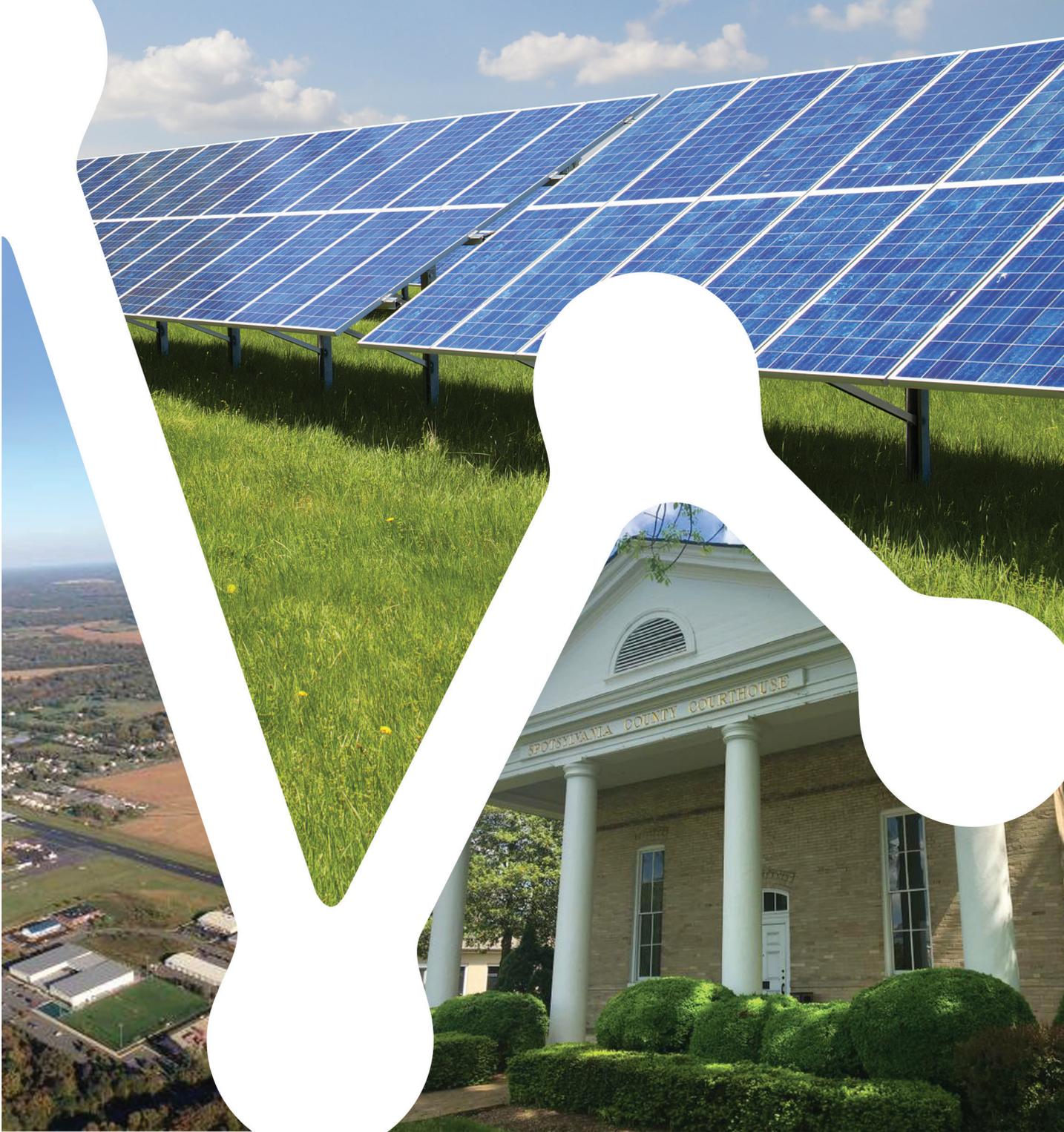


The Economic and Fiscal Contribution that the
**SPOTSYLVANIA SOLAR ENERGY CENTER WOULD
MAKE TO SPOTSYLVANIA COUNTY**



MAY 2018

Report prepared by



Dr. Mangum earned his Ph.D. in economics at George Mason University in 1995. He has more than two decades of experience in quantitative analysis and policy development at the federal and state level.

Mangum Economic Consulting, LLC is a Richmond, Virginia based firm that specializes in producing objective economic, quantitative, and qualitative analysis in support of strategic decision making. Examples of typical studies include:

Policy Analysis

Identify the intended and, more importantly, unintended consequences of proposed legislation and other policy initiatives.

Economic Impact Assessments and Return on Investment Analyses

Measure the economic contribution that business, education, or other enterprises make to their localities.

Workforce Information

Project the demand for, and supply of, qualified workers.

Cluster Analysis

Use occupation and industry clusters to illuminate regional workforce and industry strengths and identify connections between the two.

Environmental Scanning

Assess the economic, demographic, and other factors likely to affect your enterprise in the future.

4201 DOMINION BOULEVARD, SUITE 114
GLEN ALLEN, VIRGINIA 23060

(804) 346-8446

MANGUMECONOMICS.COM

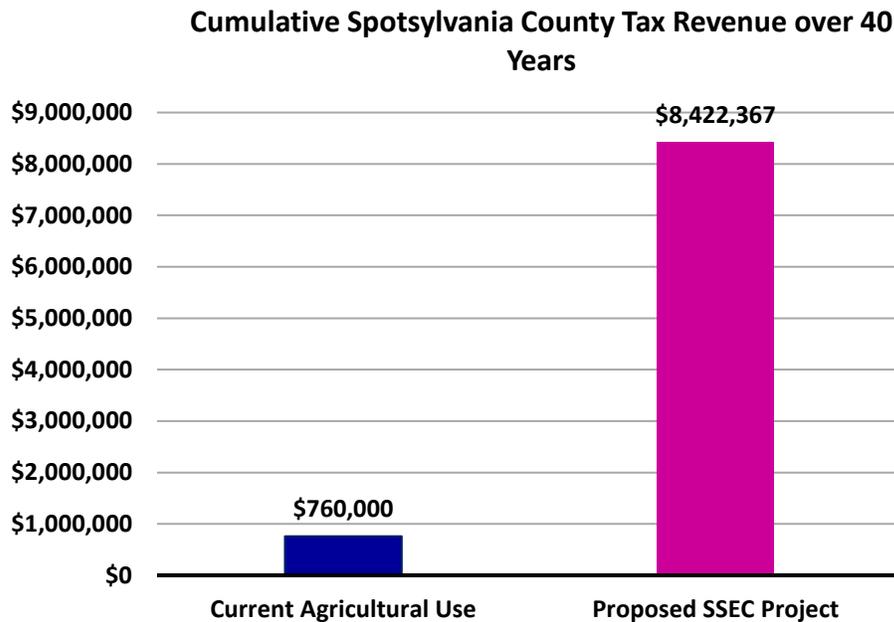
Executive Summary

This report assesses the economic and fiscal contribution that the proposed Spotsylvania Solar Energy Center (SSEC) would make to Spotsylvania County. The primary findings from that assessment are as follows:

- 1) **The SSEC is a 650-Megawatt (MW) solar project located in western Spotsylvania County, Virginia. The Project Site encompasses approximately 6,500 acres, of which approximately 3,500 acres will be developed into the solar project, with the remaining 3,000 acres preserved as undeveloped, vacant land. The project site currently consists of recently timbered land and is bordered by other forested lands and scattered single-family residences.**
- 2) **The proposed SSEC project would make a significant economic contribution to Spotsylvania County:**
 - The SSEC would provide an estimated one-time pulse of economic activity during its construction phase of approximately:
 - 843 full-time-equivalent jobs.
 - \$45.8 million in associated labor income.
 - \$110.0 million in economic output.
 - The SSEC would provide an estimated annual economic impact during its ongoing operational phase of approximately:
 - 34 full-time-equivalent jobs.
 - \$2.5 million in associated labor income.
 - \$4.7 million in economic output.
 - In comparison, our analysis indicates that in its current agricultural use the property that would be occupied by the SSEC provides a potential estimated annual economic impact of approximately:
 - 228 full-time-equivalent jobs.
 - \$1.2 million in associated labor income.
 - \$2.8 million in economic output.

3) The proposed SSEC project would also make a significant fiscal contribution to Spotsylvania County. We estimate that the proposed project would generate:

- \$3.5 million in state and local tax revenue from the one-time pulse of economic activity associated with the project’s construction.
- \$936,152 in net county revenue in the facility’s first year of operation (exclusive of county fees for permitting and controlling for the effect the facility would have on the county’s composite index and locally funded school budget), with that figure projected to gradually decline to \$48,461 in the facility’s 40th year of operation, as the value of the proposed projected-related capital investments is depreciated.
- Approximately \$8.4 million in cumulative county revenue over the 40 year expected life of the solar project, as compared to approximately \$760,000 in cumulative county revenue in the property’s current agricultural use – a difference of almost \$7.7 million.



- 4) **The SSEC would be entirely consistent with Virginia’s stated energy policy objectives as presented in Governor McAuliffe’s 2014 Virginia Energy Plan. The very first goal of which is to “accelerate the development of renewable energy sources in the Commonwealth to ensure a diverse fuel mix,” because doing so “will lead to economic prosperity through increased jobs and environmental health through lower harmful emissions.”**
- 5) **The SSEC could aid in attracting high-tech industries to Spotsylvania County:**
- Where in 2015 wind and solar energy did not materially contribute to electricity production in Virginia, today Dominion Energy, Virginia’s largest electricity producer, has more than 744-megawatts of in-state solar generation capacity that is either operational or under development, and 78 percent of that capacity is directly attributable to partnerships with leading data center companies.
 - One such partnership is Amazon Solar Farm U.S. East, an 80-megawatt solar project located on Virginia’s Eastern Shore in Accomack County, Virginia. Construction of that project was made possible as a result of a long-term power purchase agreement with Amazon Web Services, an affiliate of Amazon’s cloud computing business.
 - As this example illustrates, renewable energy is becoming an important asset for localities in promoting technology-driven economic development. And more importantly for Spotsylvania County, data centers are becoming a key component of regional economic development. In nearby Prince William County, data centers accounted for \$1.2 billion in investment in 2016 alone.¹ Moreover, since 2012 data centers have accounted for 92 percent of all industry investment in Prince William County.

¹ Data Source: Prince William County, Department of Economic Development.

The estimates provided in this report are based on the best information available and all reasonable care has been taken in assessing that information. However, because these estimates attempt to foresee circumstances that have not yet occurred, it is not possible to provide any assurance that they will be representative of actual events. These estimates are intended to provide a general indication of likely future outcomes and should not be construed to represent a precise measure of those outcomes.



Introduction

This report assesses the economic and fiscal contribution that the Spotsylvania Solar Energy Center (SSEC) would make to Spotsylvania County. The remainder of the report is divided into six sections:

- The SSEC Project section provides a brief description of the project.
- The Electricity Production in Virginia section provides general background information on Virginia’s electricity production sector and the role that solar energy could play in that sector.
- The Local Economic Profile section supplies context for the impact analysis to follow, by providing information on the local economy of Spotsylvania County.
- The Economic and Fiscal Impact section provides an empirical assessment of the economic and fiscal contribution that the SSEC would make to Spotsylvania County.
- The Other Considerations section discusses issues that are not directly addressed in the economic and fiscal impact analysis, such as how the proposed project supports Virginia’s stated energy goals and the potential spillover effects for economic development.

This report was commissioned by Sustainable Power Group LLC (sPower) and produced by Mangum Economics.

SSEC Project

The SSEC is a 650-Megawatt (MW) solar project located in western Spotsylvania County, Virginia. The project site encompasses approximately 6,500 acres, of which approximately 3,500 acres will be developed into the solar project, with the remaining 3,000 acres preserved as undeveloped, vacant land. The project site currently consists of recently timbered land.

Electricity Production in Virginia

In this section, we provide a backdrop for the proposed SSEC project by profiling Virginia’s electricity production sector and the role that solar energy could play in that sector.

Overall Market

As shown in Figure 1, in 2016 electricity sales and direct use in Virginia totaled 115.0 million megawatt hours, ranking the state 10th among the fifty states in terms of electricity consumption. However, only 81 percent of that demand was met by in-state utilities, independent producers, and other sources. As a result, Virginia had to import 19 percent of the electricity it consumed from producers in other states. As with all imports, this means that the jobs, wages, and economic output created by that production went to localities in those states, not to localities in Virginia.

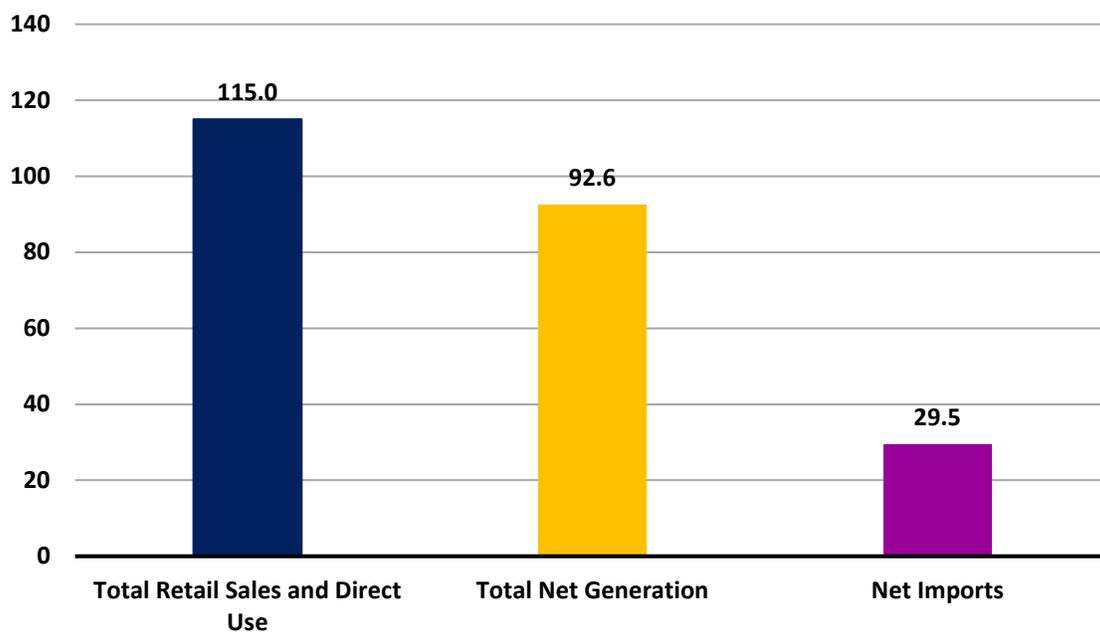


Figure 1: Demand and Supply of Electricity in Virginia in 2016 (in millions of megawatt-hours)²

² Data Source: U.S. Energy Information Administration. In this chart, “Net Imports” also takes into account losses during transmission. As a result, it does not directly equal the residual of “Total Net Generation” minus “Total Retail Sales and Direct Use.”

Sources of Production

Between 2006 and 2016, the total amount of electricity produced by the electric industry in Virginia increased from 73.1 to 92.6 million megawatt hours, while retail and direct consumption of electricity increased from 109.3 to 115.0 million megawatt hours. Figure 2 provides a comparison of the energy sources that were used to produce electricity in Virginia in 2006 and 2016. As these data show, the share of electricity produced using high-emissions energy sources declined over the period. Where coal was the state’s largest source of electricity in 2006, accounting for 47 percent of production, by 2016 it had fallen to third place, and accounted for only 18 percent of production.

In contrast, the share of electricity produced using cleaner-burning low-emissions energy sources increased over the period. Where natural gas accounted for only 10 percent of Virginia’s electricity production in 2006, by 2016 that proportion had almost quadrupled to 44 percent, making natural gas the state’s largest source of electricity. The one exception to this trend is wind and solar power, which accounted for zero percent of Virginia’s electricity production in 2006 and only two-one-hundredths of a percent in 2016.

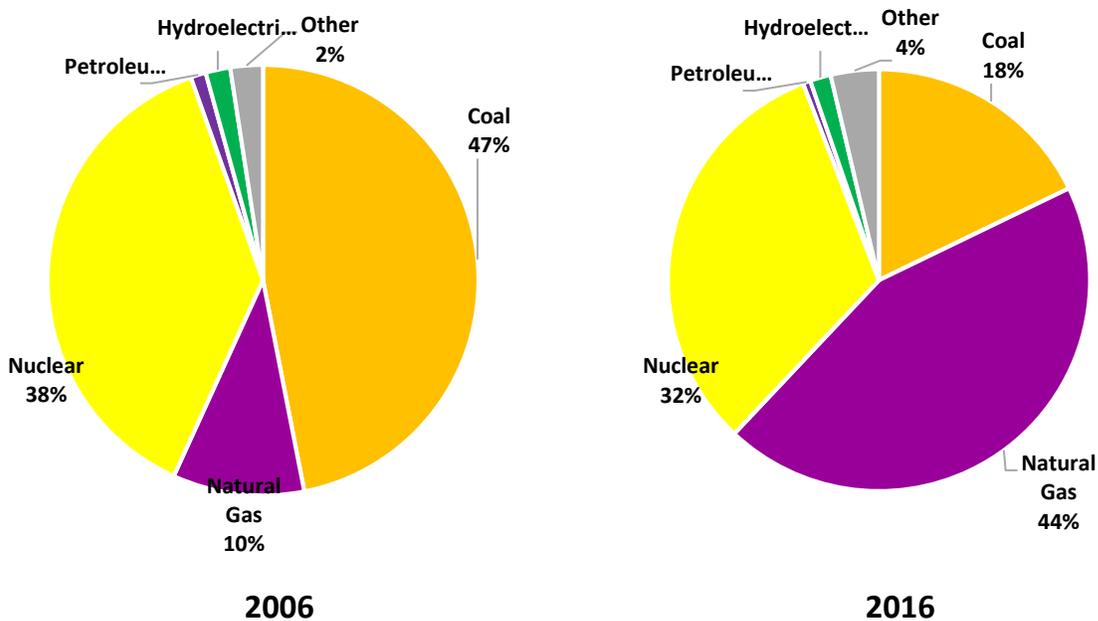


Figure 2: Electricity Generation in Virginia by Energy Source³

³ Data Source: U.S. Energy Information Administration.

Figure 3 provides similar data for the U.S. as a whole. A quick comparison of Figures 2 and 3 shows similarities, even though the degree of reliance on specific energy sources for electricity production is quite different. Nationally, as in Virginia, the most pronounced trend between 2006 and 2016 was that cleaner-burning low-emissions energy sources replaced high-emissions sources over the period. Where coal accounted for 49 percent of all electricity production nationwide in 2006, by 2016 that proportion had fallen to 30 percent. While at the other end of the spectrum, where natural gas accounted for 20 percent of electricity production nationally in 2006, by 2016 that figure had grown to 34 percent.

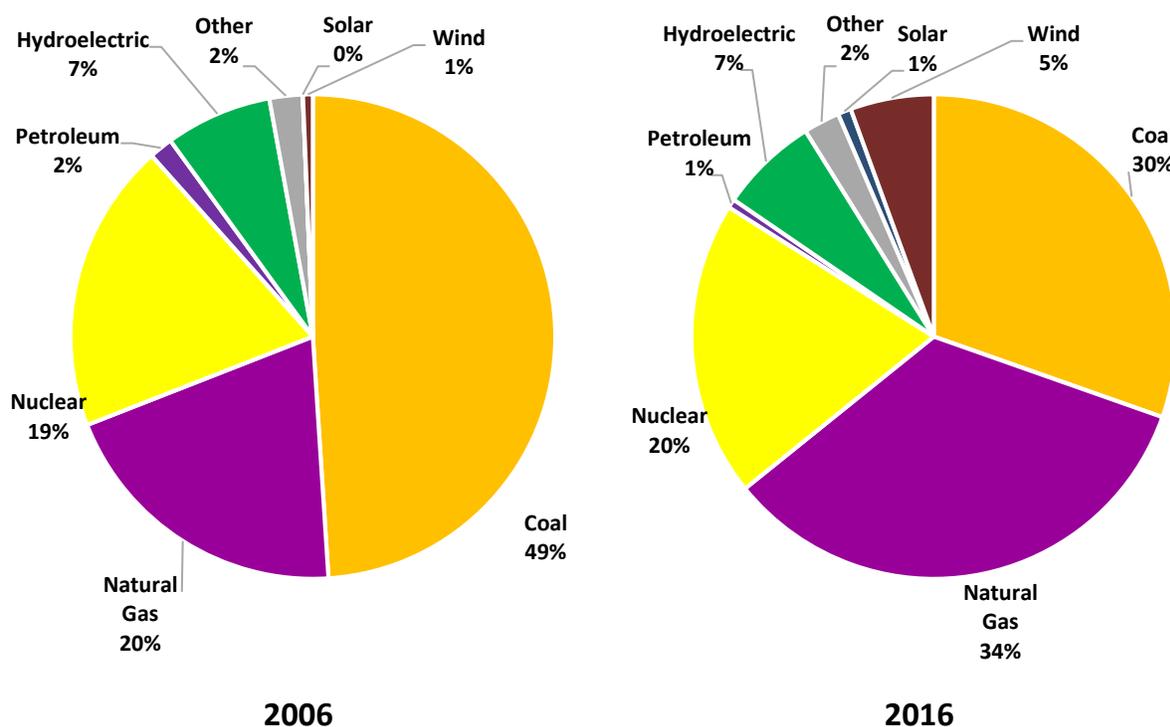


Figure 3: Electricity Generation in the U.S. by Energy Source⁴

One notable difference between the national trends represented in Figure 3 and the Virginia trends represented in Figure 2, however, is in the wind and solar categories. Where nationally the total contribution of these two energy sources to electricity production increased from 1 percent in 2006 to 6 percent in 2016, in Virginia wind and solar energy did not materially contribute to electricity production in 2006 or 2016.

⁴ Data Source: U.S. Energy Information Administration.



Impact on the Environment

In discussing the impact of these trends on the environment, it is important to realize that electricity production is the U.S.'s largest source of greenhouse gas emissions. Electricity production accounted for 40 percent of all carbon dioxide emissions from fossil fuel consumption in the U.S. in 2006, and 35 percent ten years later in 2016.⁵ However, that small change in percentage share masks some very significant changes in absolute emissions. Moreover, those changes in emissions levels were largely attributable to the shifts described above, which is to say that as the industry has transitioned to cleaner-burning energy sources, its greenhouse gas emissions have fallen.

Figure 4 depicts this change for both Virginia and the U.S. nationally. As these data indicate, between 2006 and 2016, as the share of electricity produced in Virginia by coal fell from 47 to 18 percent, carbon dioxide emissions from electricity production fell from 42.5 to 36.6 million metric tons. Similarly, at the national level as the share of electricity produced by coal and petroleum fell from 49 to 30 percent, carbon dioxide emissions from electricity production fell from 2,488.9 to 1,928.4 million metric tons.

To further promote these shifts, the very first recommendation in Governor McAuliffe's 2014 Virginia Energy Plan proposed to "accelerate the development of renewable energy sources in the Commonwealth to ensure a diverse fuel mix," because doing so "will lead to economic prosperity through increased jobs and environmental health through lower harmful emissions."⁶

⁵ Data Source: U.S. Energy Information Administration.

⁶ Virginia Energy Plan, Virginia Department of Mines, Minerals, and Energy, October 1, 2014.

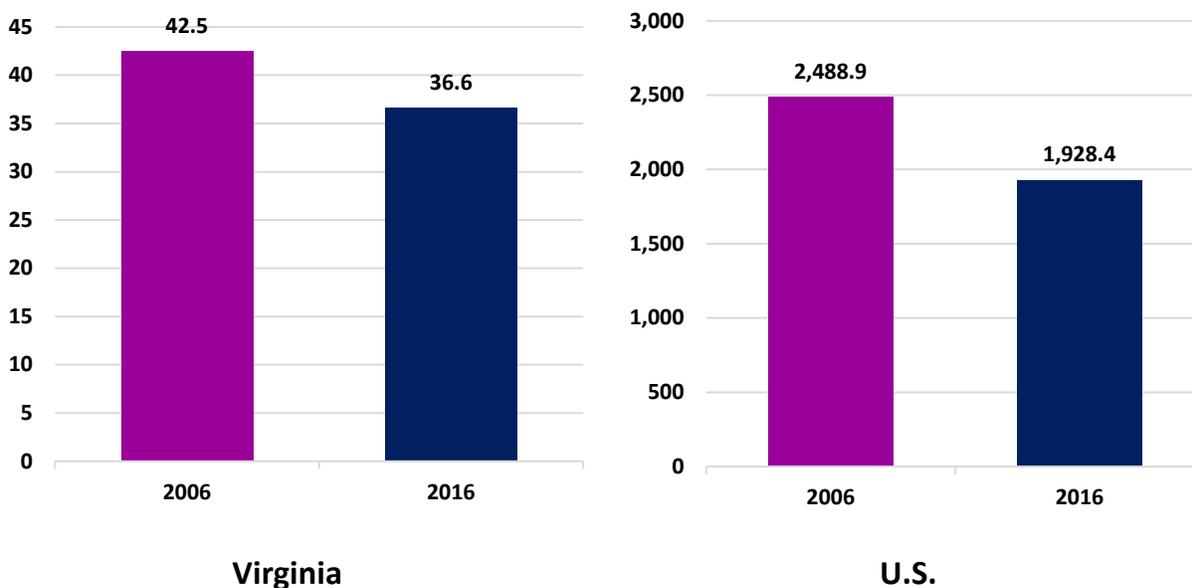


Figure 4: Carbon Dioxide Emissions from Electricity Production (in millions of metric tons)⁷

Local Economic Profile

In this section, we provide context for the economic and fiscal impact assessments to follow by profiling the local economy of Spotsylvania County.

Total Employment

Figure 5 depicts the trend in total employment in Spotsylvania County from the fourth quarter of 2012 to the fourth quarter of 2017. As these data show, employment in the county gradually trended upward over the period. As of the fourth quarter of 2017, county employment stood at 35,791 jobs. This represents a 3,873 job, or 12.1 percent, increase in employment over the period as a whole. To put this number in perspective, over this same period total statewide employment in Virginia increased by 5.9 percent.⁸

⁷ Data Source: U.S. Energy Information Administration.

⁸ Data Source: Virginia Employment Commission.

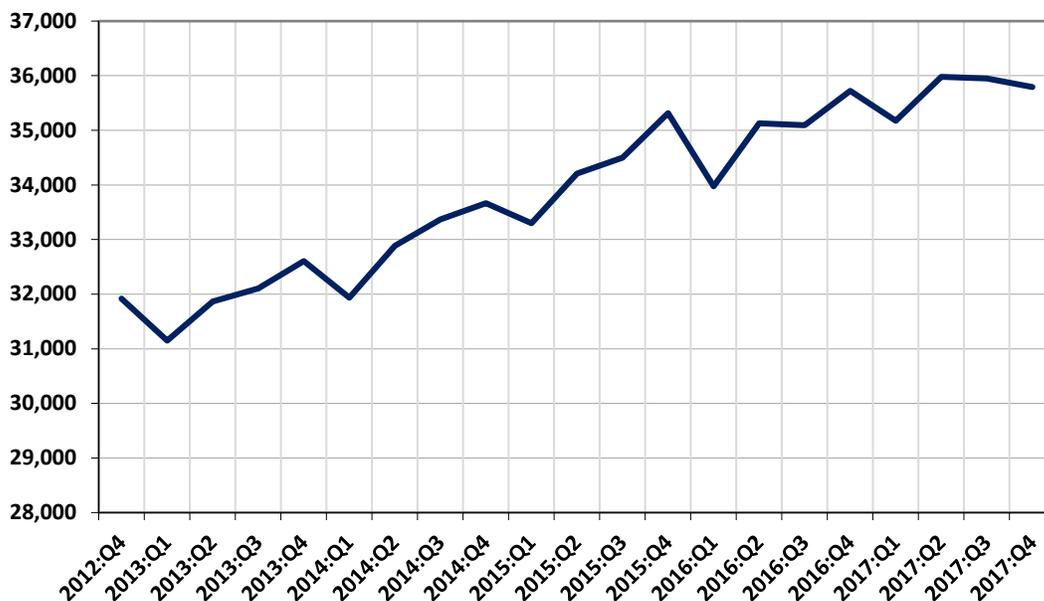


Figure 5: Total Employment in Spotsylvania County – Fourth Quarter 2012 to Fourth Quarter 2017⁹

To control for seasonality and provide a point of reference, Figure 6 compares the year-over-year change in total employment in Spotsylvania County to that of the state of Virginia as a whole over the same five-year period. Any point above the zero line in this graph indicates growth in year-over-year employment, while any point below the zero line indicates a decline in year-over-year employment. As these data indicate, year-over-year employment changes in Spotsylvania County out-performed the statewide average throughout most of the period. However, that margin generally closed from 2016 on. As of the fourth quarter of 2017, year-over-year employment growth was 0.2 percent in Spotsylvania County as compared to 1.2 percent statewide in Virginia.

⁹ Data Source: Virginia Employment Commission.

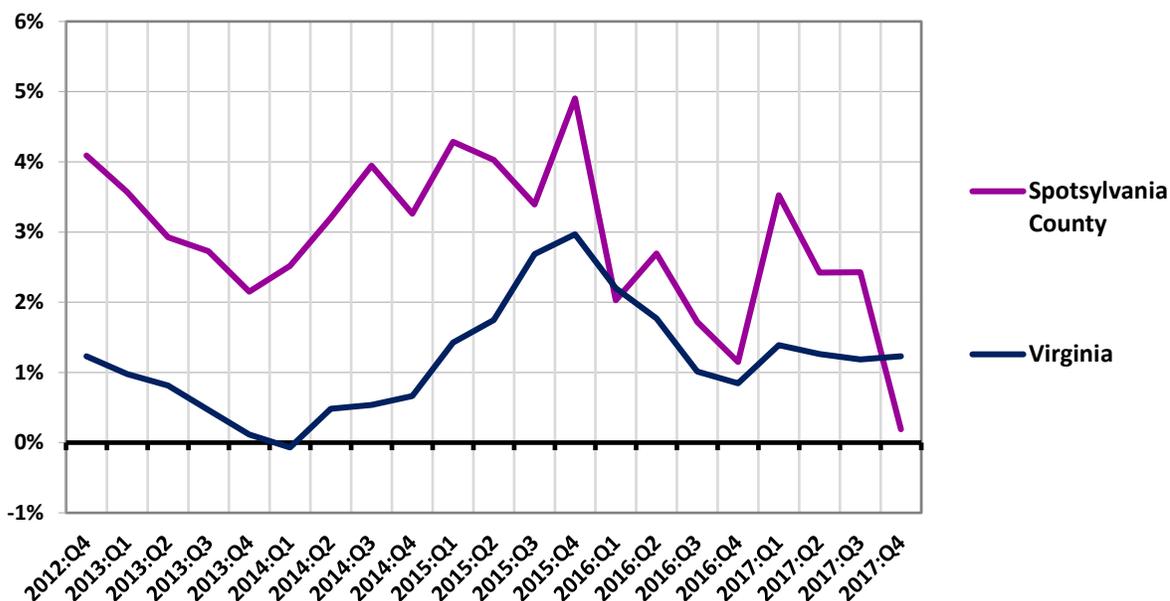


Figure 6: Year-Over-Year Change in Total Employment – Fourth Quarter 2012 to Fourth Quarter 2017¹⁰

Unemployment

Figure 7 illustrates the trend in Spotsylvania County’s unemployment rate over the five-year period from March 2013 through March 2018 and benchmarks those data against the statewide trend for Virginia. As these data show, unemployment rates in Spotsylvania County generally tracked very closely with the statewide average throughout this period. As of March 2018, unemployment stood at 3.3 percent in both Spotsylvania County and in Virginia as a whole.

¹⁰ Data Source: Virginia Employment Commission.

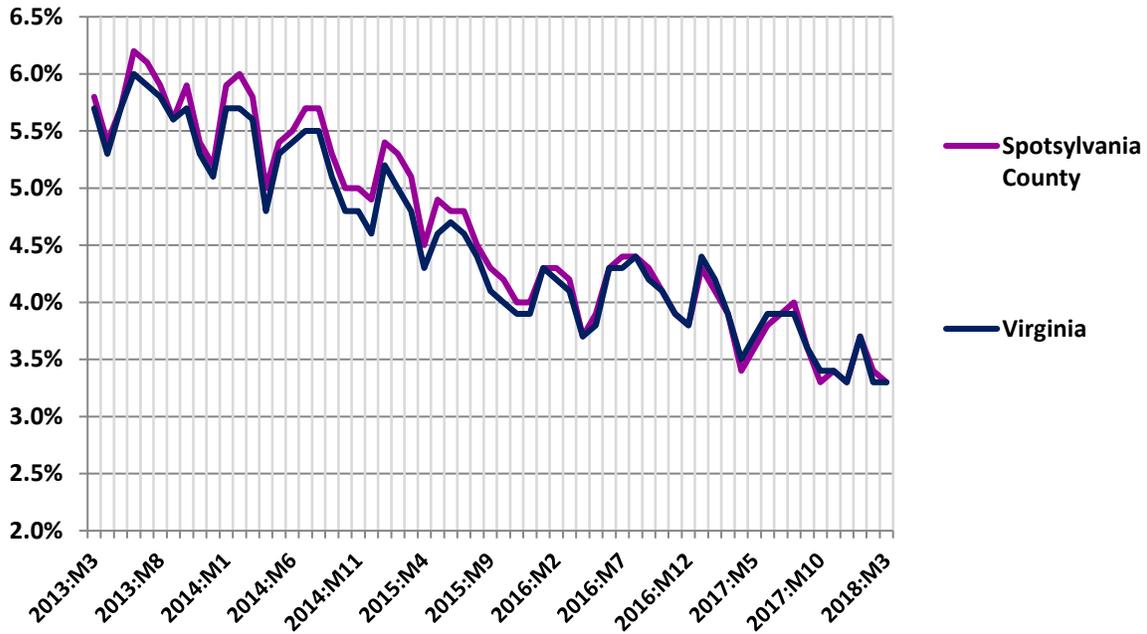


Figure 7: Unemployment Rate – March 2013 to March 2018¹¹

Employment and Wages by Major Industry Sector

To provide a better understanding of the underlying factors motivating the total employment trends depicted in Figures 5 and 6, Figures 8 through 10 provide data on employment and wages by major industry sector in Spotsylvania County.

Figure 8 provides an indication of the distribution of employment across major industries in Spotsylvania County’s economy in the fourth quarter of 2017 by ranking each industry by total employment. As these data indicate, the county’s largest industry sector that quarter was Retail Trade (6,867 jobs), followed by Educational Services 5,179 jobs), Health Care and Social Assistance 4,607 jobs), Accommodation and Food Services (4,108 jobs), and Construction (2,243 jobs).

¹¹ Data Source: Virginia Employment Commission.

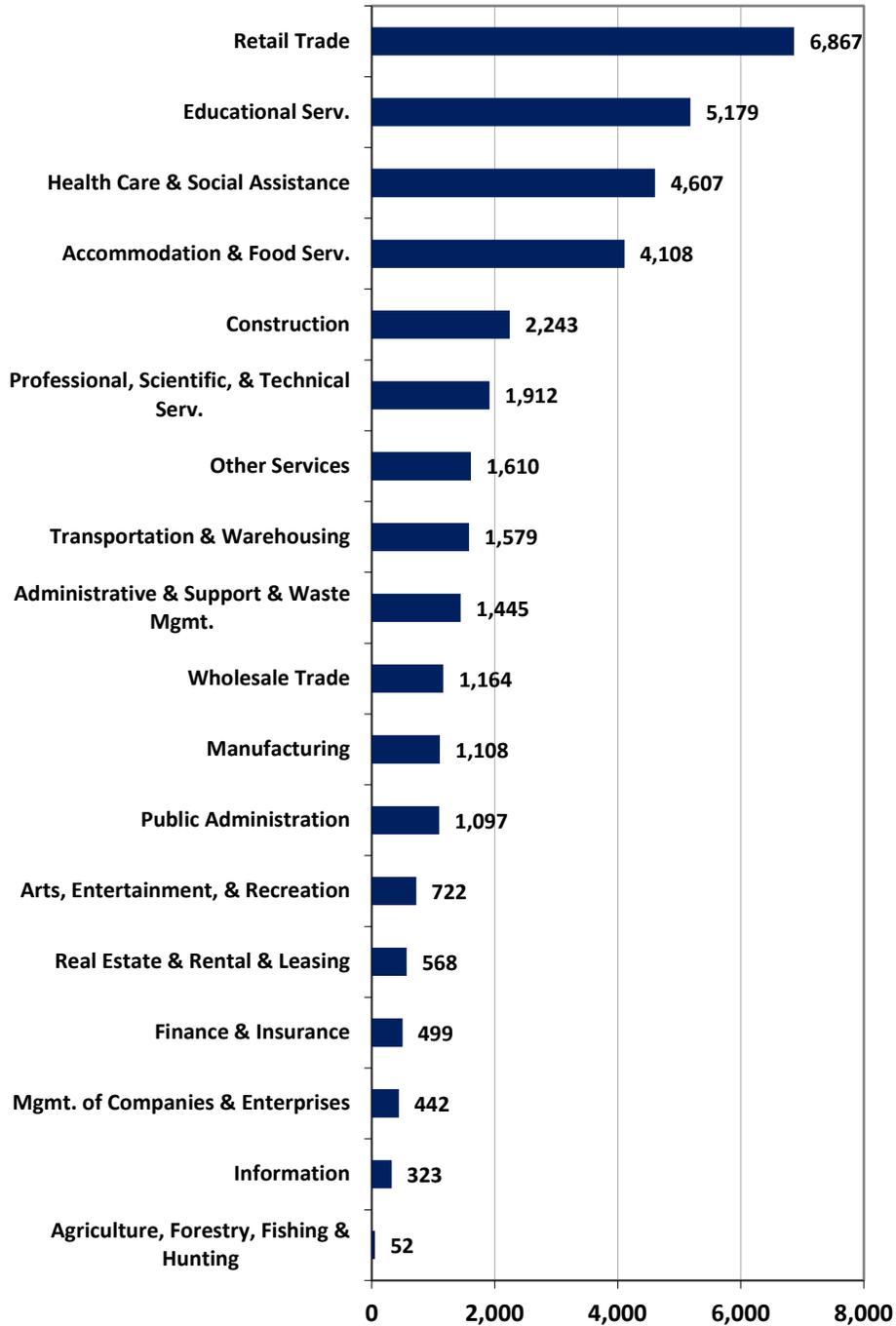


Figure 8: Employment by Major Industry in Spotsylvania County – Fourth Quarter 2017¹²

¹² Data Source: Virginia Employment Commission.



Figure 9: Average Weekly Wages by Major Industry in Spotsylvania County – Fourth Quarter 2017¹³

¹³ Data Source: Virginia Employment Commission.

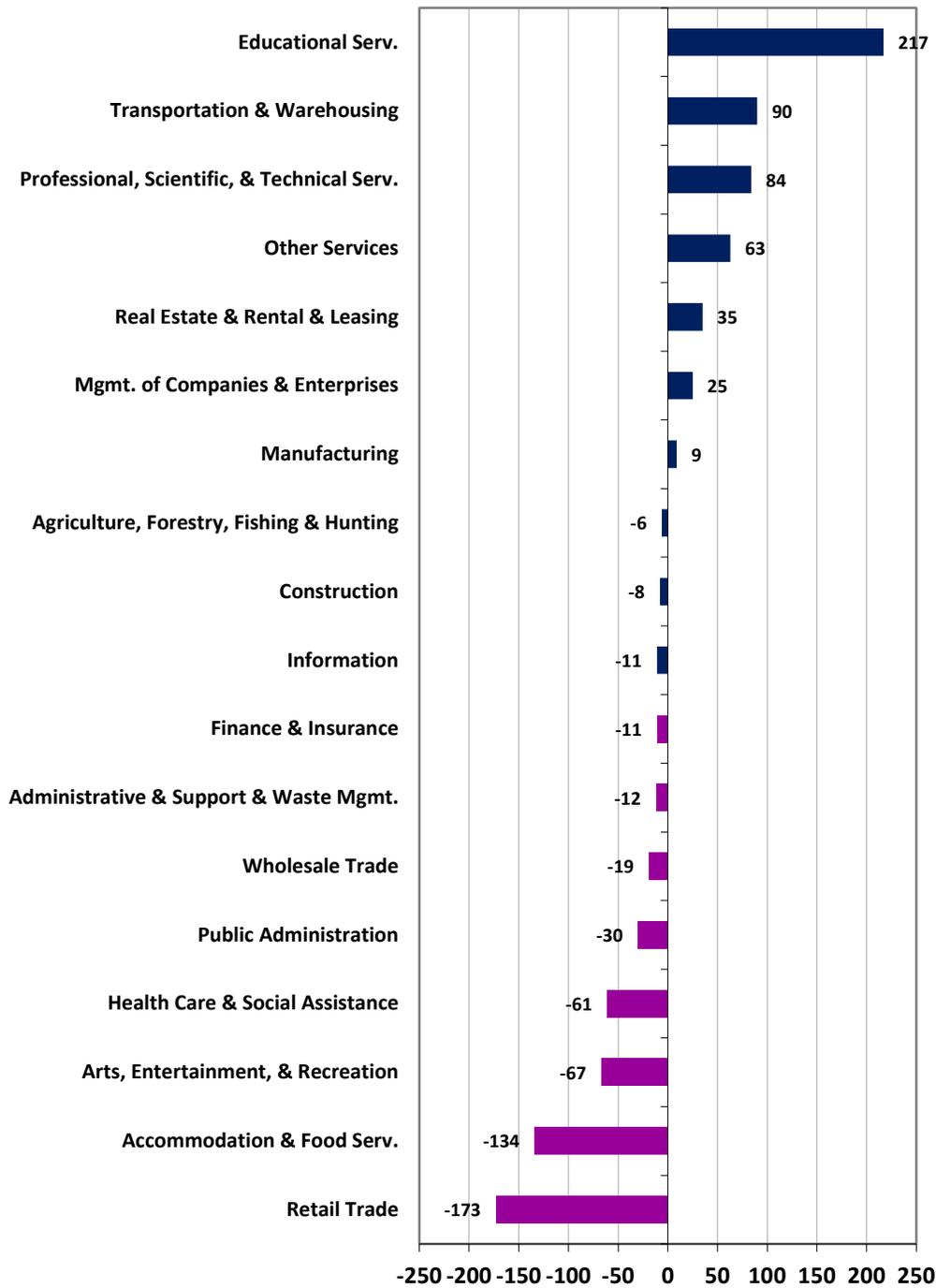


Figure 10: Change in Employment by Major Industry in Spotsylvania County – Fourth Quarter 2016 to Fourth Quarter 2017¹⁴

¹⁴ Data Source: Virginia Employment Commission.

Figure 9 provides a similar ranking for average weekly wages by major industry sector in Spotsylvania County in the fourth quarter of 2017. As these data show, the highest paying industries in the county that quarter were Professional Scientific, and Technical Services (\$1,765 per week), Management of Companies and Enterprises (\$1,393 per week), Construction (\$1,359 per week), Wholesale Trade (\$1,107 per week), and Manufacturing (\$1,062 per week). By way of reference, the average weekly wage across all industry sectors in Spotsylvania County that quarter was \$811 per week.

Lastly, Figure 10 details the year-over-year change in employment between the fourth quarter of 2016 and the fourth quarter of 2017 by major industry sector in Spotsylvania County. Over this period, the largest employment gains occurred in the Educational Services (up 217 jobs), Transportation and Warehousing (up 90 jobs), and Professional, Scientific, and Technical Services (up 84 jobs) sectors. While at the other end of the spectrum, the largest employment losses occurred in the Retail Trade (down 173 jobs), Accommodation and Food Services (down 134 jobs), and Arts, Entertainment, and Recreation (down 67 jobs) sectors.

Economic and Fiscal Impact

In this section, we quantify the economic and fiscal contribution that the SSEC would make to Spotsylvania County. Our analysis separately evaluates the one-time pulse of economic activity that would occur during the construction phase of the project, as well as the annual economic activity that the project would generate during its ongoing operations phase.

Method

To empirically evaluate the likely local economic impact attributable to the proposed SSEC project, we employ a regional economic impact model called IMPLAN.¹⁵ The IMPLAN model is one of the most commonly used economic impact simulation models in the U.S., and in Virginia is used by UVA's Weldon Cooper Center, the Virginia Department of Planning and Budget, the Virginia Employment Commission, and other state agencies and research institutes. Like all economic impact models, the IMPLAN model uses economic multipliers to quantify economic impact.

¹⁵ IMPLAN v.3 is produced by Minnesota IMPLAN Group, Inc.

Economic multipliers measure the ripple effects that an expenditure generates as it makes its way through the economy. For example, as when the SSEC purchases goods and services – or when project employees use their salaries and wages to make household purchases – thereby generating income for someone else, which is in turn spent, thereby becoming income for yet someone else, and so on, and so on. Through this process, one dollar in expenditures generates multiple dollars of income. The mathematical relationship between the initial expenditure and the total income generated is the economic multiplier.

One of the primary advantages of the IMPLAN model is that it uses regional and national production and trade flow data to construct region-specific and industry-specific economic multipliers, which are then further adjusted to reflect anticipated actual spending patterns within the specific geographic study area that is being evaluated. As a result, the economic impact estimates produced by IMPLAN are not generic. They reflect as precisely as possible the economic realities of the specific industry, and the specific study area, being evaluated.

In the analysis that follows, these impact estimates are divided into three categories. First round direct impact measures the direct economic contribution of the entity being evaluated (e.g., own employment, wages paid, goods and services purchased by the SSEC). Second round indirect and induced impact measures the economic ripple effects of this direct impact in terms of business to business, and household (employee) to business, transactions. Total impact is simply the sum of the preceding two. These categories of impact are then further defined in terms of employment (the jobs that are created), labor income (the wages and benefits associated with those jobs), and economic output (the total amount of economic activity that is created in the economy).



Construction Phase

In conducting our analysis of the one-time economic and fiscal impact that the proposed SSEC project would have on Spotsylvania County during the construction phase of the project, we employ the following assumptions:

- For ease of analysis, all construction expenditures are assumed to take place in a single year.
- Total architecture, engineering, and construction costs are estimated to be \$215,475,000 for the SSEC.¹⁶
- It is anticipated that approximately 34 percent of architecture, engineering, and construction expenditures would be spent with vendors in Spotsylvania County.¹⁷
- Capital equipment costs are estimated to be \$337,025,000 for the SSEC.¹⁸
- It is anticipated that no capital equipment will be purchased from vendors in Spotsylvania County.¹⁹

By feeding these assumptions into the IMPLAN model, we obtain the following estimates of one-time economic and fiscal impact. As shown in Table 1, construction of the proposed SSEC project would directly provide a one-time pulse of approximately: 1) 523 full-time-equivalent jobs, 2) \$31.9 million in labor income, and 3) \$70.8 million in economic output to Spotsylvania County.

Taking into account the economic ripple effects that direct investment would generate, we estimate that the total one-time impact on Spotsylvania County would be: 1) 843 full-time-equivalent jobs, 2) \$45.8 million in labor income, 3) \$110.0 million in economic output, and 4) \$3.5 million in state and local tax revenue.

¹⁶ Data Source: sPower.

¹⁷ Data Source: sPower. It is not possible to know with precision the proportion of services that will be purchased from Spotsylvania County contractors and subcontractors.

¹⁸ Data Source: sPower.

¹⁹ Data Source: sPower.

Table 1: One-Time Economic and Fiscal Impact of the SSEC on Spotsylvania County – Construction Phase (2018 Dollars)

Economic Impact:			
	Employment	Labor Income	Output
First Round Direct Economic Activity	523	\$31,858,693	\$70,778,754
Second Round Indirect and Induced Economic Activity	320	\$13,969,627	\$39,186,689
Total, Direct, Indirect, and Induced Economic Activity	843	\$45,828,320	\$109,965,443
Fiscal Impact:			
Total State and Local Fiscal Impact			\$3,460,221

Ongoing Operations Phase

In conducting our analysis of the annual economic and fiscal impact that the proposed SSEC project would have on Spotsylvania County during the ongoing operations phase of the project, we employ the following assumptions:

- The SSEC would employ approximately 20 people and pay wages of \$1,881,136 each year.²⁰
- The SSEC would spend approximately \$1,061,000 each year on the purchase of various goods and services.²¹
- The SSEC would involve a capital investment of \$552,500,000 in equipment and capital improvements to the existing property.²²

²⁰ Data Source: sPower.

²¹ Data Source: sPower.

²² Data Source: sPower.

- The SSEC would generate \$500,000 in roll back real property taxes for Spotsylvania County.²³

By feeding these assumptions into the IMPLAN model, we obtain the following estimates of annual economic and fiscal impact.

Economic Impact

As shown in Table 2, annual operation of the proposed SSEC project would directly provide approximately: 1) 20 full-time-equivalent jobs, 2) \$1.9 million in labor income, and 3) \$2.9 million in economic output to Spotsylvania County. Taking into account the economic ripple effects that direct impact would generate, we estimate that the total annual impact on Spotsylvania County would be: 1) 34 full-time-equivalent jobs, 2) \$2.5 million in labor income, and 3) \$4.7 million in economic output.

Table 2: Total Annual Economic Impact of the SSEC on Spotsylvania County – Operations Phase (2018 Dollars)

	Employment	Labor Income	Output
First Round Direct Economic Activity	20	\$1,881,136	\$2,942,136
Second Round Indirect and Induced Economic Activity	14	\$569,370	\$1,774,883
Total, Direct, Indirect, and Induced Economic Activity	34	\$2,450,506	\$4,717,019

²³ Data Source: sPower. Changing the use of the property from agricultural to industrial increases the assessed value of the property for purposes of real estate taxes. In such instances, Spotsylvania County requires the owner to pay “roll back taxes,” or the difference in the current and previous real estate taxes on the property going back for a period of five years.



Fiscal Impact

In this section, we quantify the net fiscal contribution that the proposed SSEC project would make to Spotsylvania County. This analysis explicitly takes into account roll back taxes and the effect the proposed project would have on the county's composite index and the local contribution to the county's school budget.

Gross County Revenue

Table 3 provides a calculation of the gross revenue that the proposed SSEC project would generate for Spotsylvania County over a 40 year period. This calculation is based on the value of proposed capital equipment and improvements, times depreciation (pursuant to State Corporation Commission guidelines), times the 80 percent local real property tax exemption (pursuant to Virginia Code § 58.1-3660), times Spotsylvania County's real property tax rate of \$0.833 per \$100 of assessed value (pursuant to Virginia Code § 58.1-2606 and the county's published tax rate for real property for 2018), with the property assessed at 86.3 percent in accordance with the State Corporation Commission's guideline for tax assessment of public utilities in Spotsylvania County.

As the data in Table 3 indicate, we estimate gross county revenue from the project to be approximately \$1,214,925 in the project's first year of operation (exclusive of county fees for permitting), with that figure projected to gradually decline to approximately \$79,436 in the project's 40th year of operation, as the value of the proposed capital investments is depreciated.

Table 3: Estimated Gross County Tax Revenue Generated by the SSEC over 40 Years (2018 Dollars)

Year	Roll Back Taxes ²⁴	Capital Investment ²⁵	Depreciation ²⁶	Depreciated Value of Capital Investment	Taxable Capital Investment (less 80% exemption) ²⁷	Gross Annual County Tax Revenue ²⁸
1	\$500,000	\$552,500,000	90%	\$497,250,000	\$85,825,350	\$1,214,925
2		\$552,500,000	90%	\$497,250,000	\$85,825,350	\$714,925
3		\$552,500,000	90%	\$497,250,000	\$85,825,350	\$714,925
4		\$552,500,000	90%	\$497,250,000	\$85,825,350	\$714,925
5		\$552,500,000	90%	\$495,758,250	\$85,567,874	\$712,780
6		\$552,500,000	87%	\$482,277,250	\$83,241,053	\$693,398
7		\$552,500,000	85%	\$467,967,500	\$80,771,191	\$672,824
8		\$552,500,000	82%	\$452,829,000	\$78,158,285	\$651,059
9		\$552,500,000	79%	\$436,806,500	\$75,392,802	\$628,022
10		\$552,500,000	76%	\$419,789,500	\$72,455,668	\$603,556
11		\$552,500,000	73%	\$401,722,750	\$69,337,347	\$577,580
12		\$552,500,000	69%	\$382,606,250	\$66,037,839	\$550,095
13		\$552,500,000	66%	\$362,329,500	\$62,538,072	\$520,942
14		\$552,500,000	62%	\$340,892,500	\$58,838,046	\$490,121
15		\$552,500,000	58%	\$318,129,500	\$54,909,152	\$457,393
16		\$552,500,000	53%	\$293,985,250	\$50,741,854	\$422,680
17		\$552,500,000	49%	\$268,404,500	\$46,326,617	\$385,901
18		\$552,500,000	44%	\$241,276,750	\$41,644,367	\$346,898
19		\$552,500,000	38%	\$212,546,750	\$36,685,569	\$305,591
20		\$552,500,000	33%	\$182,048,750	\$31,421,614	\$261,742
21		\$552,500,000	27%	\$149,782,750	\$25,852,503	\$215,351
22		\$552,500,000	21%	\$115,527,750	\$19,940,090	\$166,101

²⁴ Data Source: sPower.

²⁵ Data Source: sPower.

²⁶ Data Source: State Corporation Commission guidelines.

²⁷ Calculated pursuant to Virginia Code § 58.1-3660 which stipulates that solar facilities over 20MW are subject to an 80 percent exemption from local property taxes, and using the State Corporation Commission’s 2017 utility assessment ratio for Spotsylvania County of 0.863.

²⁸ Calculated pursuant to Virginia Code § 58.1-2606 which stipulates that capital equipment owned by utilities is taxed as real property and the local tax rate on that capital equipment would be capped at Spotsylvania County’s real property tax rate of \$0.833 per \$100 of assessed value.

Table 3: Estimated Gross County Tax Revenue Generated by the SSEC over 40 Years (2018 Dollars)

Year	Roll Back Taxes ²⁴	Capital Investment ²⁵	Depreciation ²⁶	Depreciated Value of Capital Investment	Taxable Capital Investment (less 80% exemption) ²⁷	Gross Annual County Tax Revenue ²⁸
23		\$552,500,000	14%	\$79,228,500	\$13,674,839	\$113,911
24		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
25		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
26		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
27		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
28		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
29		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
30		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
31		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
32		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
33		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
34		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
35		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
36		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
37		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
38		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
39		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436
40		\$552,500,000	10%	\$55,250,000	\$9,536,150	\$79,436

Impact on Composite Index

On average, Virginia localities fund 45 percent of their primary and secondary education expenditures and the Commonwealth of Virginia funds the remaining 55 percent. But, each locality’s share is adjusted up or down based on a composite index that measures the locality’s “ability to pay,” as determined by the locality’s property tax base, adjusted gross income, and taxable retail sales. Table 4 illustrates the likely effect that the capital improvements proposed as part of the SSEC would have on Spotsylvania County’s composite index, and the county’s share of its school budget, over a 40 year period.



The calculation presented in Table 4 is derived by: 1) using baseline data for Spotsylvania County on County Taxable Real Property, Adjusted Gross Income, Taxable Retail Sales, County School Average Daily Membership (ADM), and County Population from the Virginia Department of Education’s 2018-2020 Composite Index of Local Ability to Pay, 2) adjusting County Taxable Real Property in subsequent years using the Taxable Capital Investment figures from Table 3, and 3) applying those figures to the Virginia Department of Education’s composite index formula to compute a revised composite index for Spotsylvania County in each subsequent year.²⁹ That revised composite index is then applied to the County of Spotsylvania’s baseline FY 2017 locally funded school budget as reported by the Virginia Auditor of Public Accounts to determine the additional local school funding that would be required in each subsequent year relative to the baseline.

It is important to note that this calculation measures changes from the baseline only. No attempt is made to forecast future changes in county data beyond the addition to County Taxable Real Property from the capital improvements proposed as part of the SSEC. As shown in Table 4, based on these calculations, we estimate the proposed SSEC project’s addition to Spotsylvania County’s Taxable Real Property would increase required local school funding by approximately \$278,773 in the project’s first year of operation, with that figure projected to gradually decline to approximately \$30,975 in the project’s 40th year of operation, as the value of the proposed capital investments is depreciated.

²⁹ The Virginia Department of Education’s composite index formula is: $(0.5 * (((0.66) * ((\text{County Taxable Real Property} / \text{County School ADM}) / (\text{State Taxable Real Property} / \text{State School ADM})) + ((0.33) * ((\text{County Taxable Real Property} / \text{County Population}) / (\text{State Taxable Real Property} / \text{State Population})))))) + (0.4 * (((0.66) * ((\text{County Adjusted Gross Income} / \text{County School ADM}) / (\text{State Adjusted Gross Income} / \text{State School ADM})) + ((0.33) * ((\text{County Adjusted Gross Income} / \text{County Population}) / (\text{State Adjusted Gross Income} / \text{State Population})))))) + (0.1 * (((0.66) * ((\text{County Taxable Retail Sales} / \text{County School ADM}) / (\text{State Taxable Retail Sales} / \text{State School ADM})) + ((0.33) * ((\text{County Taxable Retail Sales} / \text{County Population}) / (\text{State Taxable Retail Sales} / \text{State Population}))))))$.

Table 4: Change in Composite Index and Required Local Contribution to School Budget Attributable to the SSEC over 40 years (2018 Dollars)

Year	County Taxable Real Property ³⁰	Taxable Proposed Capital Investment ³¹	Adj. County Taxable Real Property	Adj. Gross Income ³²	Taxable Retail Sales ³³	County School ADM ³⁴	County Pop. ³⁵	Com-posite Index ³⁶	Locally Funded School Budget ³⁷	Change in Locally Funded School Budget
Base-line	\$16,138,769,358			\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3626	\$106,622,374	\$0
1	\$16,138,769,358	\$85,825,350	\$16,224,594,708	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3636	\$106,901,147	\$278,773
2	\$16,138,769,358	\$85,825,350	\$16,224,594,708	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3636	\$106,901,147	\$278,773
3	\$16,138,769,358	\$85,825,350	\$16,224,594,708	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3636	\$106,901,147	\$278,773
4	\$16,138,769,358	\$85,825,350	\$16,224,594,708	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3636	\$106,901,147	\$278,773
5	\$16,138,769,358	\$85,567,874	\$16,224,337,231	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3636	\$106,900,311	\$277,937
6	\$16,138,769,358	\$83,241,053	\$16,222,010,411	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3636	\$106,892,753	\$270,379
7	\$16,138,769,358	\$80,771,191	\$16,219,540,548	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3635	\$106,884,730	\$262,356
8	\$16,138,769,358	\$78,158,285	\$16,216,927,643	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3635	\$106,876,243	\$253,869

³⁰ Data Source: Virginia Department of Education, 2018-20 Composite Index of Local Ability to Pay.

³¹ Data Source: From Table 3.

³² Data Source: Virginia Department of Education, 2018-20 Composite Index of Local Ability to Pay.

³³ Data Source: Virginia Department of Education, 2018-20 Composite Index of Local Ability to Pay.

³⁴ Data Source: Virginia Department of Education, 2018-20 Composite Index of Local Ability to Pay.

³⁵ Data Source: Virginia Department of Education, 2018-20 Composite Index of Local Ability to Pay.

³⁶ Data Source: Baseline data taken from the Virginia Department of Education, 22018-20 Composite Index of Local Ability to Pay. Subsequent annual calculations are based on the Adjusted County Taxable Real Property, Adjusted Gross Income, County School Average Daily Membership (ADM), and County Population data presented for each year.

³⁷ Data Source: Virginia Auditor of Public Accounts, Comparative report of Local Government revenue and Expenditures for FY 2017.



Table 4: Change in Composite Index and Required Local Contribution to School Budget Attributable to the SSEC over 40 years (2018 Dollars)

Year	County Taxable Real Property ³⁰	Taxable Proposed Capital Investment ³¹	Adj. County Taxable Real Property	Adj. Gross Income ³²	Taxable Retail Sales ³³	County School ADM ³⁴	County Pop. ³⁵	Com-posite Index ³⁶	Locally Funded School Budget ³⁷	Change in Locally Funded School Budget
9	\$16,138,769,358	\$75,392,802	\$16,214,162,159	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3635	\$106,867,260	\$244,886
10	\$16,138,769,358	\$72,455,668	\$16,211,225,025	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3634	\$106,857,720	\$235,346
11	\$16,138,769,358	\$69,337,347	\$16,208,106,704	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3634	\$106,847,591	\$225,217
12	\$16,138,769,358	\$66,037,839	\$16,204,807,196	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3634	\$106,836,874	\$214,500
13	\$16,138,769,358	\$62,538,072	\$16,201,307,429	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3633	\$106,825,506	\$203,132
14	\$16,138,769,358	\$58,838,046	\$16,197,607,403	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3633	\$106,813,488	\$191,114
15	\$16,138,769,358	\$54,909,152	\$16,193,678,509	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3633	\$106,800,727	\$178,353
16	\$16,138,769,358	\$50,741,854	\$16,189,511,212	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3632	\$106,787,191	\$164,817
17	\$16,138,769,358	\$46,326,617	\$16,185,095,974	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3632	\$106,772,849	\$150,475
18	\$16,138,769,358	\$41,644,367	\$16,180,413,725	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3631	\$106,757,641	\$135,267
19	\$16,138,769,358	\$36,685,569	\$16,175,454,927	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3630	\$106,741,534	\$119,160
20	\$16,138,769,358	\$31,421,614	\$16,170,190,972	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3630	\$106,724,436	\$102,062
21	\$16,138,769,358	\$25,852,503	\$16,164,621,860	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3629	\$106,706,347	\$83,973
22	\$16,138,769,358	\$19,940,090	\$16,158,709,447	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3629	\$106,687,142	\$64,768
23	\$16,138,769,358	\$13,674,839	\$16,152,444,197	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3628	\$106,666,792	\$44,418
24	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975
25	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975
26	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975
27	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975



Table 4: Change in Composite Index and Required Local Contribution to School Budget Attributable to the SSEC over 40 years (2018 Dollars)

Year	County Taxable Real Property ³⁰	Taxable Proposed Capital Investment ³¹	Adj. County Taxable Real Property	Adj. Gross Income ³²	Taxable Retail Sales ³³	County School ADM ³⁴	County Pop. ³⁵	Com-posite Index ³⁶	Locally Funded School Budget ³⁷	Change in Locally Funded School Budget
28	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975
29	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975
30	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975
31	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975
32	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975
33	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975
34	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975
35	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975
36	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975
37	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975
38	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975
39	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975
40	\$16,138,769,358	\$9,536,150	\$16,148,305,508	\$3,790,488,329	\$1,547,887,315	23,094	128,998	0.3627	\$106,653,349	\$30,975



Net County Revenue

Finally, Table 5 combines the results from the calculations depicted in Table 3 and 4 to provide an estimate of the net fiscal contribution that the proposed SSEC project would make to Spotsylvania County over 40 years. As these data indicate, we estimate net county revenue from the project to be approximately \$936,152 in the project’s first year of operation (exclusive of county fees for permitting), with that figure projected to gradually decline to approximately \$48,461 in the project’s 40th year of operation, as the value of the proposed capital investments is depreciated. Overall, we estimate that the cumulative net local tax revenue payments from the proposed SSEC project over 40 years would be approximately \$8.4 million.

Table 5: Estimated Net County Tax Revenue Generated by the SSEC over 40 years (2018 Dollars)

Year	Gross Additional Annual County Tax Revenue ³⁸	Change in Locally Funded School Budget ³⁹	Net Additional Annual County Tax Revenue
1	\$1,214,925	\$278,773	\$936,152
2	\$714,925	\$278,773	\$436,152
3	\$714,925	\$278,773	\$436,152
4	\$714,925	\$278,773	\$436,152
5	\$712,780	\$277,937	\$434,844
6	\$693,398	\$270,379	\$423,019
7	\$672,824	\$262,356	\$410,468
8	\$651,059	\$253,869	\$397,189
9	\$628,022	\$244,886	\$383,136
10	\$603,556	\$235,346	\$368,209
11	\$577,580	\$225,217	\$352,363
12	\$550,095	\$214,500	\$335,595
13	\$520,942	\$203,132	\$317,810
14	\$490,121	\$191,114	\$299,007
15	\$457,393	\$178,353	\$279,041
16	\$422,680	\$164,817	\$257,863
17	\$385,901	\$150,475	\$235,425
18	\$346,898	\$135,267	\$211,631

³⁸ From Table 1.

³⁹ From Table 2.



Table 5: Estimated Net County Tax Revenue Generated by the SSEC over 40 years (2018 Dollars)

Year	Gross Additional Annual County Tax Revenue ³⁸	Change in Locally Funded School Budget ³⁹	Net Additional Annual County Tax Revenue
19	\$305,591	\$119,160	\$186,431
20	\$261,742	\$102,062	\$159,680
21	\$215,351	\$83,973	\$131,379
22	\$166,101	\$64,768	\$101,333
23	\$113,911	\$44,418	\$69,494
24	\$79,436	\$30,975	\$48,461
25	\$79,436	\$30,975	\$48,461
26	\$79,436	\$30,975	\$48,461
27	\$79,436	\$30,975	\$48,461
28	\$79,436	\$30,975	\$48,461
29	\$79,436	\$30,975	\$48,461
30	\$79,436	\$30,975	\$48,461
31	\$79,436	\$30,975	\$48,461
32	\$79,436	\$30,975	\$48,461
33	\$79,436	\$30,975	\$48,461
34	\$79,436	\$30,975	\$48,461
35	\$79,436	\$30,975	\$48,461
36	\$79,436	\$30,975	\$48,461
37	\$79,436	\$30,975	\$48,461
38	\$79,436	\$30,975	\$48,461
39	\$79,436	\$30,975	\$48,461
40	\$79,436	\$30,975	\$48,461
Cumulative			\$8,422,367

Current Agricultural Use

In this section, we provide a benchmark for the previous estimates of the economic contribution that the proposed SSEC project would make to Spotsylvania County by estimating the economic contribution that the site makes to the county in its current agricultural use. In conducting that analysis, we employ the following assumptions:

- The proposed SSEC project would be situated on an approximately 6,500 acre tract of land.
- Approximately 65 percent of the property is currently used for agricultural production.⁴⁰
- Average revenue per acre for Virginia farmland is approximately \$411.62.⁴¹
- Real property tax payments by current landowners to Spotsylvania County are approximately \$19,000 each year.⁴²

By feeding these assumptions into the IMPLAN model, we obtain the following estimates of annual economic and fiscal impact. As shown in Table 6, in its current agricultural use we estimate that the proposed SSEC project site directly provides approximately: 1) 210 full-time-equivalent jobs, 2) \$809,198 in labor income, and 3) \$1.7 million in economic output to Spotsylvania County. Taking into account the economic ripple effects that direct impact generates, we estimate that the total annual impact on Spotsylvania County is: 1) 228 full-time-equivalent jobs, 2) \$1.2 million in labor income, 3) \$2.8 million in economic output, and 4) \$19,000 in direct real property tax payments to Spotsylvania County.

⁴⁰ Data Source: sPower.

⁴¹ Data Source: Estimated based on data from the Virginia Department of Agriculture and Consumer Services.

⁴² Data Source: sPower.



Table 6: Total Annual Economic Impact of the Proposed SSEC Project Site on Spotsylvania County – Current Agricultural Use (2018 Dollars)

Economic Impact:			
	FTE Employment	Labor Income	Output
First Round Direct Economic Activity	216	\$809,198	\$1,739,095
Second Round Indirect and Induced Economic Activity	12	\$380,956	\$1,037,243
Total, Direct, Indirect, and Induced Economic Activity*	228	\$1,190,154	\$2,776,338
Fiscal Impact:			
Annual Spotsylvania County Tax Revenue			\$19,000
Cumulative Impact over 40 Years			\$760,000

*May not sum due to rounding

Other Considerations

One of the methodological problems associated with conducting economic impact assessments is that not all of the economic effects associated with a given enterprise can easily be captured and quantified in standard simulation models. To compensate for this limitation, in this portion of the section we attempt to at least qualify some of the potential economic effects associated with the proposed SSEC project that cannot be easily quantified.

State Energy Policy

The SSEC would be entirely consistent with Virginia’s stated energy policy objectives as presented in Governor McAuliffe’s 2014 Virginia Energy Plan.⁴³ The very first goal of which is to “accelerate the development of renewable energy sources in the Commonwealth to ensure a diverse fuel mix,” because doing so “will lead to economic prosperity through increased jobs and environmental health through lower harmful emissions.”

Renewable Energy Supports Economic Development

Industrial development prospects with high energy needs are becoming increasingly sensitive to the proportion of their energy requirements that are produced through renewable sources. A good example of this is data centers. According to a recent analysis by the U.S. Chamber of Commerce, energy costs comprise between 40 and 80 percent of a data center’s annual operating budget.⁴⁴ As a result, data centers are constantly working to reduce their energy footprint. This has caused leading data center companies such as Amazon Web Services (AWS), Apple, Facebook, Google, and Microsoft to move toward sourcing 100 percent of their power needs from renewable energy. And for that reason, data centers have become a driving force behind the development of utility scale renewable energy projects.

Where as recently as 2015 wind and solar energy did not materially contribute to electricity production in Virginia, today Dominion Energy, Virginia’s largest electricity producer, has more than 744-megawatts of in-state solar generation capacity that is either operational or under development, and 78 percent of that capacity is directly attributable to partnerships with

⁴³ Virginia Energy Plan, Virginia Department of Mines, Minerals, and Energy, October 1, 2014.

⁴⁴ Data Source: “Data Centers: Jobs and Opportunities in Communities Nationwide,” U.S. Chamber of Commerce, June 2017.



leading data center companies. One such partnership is Amazon Solar Farm U.S. East, an 80-megawatt solar project located on Virginia’s Eastern Shore in Accomack County, Virginia. Construction of that project was made possible as a result of a long-term power purchase agreement with Amazon Web Services, an affiliate of Amazon’s cloud computing business.

As this example illustrates, renewable energy is becoming an important asset for localities in promoting technology-driven economic development. And more importantly for Spotsylvania County, data centers are becoming a key component of regional economic development. In nearby Prince William County, data centers accounted for \$1.2 billion in investment in 2016 alone.⁴⁵ Moreover, since 2012 data centers have accounted for 92 percent of all industry investment in Prince William County.⁴⁶

The estimates provided in this report are based on the best information available and all reasonable care has been taken in assessing that information. However, because these estimates attempt to foresee circumstances that have not yet occurred, it is not possible to provide any assurance that they will be representative of actual events. These estimates are intended to provide a general indication of likely future outcomes and should not be construed to represent a precise measure of those outcomes.

⁴⁵ Data Source: Prince William County, Department of Economic Development.

⁴⁶ Data Source: “The Economic and Fiscal Contribution that data Center make to Virginia: Spotlight on Prince William County,” produced for Northern Virginia Technology Council by Mangum Economics, February 2018.