena County
<b>Construction</b>					
Direct	23	177	82	33	43
Indirect	82	214	56	73	29
Induced	8	51	38	17	10
<b>Total</b>	<b>113</b>	<b>442</b>	<b>176</b>	<b>123</b>	<b>82</b>
<b>Operations</b>					
Direct	5.1	44.0	33.7	17.6	1.2
Indirect	0.2	10.6	0.8	0.4	0.0
Induced	0.2	3.3	0.8	0.2	0.1
<b>Total</b>	<b>5.5</b>	<b>57.9</b>	<b>35.3</b>	<b>18.2</b>	<b>1.3</b>

**Table 5.2 – Total Employment Impact from the Southern Spirit Transmission Line for Mississippi Counties (Cont.)**

	Montgomery County	Sharkey County	Washington County	Rest of Mississippi	State of Mississippi
<b>Construction</b>					
Direct	23	41	3	0	425
Indirect	31	110	10	62	668
Induced	11	16	4	157	311
<b>Total</b>	<b>65</b>	<b>167</b>	<b>17</b>	<b>219</b>	<b>1,404</b>
<b>Operations</b>					
Direct	6.9	2.0	8.1	0.0	119
Indirect	0.5	0.1	0.6	13.0	26
Induced	0.3	0.1	0.8	12.7	19
<b>Total</b>	<b>7.7</b>	<b>2.2</b>	<b>9.5</b>	<b>25.7</b>	<b>163</b>

Tables 5.3 and 5.4 show the earnings impacts from the transmission line for the counties in Mississippi during construction and operations. The new local earnings during construction total over \$7.1 million for Carroll County, over \$61.1 million for Choctaw County, over \$24 million for Holmes County, over \$11.2 million for Humphreys County, over \$11.7 million for Issaquena County, over \$7.5 million for Montgomery County, over \$13.7 million for Sharkey County, over \$1.4 million for Washington County, and over \$146 million for the State of Mississippi. The new local long-term earnings totals over \$155 thousand for Carroll County, over \$3.9 million for Choctaw County, over \$603 thousand for Holmes County, over \$221 thousand for Humphreys County, over \$67.2 thousand for Issaquena County, over \$234 thousand for Montgomery County, over \$116 thousand for Sharkey County, over \$348 thousand for Washington County, and over \$6.9 million for the State of Mississippi.

Table 5.3 – Total Earnings Impact from the Southern Spirit Transmission Line for Mississippi Counties

	Carroll County	Choctaw County	Holmes County	Humphreys County	Issaquena County
<b>Construction</b>					
Direct	\$6,207,307	\$47,120,747	\$21,881,458	\$8,804,048	\$11,323,775
Indirect	\$771,109	\$12,313,639	\$1,211,269	\$1,985,845	\$297,363
Induced	\$173,212	\$1,688,325	\$988,510	\$468,648	\$163,341
<b>Total</b>	<b>\$7,151,628</b>	<b>\$61,122,711</b>	<b>\$24,081,237</b>	<b>\$11,258,541</b>	<b>\$11,784,479</b>
<b>Operations</b>					
Direct	\$150,403	\$2,651,710	\$570,042	\$203,373	\$66,315
Indirect	\$1,529	\$1,166,485	\$12,046	\$10,291	\$151
Induced	\$3,243	\$110,900	\$21,558	\$8,154	\$784
<b>Total</b>	<b>\$155,175</b>	<b>\$3,929,095</b>	<b>\$603,646</b>	<b>\$221,818</b>	<b>\$67,250</b>

Table 5.4 – Total Earnings Impact from the Southern Spirit Transmission Line for Mississippi Counties (Cont.)

	Montgomery County	Sharkey County	Washington County	Rest of Mississippi	State of Mississippi
<b>Construction</b>					
Direct	\$6,057,454	\$10,833,044	\$889,294	\$0	\$113,117,128
Indirect	\$1,163,545	\$2,440,941	\$436,759	\$2,400,967	\$23,021,436
Induced	\$315,183	\$475,257	\$135,021	\$6,173,900	\$10,581,397
<b>Total</b>	<b>\$7,536,182</b>	<b>\$13,749,242</b>	<b>\$1,461,074</b>	<b>\$8,574,867</b>	<b>\$146,719,961</b>
<b>Operations</b>					
Direct	\$207,463	\$112,164	\$289,809	\$0	\$4,251,280
Indirect	\$19,355	\$1,196	\$29,551	\$794,084	\$2,034,687
Induced	\$8,164	\$3,509	\$29,173	\$485,317	\$670,801
<b>Total</b>	<b>\$234,982</b>	<b>\$116,869</b>	<b>\$348,533</b>	<b>\$1,279,401</b>	<b>\$6,956,768</b>

Tables 5.5 and 5.6 show the output impacts (economic output is the value of goods and services produced in the county or state) from the transmission line for the counties in Mississippi during construction and operations. The new local output during construction totals over \$13.8 million for Carroll County, over \$86.5 million for Choctaw County, over \$32.7 million for Holmes County, over \$17.5 million for Humphreys County, over \$14.4 million for Issaquena County, over \$10.4 million for Montgomery County, over \$23.7 million for Sharkey County, over \$2.5 million for Washington County, and over \$231 million for the State of Mississippi. The new local long-term output from the Project totals over \$765 thousand for Carroll County, over \$19.8 million for Choctaw County, over \$2.9 million for Holmes County, over \$1.1 million for Humphreys County, over \$1 million for Issaquena County, over \$1 million for Montgomery County, over \$1.1 million for Sharkey County, over \$783 thousand for Washington County, and over \$34.8 million for the State of Mississippi.

**Table 5.5 – Total Output Impact from the Southern Spirit Transmission Line for Mississippi Counties**

	<b>Carroll County</b>	<b>Choctaw County</b>	<b>Holmes County</b>	<b>Humphreys County</b>	<b>Issaquena County</b>
<b>Construction</b>					
Direct	\$6,207,307	\$47,120,747	\$21,881,458	\$8,804,048	\$11,323,775
Indirect	\$6,524,923	\$31,509,808	\$6,051,736	\$6,546,422	\$1,703,081
Induced	\$1,141,703	\$7,931,973	\$4,858,195	\$2,151,825	\$1,403,653
<b>Total</b>	<b>\$13,873,933</b>	<b>\$86,562,528</b>	<b>\$32,791,389</b>	<b>\$17,502,295</b>	<b>\$14,430,509</b>
<b>Operations</b>					
Direct	\$720,696	\$11,173,120	\$2,733,021	\$1,095,295	\$1,039,518
Indirect	\$23,181	\$8,146,038	\$76,185	\$51,010	\$740
Induced	\$21,704	\$521,233	\$105,482	\$37,524	\$6,624
<b>Total</b>	<b>\$765,581</b>	<b>\$19,840,391</b>	<b>\$2,914,688</b>	<b>\$1,183,829</b>	<b>\$1,046,882</b>

**Table 5.6 – Total Output Impact from the Southern Spirit Transmission Line for Mississippi Counties (Cont.)**

	Montgomery County	Sharkey County	Washington County	Rest of Mississippi	State of Mississippi
<b>Construction</b>					
Direct	\$6,057,454	\$10,833,044	\$889,294	\$0	\$113,117,128
Indirect	\$2,999,825	\$10,580,208	\$1,232,761	\$9,376,411	\$76,525,175
Induced	\$1,382,591	\$2,318,579	\$472,120	\$20,354,101	\$42,014,739
<b>Total</b>	<b>\$10,439,870</b>	<b>\$23,731,831</b>	<b>\$2,594,175</b>	<b>\$29,730,512</b>	<b>\$231,657,042</b>
<b>Operations</b>					
Direct	\$912,328	\$1,123,646	\$573,134	\$0	\$19,370,758
Indirect	\$80,085	\$6,772	\$108,442	\$4,377,805	\$12,870,257
Induced	\$35,915	\$17,048	\$101,709	\$1,712,717	\$2,559,956
<b>Total</b>	<b>\$1,028,328</b>	<b>\$1,147,466</b>	<b>\$783,285</b>	<b>\$6,090,522</b>	<b>\$34,800,971</b>

Although the Southern Spirit Transmission Project is expected to last much longer, we can combine the construction impacts with the ongoing operations impact over a 40-year timeframe by adding the construction impacts and the annual impacts multiplied by 40. Table 5.7 shows the employment, total earnings and total output for Mississippi. The combined result shows 7,940 job-years resulting in over \$424 million in total earnings and over \$1.6 billion in total output for the State of Mississippi.

**Table 5.7 – Combined Impact from the Southern Spirit Transmission Line during Construction and 40-year Operation for the State of Mississippi<sup>7</sup>**

	Employment	Total Earnings	Total Output
Direct	5,174	\$283,168,326	\$887,947,438
Indirect	1,712	\$104,408,924	\$591,335,456
Induced	1,054	\$37,413,449	\$144,412,981
<b>Total</b>	<b>7,940</b>	<b>\$424,990,699</b>	<b>\$1,623,695,875</b>

<sup>7</sup> Policymakers may want to use a discount factor to weight future benefits over the next 40 years of operations with near-term benefits during construction. For simplicity, no such discount factor was used here.



## VI. Property Taxes

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Property taxes are an important funding source for education and other local government services, such as fire protection, park districts, and road maintenance. In most jurisdictions, local school districts receive about half of all property taxes to support K-12 education. In recognition of the difficulty in predicting future property tax rates over the decades of project operation, we have used the current rates published by the Mississippi Department of Revenue and then applied a standard 0.25% rate increase across each jurisdiction to reflect future tax increases needed to account for the impact of inflation and growth on county budgets.

There are several important assumptions built into our property tax calculations. Those assumptions are as follows:

- First, the tables assume that a converter station and switchyard will be located at Choctaw County, MS.
- Second, the analysis assumes that costs for transmission lines will be distributed proportionally according to the line miles in each county.
- Third, the analysis assumes an assessment ratio of 15% for Mississippi.
- Fourth, the analysis uses the most current millage rates published by the Mississippi Department of Revenue for each jurisdiction as of the writing of this report (December 2022).
- Fifth, a rate escalation factor of 0.25% was applied.
- Sixth, no comprehensive tax payment was calculated, and these calculations are only to be used to illustrate the economic impact of the Project.

Table 6.1 shows the total property tax revenue that is expected to be provided by Southern Spirit Transmission Line to the State of Mississippi. A conservative estimate of the total property taxes paid by the Project starts out at over \$7.0 million. The expected total property taxes paid to schools, county government and other taxing bodies over the 40-year lifetime of the Project is over \$275 million in the State of Mississippi, and the expected average annual property taxes paid is over \$6.8 million.

Table 6.2 shows the likely taxes paid to Carroll, Choctaw, Holmes, Humphreys, Issaquena, Montgomery, Sharkey, and Washington counties. According to Table 6.2, the total amounts paid are over \$10.8 million for Carroll County, over \$126 million for Choctaw County, over \$52.3 million for Holmes County, over \$23.7 million for Humphreys County, over \$23.2 million for Issaquena County, over \$13.3 million for Montgomery County, over \$20.1 million for Sharkey County, and over \$1.7 million for Washington County over the life of the Project.

**Table 6.1 – Total Tax Revenue from the Southern Spirit Transmission Line in Mississippi**

Year	Total
2027	\$7,037,717
2028	\$7,122,985
2029	\$7,133,431
2030	\$7,140,727
2031	\$7,144,723
2032	\$7,145,267
2033	\$7,060,112
2034	\$7,051,423
2035	\$7,038,759
2036	\$10,748,279
2037	\$10,573,285
2038	\$10,527,195
2039	\$10,328,182
2040	\$10,114,840
2041	\$9,886,623
2042	\$9,487,438
2043	\$9,224,264
2044	\$8,781,771
2045	\$8,480,921
2046	\$7,991,996
2047	\$7,476,707
2048	\$7,111,914
2049	\$6,726,865
2050	\$6,320,835
2051	\$5,893,073
2052	\$5,442,805
2053	\$4,969,230
2054	\$4,674,785
2055	\$4,572,366
2056	\$4,250,431
2057	\$4,346,277
2058	\$4,444,287
2059	\$4,544,505
2060	\$4,646,983
2061	\$4,751,773
2062	\$4,858,926
2063	\$4,968,494
2064	\$5,080,535
2065	\$5,195,099
2066	\$5,312,249
<b>40-year Total</b>	<b>\$275,608,075</b>
<b>Annual Average</b>	<b>\$6,890,202</b>

**Table 6.2 – Total Tax Revenue from the Southern Spirit Transmission Line for Mississippi Counties**

Year	Carroll County	Choctaw County	Holmes County	Humphreys County	Issaquena County	Montgomery County	Sharkey County	Washington County
2027	\$379,909	\$1,935,541	\$1,836,352	\$834,302	\$814,644	\$467,069	\$706,866	\$63,034
2028	\$384,512	\$1,958,991	\$1,858,601	\$844,411	\$824,514	\$472,728	\$715,431	\$63,797
2029	\$385,076	\$1,961,864	\$1,861,327	\$845,649	\$825,724	\$473,421	\$716,480	\$63,891
2030	\$385,470	\$1,963,871	\$1,863,230	\$846,514	\$826,568	\$473,905	\$717,213	\$63,956
2031	\$385,686	\$1,964,970	\$1,864,273	\$846,988	\$827,031	\$474,170	\$717,614	\$63,992
2032	\$385,715	\$1,965,120	\$1,864,415	\$847,052	\$827,094	\$474,206	\$717,669	\$63,997
2033	\$381,118	\$1,941,699	\$1,842,195	\$836,957	\$817,237	\$468,555	\$709,116	\$63,234
2034	\$380,649	\$1,939,311	\$1,839,929	\$835,927	\$816,231	\$467,978	\$708,243	\$63,156
2035	\$379,966	\$1,935,827	\$1,836,623	\$834,426	\$814,765	\$467,138	\$706,971	\$63,043
2036	\$374,319	\$1,907,060	\$1,809,331	\$822,026	\$802,657	\$460,196	\$696,465	\$62,106
2037	\$368,225	\$5,628,033	\$1,779,873	\$808,642	\$789,589	\$452,703	\$685,126	\$61,095
2038	\$366,620	\$5,603,499	\$1,772,114	\$805,117	\$786,147	\$450,730	\$682,139	\$60,829
2039	\$359,689	\$5,497,566	\$1,738,613	\$789,897	\$771,285	\$442,209	\$669,244	\$59,679
2040	\$352,259	\$5,384,007	\$1,702,699	\$773,581	\$755,353	\$433,075	\$655,420	\$58,446
2041	\$344,311	\$5,262,530	\$1,664,282	\$756,127	\$738,311	\$423,303	\$640,632	\$57,127
2042	\$330,409	\$5,050,049	\$1,597,085	\$725,597	\$708,500	\$406,212	\$614,765	\$54,821
2043	\$321,244	\$4,909,964	\$1,552,783	\$705,470	\$688,847	\$394,944	\$597,712	\$53,300
2044	\$305,834	\$4,674,430	\$1,478,295	\$671,628	\$655,803	\$375,998	\$569,040	\$50,743
2045	\$295,356	\$4,514,292	\$1,427,651	\$648,619	\$633,336	\$363,117	\$549,545	\$49,005
2046	\$278,329	\$4,254,043	\$1,345,347	\$611,226	\$596,824	\$342,183	\$517,864	\$46,180
2047	\$260,383	\$3,979,761	\$1,258,605	\$571,817	\$558,344	\$320,121	\$484,474	\$43,202
2048	\$247,679	\$3,785,586	\$1,197,197	\$543,917	\$531,102	\$304,502	\$460,837	\$41,094
2049	\$234,270	\$3,580,630	\$1,132,379	\$514,469	\$502,347	\$288,016	\$435,886	\$38,869
2050	\$220,129	\$3,364,505	\$1,064,029	\$483,416	\$472,026	\$270,631	\$409,576	\$36,523
2051	\$205,232	\$3,136,812	\$992,021	\$450,701	\$440,081	\$252,316	\$381,858	\$34,052
2052	\$189,551	\$2,897,139	\$916,224	\$416,264	\$406,456	\$233,038	\$352,682	\$31,450
2053	\$173,058	\$2,645,062	\$836,504	\$380,046	\$371,091	\$212,761	\$321,995	\$28,713
2054	\$162,804	\$2,488,332	\$786,938	\$357,526	\$349,102	\$200,155	\$302,916	\$27,012
2055	\$159,237	\$2,433,816	\$769,697	\$349,694	\$341,454	\$195,769	\$296,279	\$26,420
2056	\$148,025	\$2,262,453	\$715,504	\$325,072	\$317,413	\$181,985	\$275,419	\$24,560
2057	\$151,363	\$2,313,471	\$731,638	\$332,402	\$324,570	\$186,089	\$281,629	\$25,114
2058	\$154,777	\$2,365,640	\$748,137	\$339,898	\$331,889	\$190,286	\$287,980	\$25,680
2059	\$158,267	\$2,418,985	\$765,007	\$347,563	\$339,373	\$194,576	\$294,474	\$26,259
2060	\$161,836	\$2,473,533	\$782,258	\$355,400	\$347,026	\$198,964	\$301,114	\$26,851
2061	\$165,485	\$2,529,311	\$799,898	\$363,414	\$354,852	\$203,451	\$307,905	\$27,457
2062	\$169,217	\$2,586,347	\$817,936	\$371,609	\$362,854	\$208,039	\$314,848	\$28,076
2063	\$173,033	\$2,644,669	\$836,380	\$379,989	\$371,036	\$212,730	\$321,948	\$28,709
2064	\$176,934	\$2,704,307	\$855,241	\$388,558	\$379,403	\$217,527	\$329,208	\$29,357
2065	\$180,924	\$2,765,289	\$874,526	\$397,320	\$387,958	\$222,432	\$336,631	\$30,019
2066	\$185,004	\$2,827,646	\$894,247	\$406,280	\$396,707	\$227,448	\$344,222	\$30,695
<b>40-year Total</b>	<b>\$10,821,904</b>	<b>\$126,455,960</b>	<b>\$52,309,382</b>	<b>\$23,765,511</b>	<b>\$23,205,544</b>	<b>\$13,304,676</b>	<b>\$20,135,436</b>	<b>\$1,795,543</b>
<b>Annual Average</b>	<b>\$270,548</b>	<b>\$3,161,399</b>	<b>\$1,307,735</b>	<b>\$594,138</b>	<b>\$580,139</b>	<b>\$332,617</b>	<b>\$503,386</b>	<b>\$44,889</b>

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## VIII. Curriculum Vitae (Abbreviated)

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David G. Loomis  
 Illinois State University  
 Department of Economics  
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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

**1996-present** Illinois State University, Normal, IL  
 Full 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 5 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 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

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**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 38 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 57 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

**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.

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



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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

by Dr. David G. Loomis,  
Bryan Loomis, and Chris Thankan  
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