Oak Run Solar Project, LLC
Case No. 22-549-EL-BGN
Case No. 22-550-EL-BTX

Exhibit I
Economic Impact and Land Use Analysis

Strategic Economic Research, LLC

September 2022

Oak Run Solar Project, LLC has requested confidential treatment of a portion of this document in accordance with OAC Rule 4906-2-21.

This document contains sensitive, trade secret information and, as such, those portions are entitled to confidential treatment under state and/or federal statutes and regulations.

An unredacted version of the following document has been submitted to the Docketing Division of the OPSB in accordance with OAC Rule 4906-2-21(D)(2).

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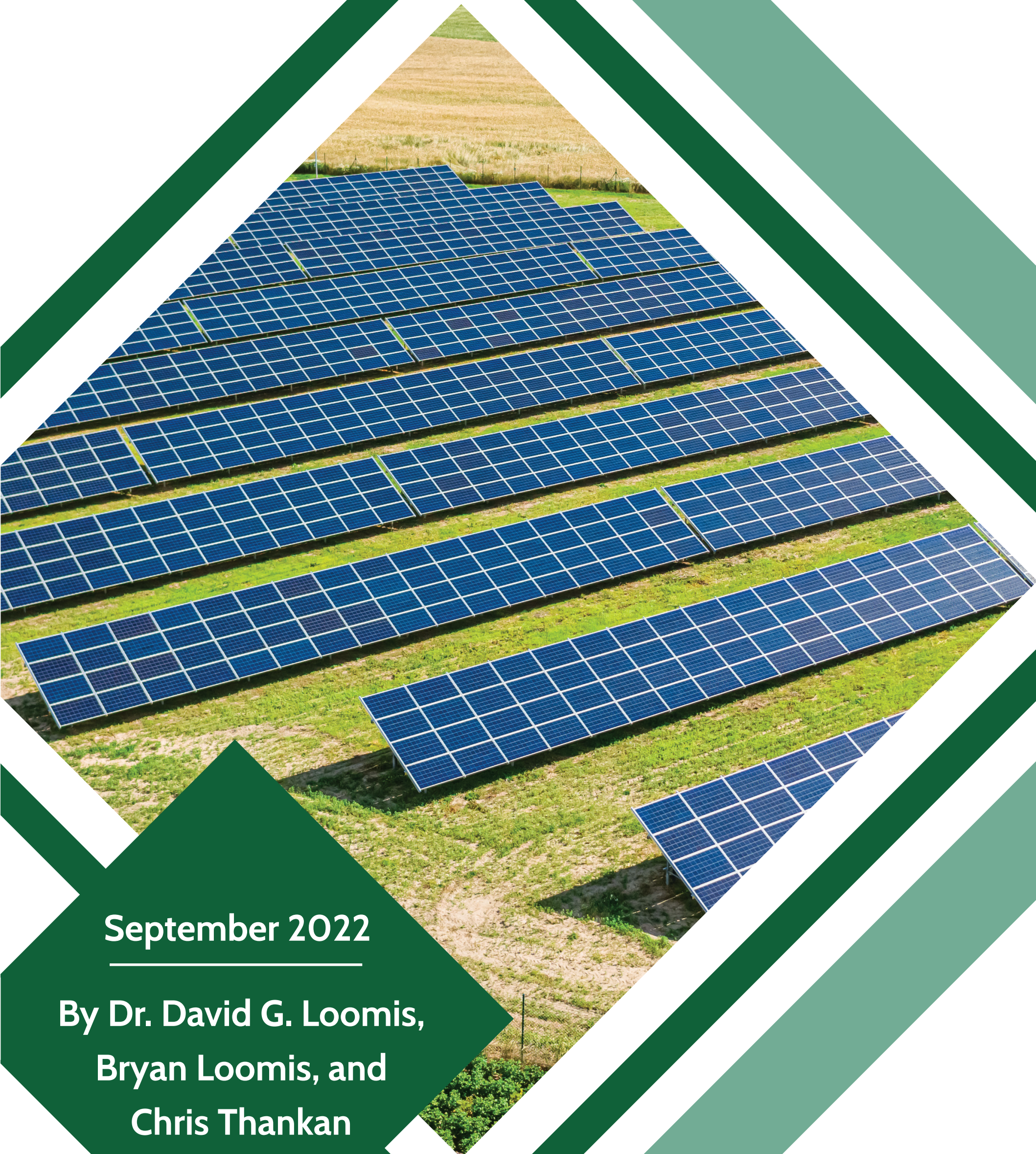

September 2022

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

ECONOMIC IMPACT AND LAND USE ANALYSIS OF OAK RUN SOLAR PROJECT

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Dr. David G. Loomis is Professor of Economics at Illinois State University and Co-Founder of the Center for Renewable Energy. He has over 20 years of experience in the renewable energy field. He has served as a consultant for 43 renewable energy development companies. He has testified on the economic impacts of energy projects before the Illinois Commerce Commission, Iowa Utilities Board, Missouri Public Service Commission, Illinois Senate Energy and Environment Committee, the Wisconsin Public Service Commission, Kentucky Public Service Commission, Ohio Public Siting Board, and numerous county boards. Dr. Loomis is a widely recognized expert and has been quoted in the Wall Street Journal, Forbes Magazine, Associated Press, and Chicago Tribune as well as appearing on CNN.

Dr. Loomis has published over 38 peer-reviewed articles in leading energy policy and economics journals. He has raised and managed over $7 million in grants and contracts from government, corporate and foundation sources. He received the 2011 Department of Energy's Midwestern Regional Wind Advocacy Award and the 2006 Best Wind Working Group Award. Dr. Loomis received his Ph.D. in economics from Temple University in 1995.

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Bryan Loomis has three years of experience in economic impact, property tax, and land use analysis at Strategic Economic Research. He has performed over 50 wind and solar analyses in the last three years. He 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. Before working for SER, Bryan mentored and worked with over 30 startups to help them grow their businesses as CEO and Founder of his own marketing agency. Bryan received his MBA in Marketing from Belmont University in 2016.

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Christopher Thankan assists with the production of the economic impact studies, including sourcing, analyzing, and graphing government data, and performing economic and property tax analysis for wind, solar and transmission projects. Thankan has a Bachelor of Science degree in Sustainable & Renewable Energy, and minored in economics.

Strategic Economic Research, LLC (SER) provides economic consulting for renewable energy projects across the US. We have produced over 150 economic impact reports in 28 states. Research Associates who performed work on this project include Ethan Loomis, Madison Schneider, Zoe Calio, Patrick Chen, Kathryn Keithley, Morgan Stong, Mandi Mitchell, and Paige Afram.

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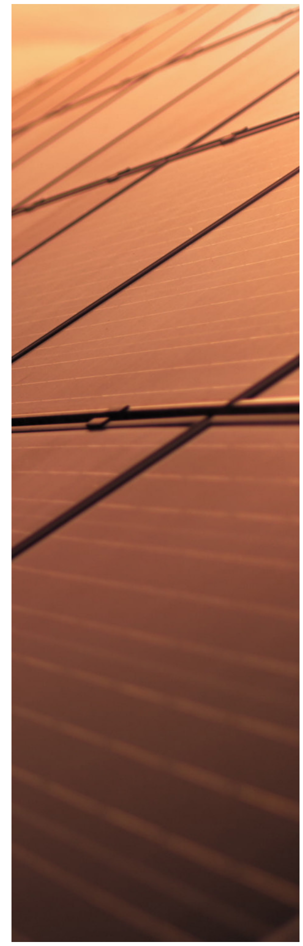

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I. Executive Summary

Savion is developing the Oak Run Solar Project in Madison County, Ohio. The purpose of this report is to aid decision makers in evaluating the economic impact of this project on Madison County and the State of Ohio. The basis of this analysis is to study the direct, indirect, and induced impacts on job creation, wages, and total economic output.

Oak Run Solar Project is an 800-megawatt alternating current (MWac) utility-scale solar powered-electric generation facility that will utilize photovoltaic (PV) panels installed on a single-axis tracking system. Savion may include a battery storage system in this project but the costs were not included in the modeling. These costs were not included as a conservative approach to estimating the economic impacts of the project. The total Project represents an investment in excess o[redacted] The total development is anticipated to result in the following:

Jobs – all jobs numbers are full-time equivalents

- Over 1,487 new local jobs during construction for Madison County
- Over 3,033 new local jobs during construction for the State of Ohio
- Over 35 new local long-term jobs for Madison County
- Over 63 new local long-term jobs for the State of Ohio

Earnings

- Over $83.4 million in new local earnings during construction for Madison County
- Over $209 million in new local earnings during construction for the State of Ohio
- Over $1.6 million in new local long-term earnings for Madison County annually
- Over $3.3 million in new local long-term earnings for the State of Ohio annually

Output

- Over $151 million in new local output during construction for Madison County
- Over $421 million in new local output during construction for the State of Ohio
- Over $3.0 million in new local long-term output for Madison County annually
- Over $8.3 million in new local long-term output for the State of Ohio annually

Property Taxes

- Over $4.3 million annually for school district revenue from the PILOT
- Over $2.4 million annually for Madison County from the PILOT
- $7.2 million annually for all taxing districts from the PILOT

Land Use

This report also performs an economic land use analysis regarding the purchasing of agricultural land for the new solar farm. That analysis yields the following results:

Using a real-options analysis, the land use value of solar purchasing far exceeds the value for agricultural use.

Madison County:

- The price of corn would need to rise to $21.31 per bushel or yields for corn would need to rise to 462.6 bushels per acre by the year 2056 for corn farming to generate more income for the landowner and local community than the annualized solar payment.
- Alternatively, the price of soybeans would need to rise to $62.55 per bushel or yields for soybeans would need to rise to 167.2 bushels per acre by the year 2056 for soybean farming to generate more income for the landowner and local community than the annualized solar payment.
- At the time of this report, corn and soybean prices are $5.45 and $13.10 per bushel respectively and yields are 210.1 and 62.2 bushels per acre respectively.

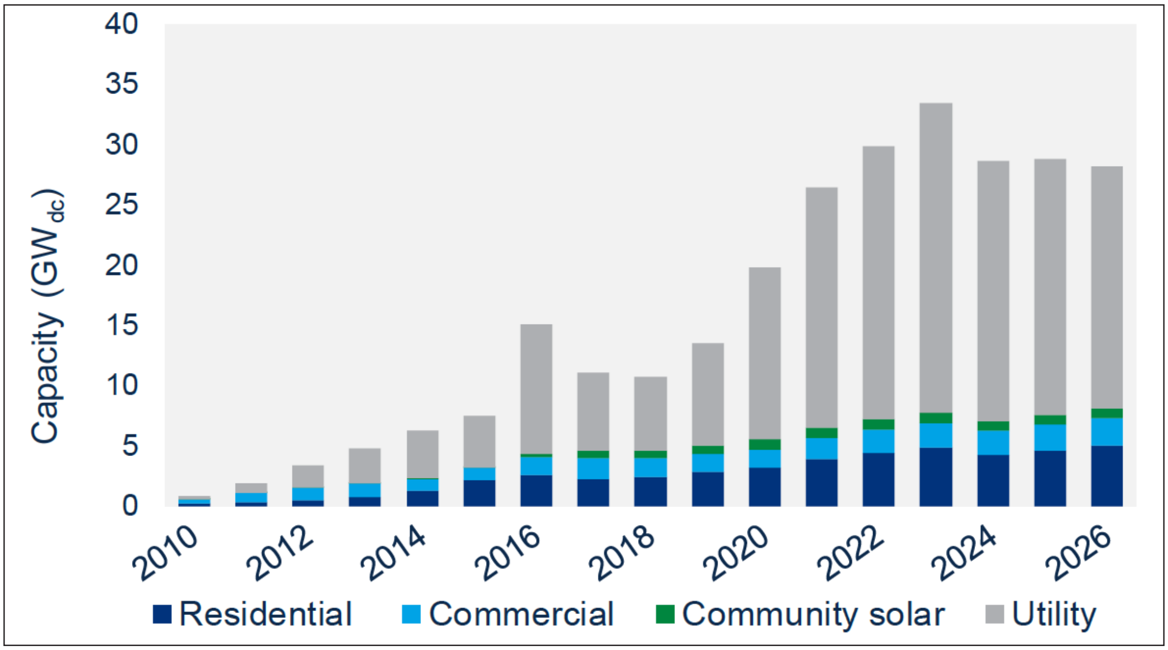
II. U.S. Solar PV Industry Growth and Economic Development

a. U.S. Solar PV Industry Growth

The U.S. solar industry is growing at a rapid but uneven pace, with systems installed for onsite use, including residential, commercial and industrial properties and with utility-scale solar powered-electric generation facilities intended for wholesale distribution, such as Oak Run Solar. From 2013 to 2018, the amount of electricity generated from solar had more than quadrupled, increasing 444% (SEIA, 2020). The industry has continued to add increasing numbers of PV systems to the grid. In the first half of 2021, the U.S. installed over 11,000 MW direct current (MWdc) of solar PV driven mostly by utility-scale PV which exceeds most of the annual installations in the last decade. Figure 1 shows the historical capacity additions as well as the forecasted additions into 2026. The primary driver of this overall sharp pace of growth is large price declines in solar equipment. The overall price of solar PV has declined from $5.79/watt in 2010 to $1.33/watt in 2020 (SEIA, 2020). According to Figure 2, utility-scale solar fixed tilt and single-axis tracking have declined from $1.50/watt at the beginning of 2015 to near $1.00/watt by the first quarter of 2021. Solar PV also benefits from the Federal Investment Tax Credit (ITC) which provides a 26 percent tax credit for residential and commercial properties.

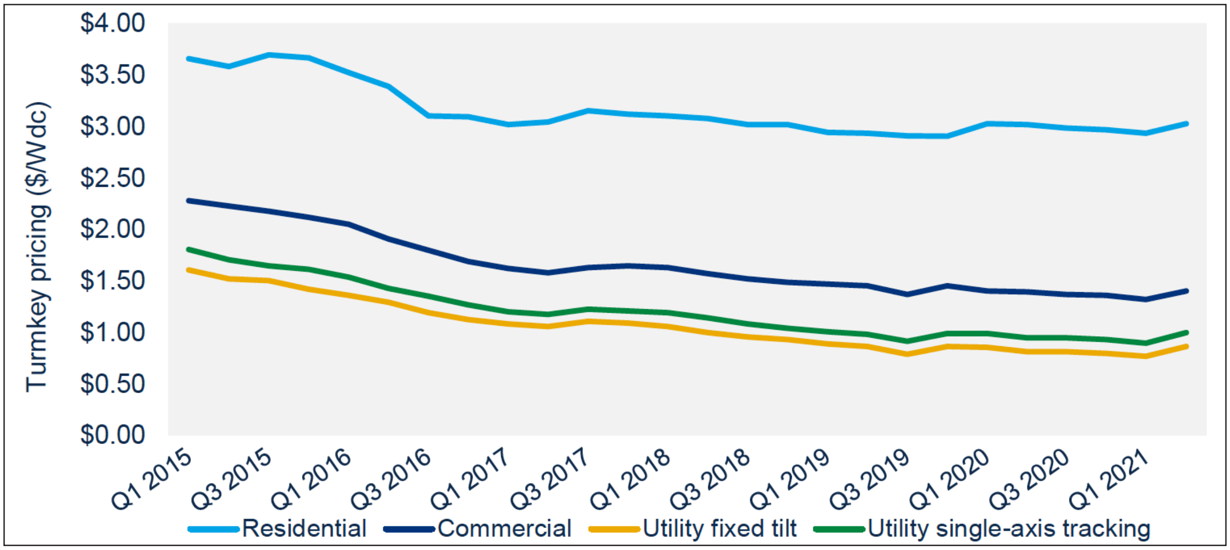
Utility-scale PV leads the installation growth in the U.S. A total of 19,200 MWdc of utility PV projects were completed in 2020. According to Figure 3, there are 85,000 MWdc of contracted utility-scale installations that have not been built yet.

Figure 1 – Annual U.S. Solar PV Installations, 2010-2026 E



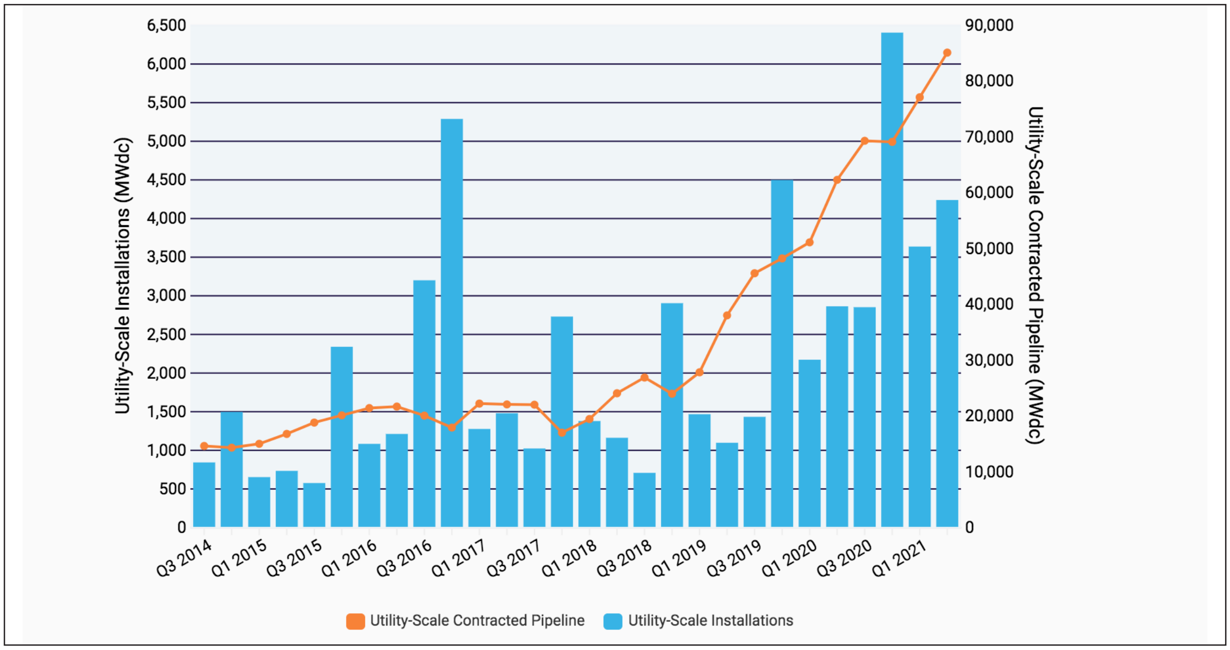
Source: Solar Energy Industries Association, Solar Market Insight Report Q3 2021

Figure 2 – U.S. Annual Solar PV Installed Price Trends Over Time



Source: Solar Energy Industries Association, Solar Market Insight Report Q3 2021

Figure 3 – U.S. Utility PV Installations vs. Contracted Pipeline



Source: Solar Energy Industries Association, Solar Market Insight Report Q2 2021

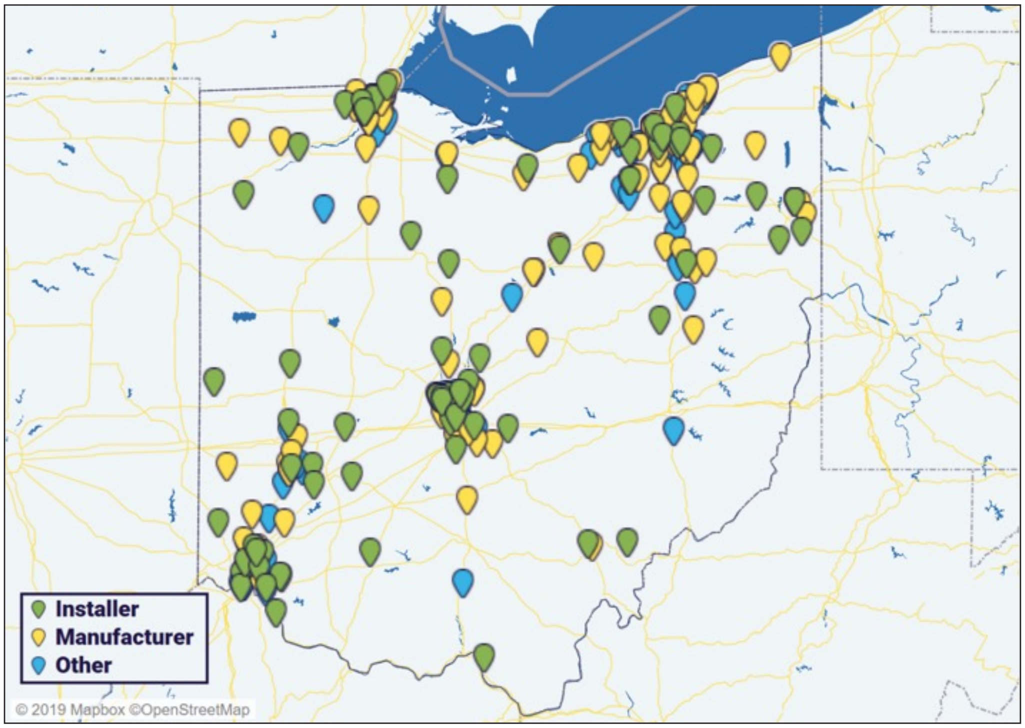
b. Ohio Solar PV Industry

According to SEIA, Ohio is ranked 25th in the U.S. in cumulative installations of solar PV. California, Texas, and Florida are the top 3 states for solar PV which may not be surprising because of the high solar irradiation that they receive. However, other states with similar solar irradiation to Ohio rank highly including New Jersey (8th), Massachusetts (10th), New York (11th), and Maryland (18th). In 2020, Ohio installed 333.9 MW of solar electric capacity bringing its cumulative capacity to 889.9 MW.

Ohio has great potential to expand its solar installations. Ohio has three utility-scale solar farms in operation: Hillcrest Solar (200 MW) in Brown County; Hardin Solar (150 MW) in Hardin County; and DG AMP Solar Bowling Green (20 MW) in Wood County. The 800 MW Oak Run Solar Project will be the largest installation in Ohio to date.

There are more than 205 solar companies in Ohio including 84 manufacturers, 58 installers/developers, and 63 others.[1] Figure 4 shows the locations of solar companies in Ohio as of the time of this report. Currently, there are 6,532 solar jobs in the State of Ohio according to SEIA.

Figure 4 – Solar Company Locations in Ohio



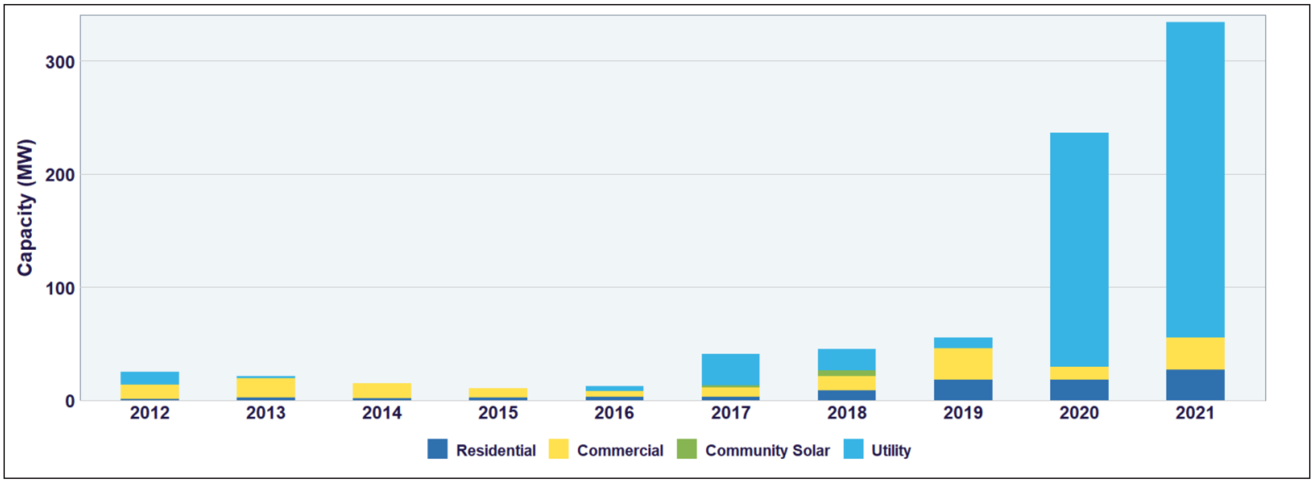
Source: Solar Energy Industries Association, Solar Spotlight: Ohio, June 2022

[1] "Other" includes Sales and Distribution, Project Management, and Engineering.

Figure 5 shows the Ohio historical installed capacity by year according to the SEIA. Huge growth was seen in 2021 and is forecasted to continue to grow in 2022 and beyond. Over the next five years, solar in Ohio is projected to grow by 5,799.77 MW.

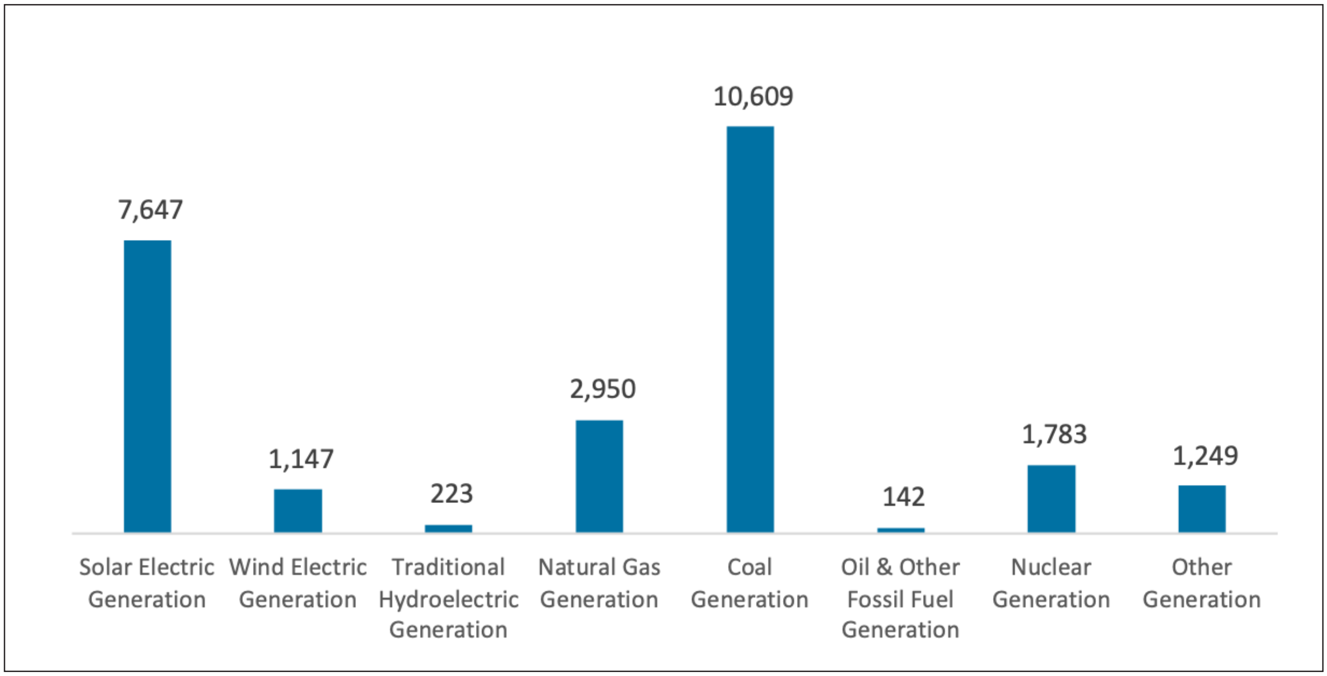
The U.S. Department of Energy sponsors the U.S. Energy and Employment Report each year. Electric Power Generation covers all utility and non-utility employment across electric generating technologies, including fossil fuels, nuclear, and renewable technologies. It also includes employees engaged in facility construction, turbine and other generation equipment manufacturing, operations and maintenance, and wholesale parts distribution for all electric generation technologies. According to Figure 6, employment in the solar energy industry (7,647) trails behind coal generation (10,609) but is larger than natural gas generation (2,950) and nuclear generation (1,783).

Figure 5 – Ohio Annual Solar Installations



Source: Solar Energy Industries Association, Solar Spotlight: Ohio, June 2022

Figure 6 – Electric Generation Employment by Technology



Source: US Energy and Employment Report 2021: Ohio

[1] "Other" includes Sales and Distribution, Project Management, and Engineering.

c. Economic Benefits of Utility-Scale Solar PV Energy

Utility-scale solar powered-electric generation facilities have numerous economic benefits. Solar PV installations create job opportunities in the local area during both the short-term construction phase and the long-term operational phase. In addition to the workers directly involved in the construction and maintenance of the solar energy project, numerous other jobs are supported through indirect supply chain purchases and the higher spending that is induced by these workers. Solar PV projects strengthen the local tax base and help improve county services, and local infrastructure, such as public roads.

Numerous studies have quantified the economic benefits of Solar PV projects across the United States and have been published in peer-reviewed academic journals using the same methodology as this report. Some of these studies examine smaller-scale solar systems, and some examine utility-scale solar energy. Croucher (2012) uses NREL's Jobs and Economic Development Impacts ("JEDI") modeling methodology to find which state will receive the greatest economic impact from installing one hundred 2.5 kW residential systems. He shows that Pennsylvania ranked first supporting 28.98 jobs during installation and 0.20 jobs during operations. Illinois ranked second supporting 27.65 jobs during construction and 0.18 jobs during operations.

Jo et. al. (2016) analyzes the financing options and economic impact of solar PV systems in Normal, IL and uses the JEDI model to determine the county and state economic impact. The study examines the effect of 100 residential retrofit fixed-mount crystalline-silicone systems having a nameplate capacity of 5kW. Eight JEDI models estimated the economic impacts using different input assumptions. They found that county employment impacts varied from 377 to 1,059 job-years during construction and 18.8 to 40.5 job-years during the operating years. Each job-year is a full-time equivalent job of 2,080 hours for a year.

More recently, Michaud et. al (2020) performed an analysis of the economic impact of utility-scale solar energy projects in the State of Ohio. They detail three scenarios: low (2.5 GW), moderate (5 GW) and high (7.5 GW). Using the JEDI model, they find that between 18,039 and 54,113 jobs would be supported during construction and between 207 and 618 jobs would be supported annually during operations. In addition, between $22.5 million and $67.5 million annually in tax revenues would come from these projects.

Loomis et. al. (2016) estimates the economic impact for the State of Illinois if the state were to reach its maximum potential for solar PV. The study estimates the economic impact of three different scenarios for Illinois – building new solar installations of either 2,292 MW, 2,714 MW or 11,265 MW. The study assumes that 60% of the capacity is utility-scale solar, 30% of the capacity is commercial, and 10% of the capacity is residential. It was found that employment impacts vary from 26,753 to 131,779 job years during construction and from 1,223 to 6,010 job years during operating years.

Several other reports quantify the economic impact of solar energy. Bezdek (2006) estimates the economic impact for the State of Ohio and finds the potential for PV market in Ohio to be $25 million with 200 direct jobs and 460 total jobs. The Center for Competitive Florida (2009) estimates the impact if the state were to install 1,500 MW of solar and finds that 45,000 direct jobs and 50,000 indirect jobs could be created. The Solar Foundation (2013) uses the JEDI modeling methodology to show that Colorado's solar PV installation to date created 10,790 job-years. They also analyze what would happen if the state were to install 2,750 MW of solar PV from 2013 to 2030 and find that it would result in nearly 32,500 job years. Berkman et. al (2011) estimates the economic and fiscal impacts of the 550 MWac Desert Sunlight Solar Farm. The project creates approximately 440 construction jobs over a 26-month period, $15 million in new sales tax revenues, $12 million in new property revenues for Riverside County, CA, and $336 million in indirect benefits to local businesses in the county.

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

III. Project Description and Location

a. Oak Run Solar Project

Savion is developing the Oak Run Solar Project in Madison County, Ohio. The Project consists of an estimated 800-megawatt alternative current (MWac) utility-scale solar powered-electric generation facility that will utilize photovoltaic (PV) panels installed on a single-axis tracking system. The total Project represents an investment in excess of [redacted]

b. Madison County, Ohio

Madison County is located in the Central part of Ohio (see Figure 7). It has a total area of 467 square miles and the U.S. Census estimates that the 2020 population was 43,824 with 16,216 housing units. The county has a population density of 94 (persons per square mile) compared to 282 for the State of Ohio. Median household income in the county was $68,663 (U.S. Census Bureau).

Figure 7 – Location of Madison County, Ohio

i. Economic and Demographic Statistics

As shown in Table 1, the largest industry is “Transportation and Warehousing” followed by “Manufacturing,” “Administrative Government” and “Retail Trade.” These data for Table 1 come from IMPLAN covering the year 2020 (the latest year available).

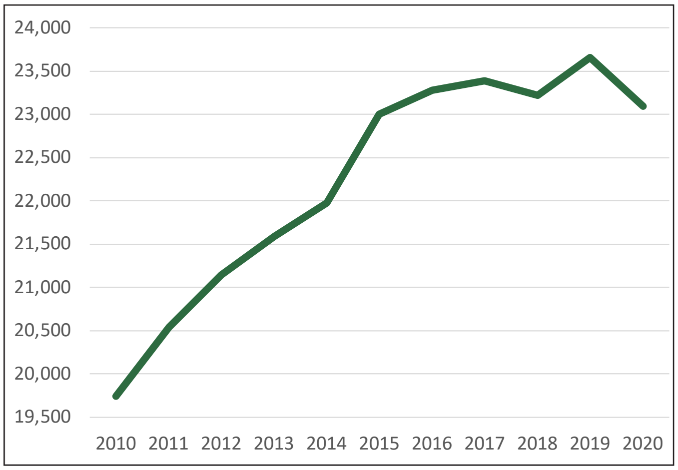
Table 1 provides the most recent snapshot of total employment but does not examine the historical trends within the county. Figure 8 shows employment from 2010 to 2020. Total employment in Madison County was at its lowest at 19,746 in 2010 and its highest at 23,660 in 2019 (BEA, 2022).

Table 1 – Employment by Industry in Madison County

Industry	Number	Percent
Transportation and Warehousing	4,034	17.0%
Manufacturing	3,376	14.3%
Administrative Government	2,825	11.9%
Retail Trade	1,994	8.4%
Health Care and Social Assistance	1,725	7.3%
Administrative and Support and Waste Management and Remediation Services	1,584	6.7%
Construction	1,474	6.2%
Accommodation and Food Services	1,396	5.9%
Professional, Scientific, and Technical Services	1,231	5.2%
Agriculture, Forestry, Fishing and Hunting	941	4.0%
Other Services (except Public Administration)	811	3.4%
Real Estate and Rental and Leasing	687	2.9%
Finance and Insurance	482	2.0%
Educational Services	388	1.6%
Wholesale Trade	359	1.5%
Government Enterprises	135	0.6%
Arts, Entertainment, and Recreation	117	0.5%
Information	54	0.2%
Management of Companies and Enterprises	44	0.2%
Mining, Quarrying, and Oil and Gas Extraction	9	0.0%
Utilities	4	0.0%

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

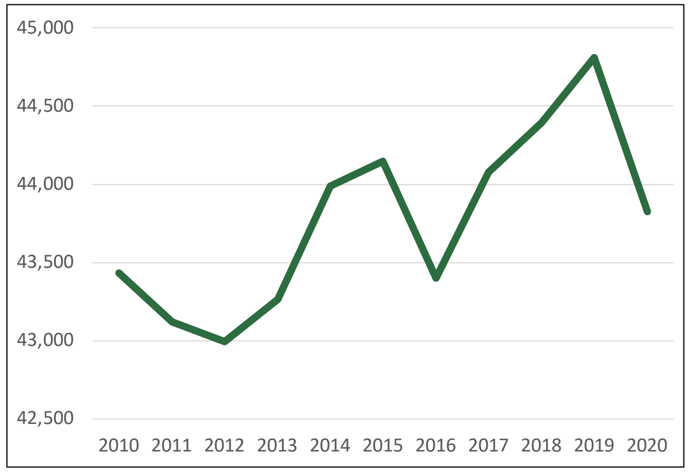
Figure 8 – Total Employment in Madison County from 2010 to 2020



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

Similar to the upward trend of employment, the overall population in the county has been increasing with some fluctuation, as shown in Figure 9. Madison County population was 43,434 in 2010 and 43,823 in 2020, a gain of 389 (FRED, 2022). The average annual population increase over this time period was 39.

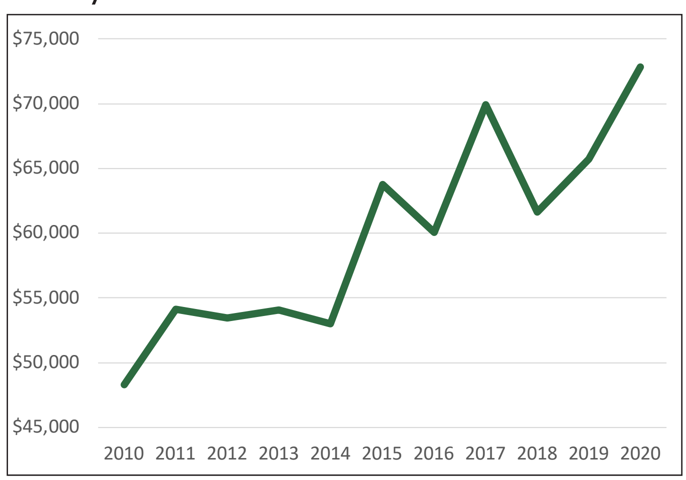
Figure 9 – Population in Madison County from 2010 to 2020



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

Like the population trend, household income has been trending upward in Madison County. Figure 10 shows the median household income in Madison County from 2010 to 2020. Household income was at its lowest at $48,295 in 2010 and its highest at $72,834 in 2020 (FRED, 2022).

Figure 10 – Median Household Income in Madison County from 2010 to 2020

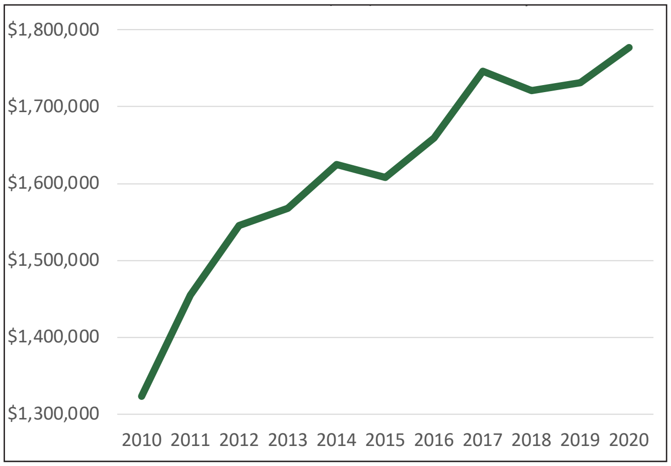


Source: Federal Reserve Bank of St. Louis Economic Data, U.S. Census Bureau, Estimate of Median Household Income, 2010-2020

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 Madison County has been increasing steadily since hitting a low in 2010, as shown in Figure 11 (BEA, 2022).

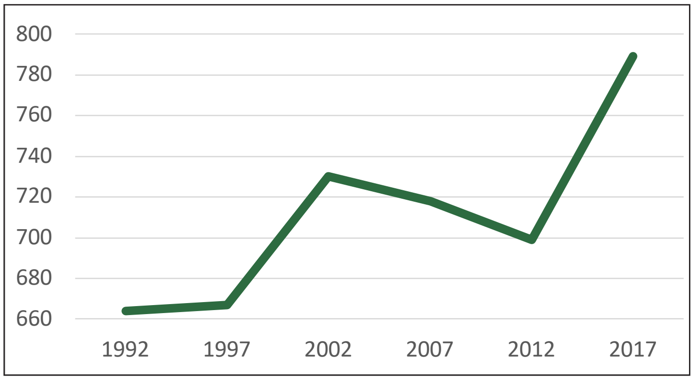
The farming industry has fluctuated in Madison County. As shown in Figure 12, the number of farms has increased from 664 in 1992 to 789 in 2017. The amount of land in farms has fluctuated greatly. The county farmland hit a low of 245,886 acres in 2002 and a high of 263,275 acres in 2012 according to Figure 13. Since 2012, the farmland in the county has decreased drastically. Factors in the increase and decrease of farm acres and number of farms include the increase in demand for ethanol from corn, technological developments in farming increasing yield per acre, and the increase in large-scale family farms ($1 million or more in GCFI), which account for about 3 percent of farms but 46 percent of the value of production.

Figure 11 – Real Gross Domestic Product (GDP) in Madison County from 2010 to 2020



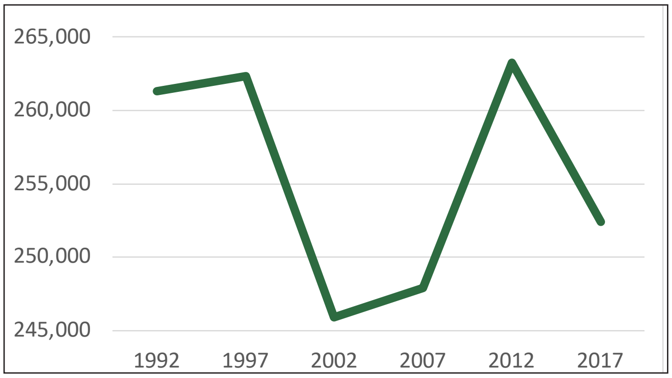
Source: Bureau of Economic Analysis, Regional Data, GDP and Personal Income, 2010-2020

Figure 12 – Number of Farms in Madison County from 1992 to 2017



Source: Census of Agriculture, 1992-2017

Figure 13 – Land in Farms in Madison County from 1992 to 2017



Source: Census of Agriculture, 1992-2017

ii. Agricultural Statistics

Ohio is ranked sixteenth among U. S. states in total value of agricultural products sold (Census, 2017). It is ranked nineteenth in the value of livestock and thirteenth in the value of crops (Census, 2017). In 2021, Ohio had 76,900 farms and 13.5 million acres in operation with the average farm being 176 acres (State Agricultural Overview, 2021). Ohio had 257 thousand cattle and produced 5.64 billion pounds of milk (State Agricultural Overview, 2021). In 2021, Ohio yields averaged 193 bushels per acre for grain corn with a total market value of $3.51 billion (State Agricultural Overview, 2021). Soybean yields averaged 56.5 bushels per acre with a total market value of $3.61 billion (State Agricultural Overview, 2021). The average net cash farm income per farm is $29,674 (Census, 2017).

In 2017, Madison County had 789 farms covering 252,392 acres for an average farm size of 320 acres (Census, 2017). The total market value of products sold was $159 million, with 21 percent coming from livestock sales and 79 percent coming from crop sales (Census, 2017). The average net cash farm income of operations was $69,116 (Census, 2017).

The 6,693 acres planned to be used by the Oak Run Solar Project represents just 2.6% of the acres used for farming in Madison County, and .05% of the acres used for farming in the state of Ohio. As we will show in the next section, solar farming is a better land use on a purely economic basis than livestock or crops for the particular land in this Project.

IV. Land Use Methodology

To analyze the specific economic land use decision for a solar energy facility, this section uses a methodology first proposed by Gazheli and Di Corato (2013). A "real options" model is used to look at the critical factors affecting the decision to lease agricultural land to a company installing a solar powered electric generating facility. According to their model, the landowner will look at his expected returns from the land that include the following: the price that they can get for the crop (typically corn or soybeans); the average yields from the land that will depend on amount and timing of rainfall, temperature and farming practices; and the cost of inputs including seed, fuel, herbicide, pesticide and fertilizer. Not considered is the fact that the landowner faces annual uncertainty on all these items and must be compensated for the risk involved in each of these parameters changing in the future. In a competitive world with perfect information, the returns to the land for its productivity should relate to the cash rent for the land.

For Oak Run Solar, Savion plans to purchase the land in lieu of a land lease. To compare this with annual farming profits, we need to convert the land purchase price to an annualized number. The holding costs would consist of the opportunity cost of capital (i.e. the interest rate that the firm could have earned if it didn't tie up its funds in the purchase of the land). In order to convert the purchase price per acre to an annualized number, a discount rate of 6%, and a time horizon of 30 years was used.

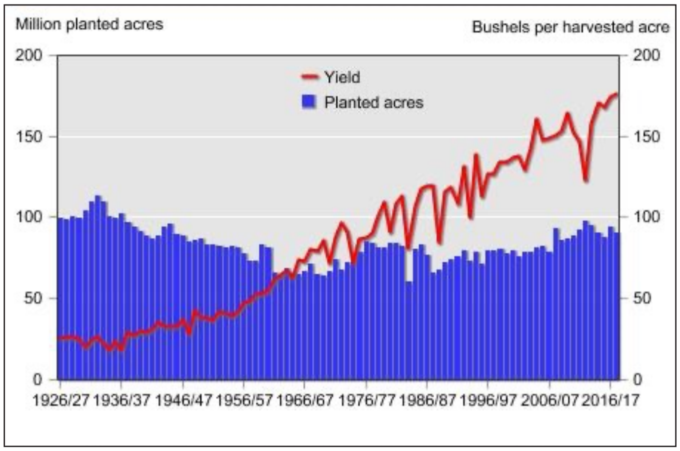
For the landowner, the key analysis will be comparing the net present value of the annualized solar payments to expected profits from farming. The farmer will choose the solar farm payment if:

$$\text{NPV (Annualized Solar Payment}_t) > \text{NPV} (P_t * \text{Yield}_t - \text{Cost}_t)$$

Where NPV is the net present value; Annualized Solar Paymentt is the payment the owner receives in year t; P_t is the price that the farmer receives for the crop (corn or soybeans) in year t; Yield_t is the yield based on the number of acres and historical average of county-specific productivity in year t; Cost_t is the total cost of farming in year t and will include the cost of seed, fertilizer, the opportunity cost of the farmer's time. Farming profit is the difference between revenue (price times yield) and cost. The model will use historical agricultural data from the county (or state when the county data is not available).

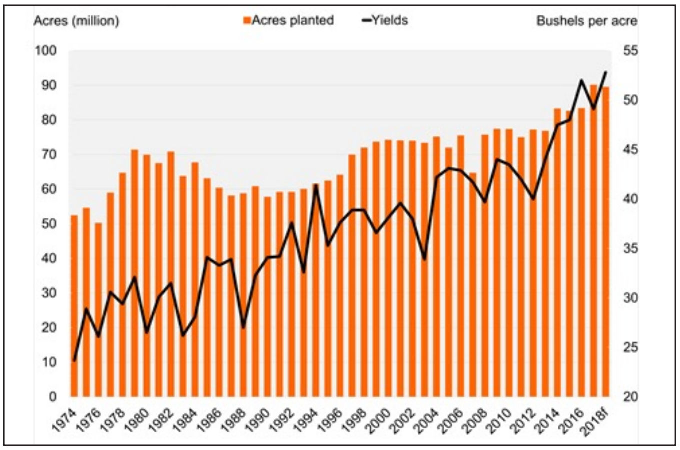
Figure 14 shows the dramatic increase in U.S. corn yields since 1926. Soybean yields have also increased though not as dramatically. Figure 15 displays the soybean yields in the U.S. since 1980.

Figure 14 – U.S. Corn Acreage and Yield



Source: USDA, Economic Research Service, https://www.ers.usda.gov/topics/crops/soybeans-oil-crops/oil-crops-sector-at-a-glance/

Figure 15 – U.S. Soybean Acreage and Yield



Source: USDA National Agricultural Statistics Service, Crop Production, November, 2018

The standard net present value calculation presented above, uses the expected value of many of the variables that are stochastic (have some randomness to them). In order to forecast returns from agriculture in future years, we use a linear regression using an intercept and time trend on historical data to predict future profits.

$$\pi_t = \propto + \beta * time$$

Where π_t is the farming profit in year t; α is intercept; β is the trend and time is a simple time trend starting at 1 and increasing by 1 each time period.

V. Land Use Results

In order to analyze future returns from farming the land, we will use historical data from Madison County to examine the local context for this analysis. The United States Department of Agriculture's National Agricultural Statistics Service publishes county-level statistics every five years. Table 2 shows the historical data from 1992 to 2017 for total farm income, production expenses, average farm size, net cash income, and average market value of machinery per farm.

Table 2 – Agricultural Statistics for Madison County, Ohio[2]

	1992	1997	2002	2007	2012	2017
Total Farm Income Per Farm	NA	NA	$8,804	$12,842	$25,961	$27,003
Total Farm Production Expenses (average/farm)	$74,968	$82,222	$78,598	$115,825	$203,204	$155,452
Average Farm Size (acres)	394	393	337	345	377	320
Net Cash Income per Farm	$27,083	$41,420	$15,275	$67,060	$94,650	$69,116
Average Market Value of Machinery Per Farm	$66,473	$93,721	$115,994	$144,089	$202,772	$215,221

Source: United States Department of Agriculture's National Agricultural Statistics Service (NASS), Census of Agriculture

The production expenses listed in Table 2 include all direct expenses like seed, fertilizer, fuel, etc. but do not include the depreciation of equipment and the opportunity cost of the farmer's own time in farming. To estimate these last two items, we can use the average market value of machinery per farm and use straight-line depreciation for 30 years with no salvage value. This is a very conservative estimate of the depreciation since the machinery will likely qualify for a shorter life and accelerated or bonus depreciation. To calculate the opportunity cost of the farmers time, we obtained the mean hourly wage for farming in each of these years from the Bureau of Labor Statistics. Again, to be conservative, we estimate that the farmer spends a total of 16 weeks @ 40 hours/week farming in a year. It seems quite likely that a farmer spends many more hours than this including direct and administrative time on the farm. These statistics and calculations are shown in Table 3.

[2] Net Cash Income per farm is reported by the NASS and does not exactly equal income minus expenses. NASS definition for this item is, "Net cash farm income of the operators. This value is the operators' total revenue (fees for producing under a production contract, total sales not under a production contract, government payments, and farm-related income) minus total expenses paid by the operators. Net cash farm income of the operator includes the payments received for producing under a production contract and does not include value of commodities produced under production contract by the contract growers. Depreciation is not used in the calculation of net cash farm income."

Table 3 – Machinery Depreciation and Opportunity Cost of Farmer's Time for Madison County, Ohio

	1992	1997	2002	2007	2012	2017
Average Market Value Machinery Per Farm	$66,473	$93,721	$115,994	$144,089	$202,772	$215,221
Annual Machinery Depreciation over 30 years - Straight Line (Market Value divided by 30)	$2,216	$3,124	$3,866	$4,803	$6,759	$7,174
Mean Hourly Wage in OH for Farming (Bureau of Labor Statistics)	$5.87	$6.67	$9.36	$10.43	$11.50	$12.95
Annual Opportunity Cost of Farmer's Time (Wage times 16 weeks times 40 Hours/Week)	$3,755	$4,269	$5,990	$6,675	$7,360	$8,288

To get the total profitability of the land, we take the net cash income per farm and subtract depreciation expenses and the opportunity cost of the farmer's time. To get the profit per acre, we divide by the average farm size. Finally, to account for inflation, we use the Consumer Price Index (CPI) to convert all profit into 2017 dollars (i.e. current dollars).[3] These calculations and results are shown in Table 4.

Table 4 – Profit Per Farm Calculations for Madison County, Ohio

	1992	1997	2002	2007	2012	2017
Net Cash Income per Farm	$27,083	$41,420	$15,275	$67,060	$94,650	$69,116
Machinery Depreciation	($2,216)	($3,124)	($3,866)	($4,803)	($6,759)	($7,174)
Opportunity Cost of Farmer's Time	($3,755)	($4,269)	($5,990)	($6,675)	($7,360)	($8,288)
Profit	$21,112	$34,027	$5,418	$55,582	$80,531	$53,654
Average Farm Size (Acres)	394	393	337	345	377	320
Profit Per Acre	$53.58	$86.58	$16.08	$161.11	$213.61	$167.67
CPI	141.9	161.3	180.9	210.036	229.601	246.524
Profit Per Acre in 2017 Dollars	$93.09	$132.33	$21.91	$189.09	$229.35	$167.67

[3] We will use the Consumer Price Index for All Urban Consumers (CPI-U) which is the most common CPI used in calculations. For simplicity, we will just use the CPI abbreviation.

Using an unsophisticated static analysis, the farmer would be better off using his land for solar if the annualized solar payment per acre exceeds the 2017 profit per acre of $167.67 which adjusts to $196.63 after counting for inflation in Madison County. Yet this static analysis fails to capture the dynamics of the agricultural market and the farmer's hope for future prices and crop yields to exceed the current level. To account for this dynamic, we use the real options model discussed in the previous section. Recall that the net returns from agriculture fluctuates according to the following equation:

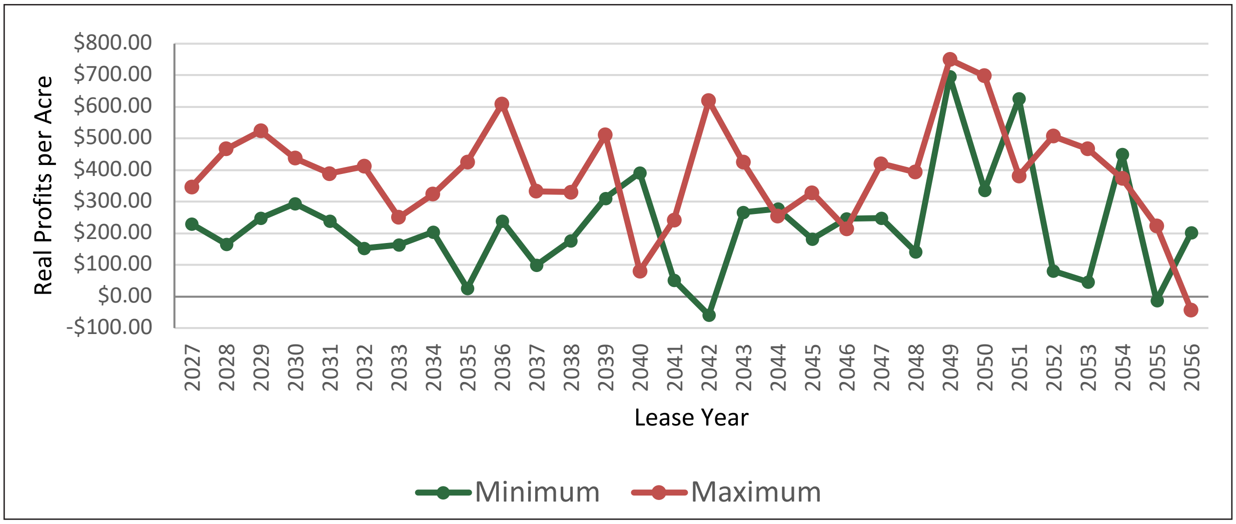
$$\pi_t = \propto + \beta * time$$

Where π_t is the farming profit in year t; α is intercept; β is the trend and time is a simple time trend starting at 1 and increasing by 1 each time period.

Using the Census of Agriculture data from 1992 to the present, the intercept is $74.79 with a standard error of $50.50. The time trend is $4.75 with a standard error of 3.16. This means that agriculture profits are expected to rise by $4.75. Both the intercept and the coefficient on the time trend have a wide variation as measured by the standard error. The wide variation means that there will be a lot of variability in agricultural profits from year to year.

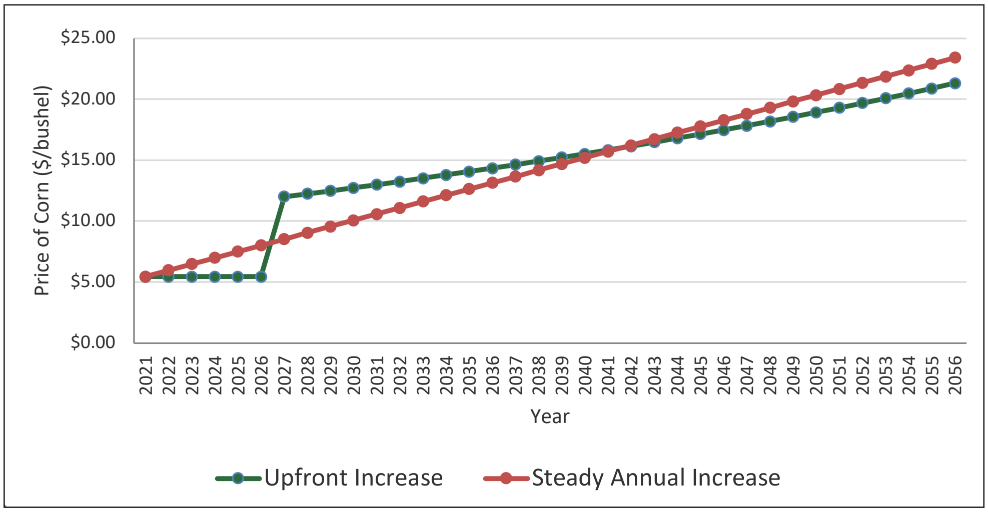
Over the period from 2017 to 2056, we assume that the profit per acre follows the equation above but allows for the random fluctuations. Because of this randomness, we can simulate multiple futures using Monte Carlo simulation. We assume that the solar farm will begin operation in 2027 and operate through 2056. Using 500 different simulations, the real profit per acre never exceeds $1,153 in any single year. Overall, the maximum average annual profit over the 30 years is $348 and the minimum average annual profit is $332. Figure 16 is a graph of the highest and lowest real profit per acre simulations. When comparing the average annual payment projected in the maximum simulation by 2056 to the solar lease per acre payment, the solar lease provides higher returns than farming in all of the 500 simulations. This means the farmer is financially better off under the solar lease in 100% of the 500 scenarios analyzed.

Figure 16 – Simulations of Real Profits Per Acre Based on Data from 1992



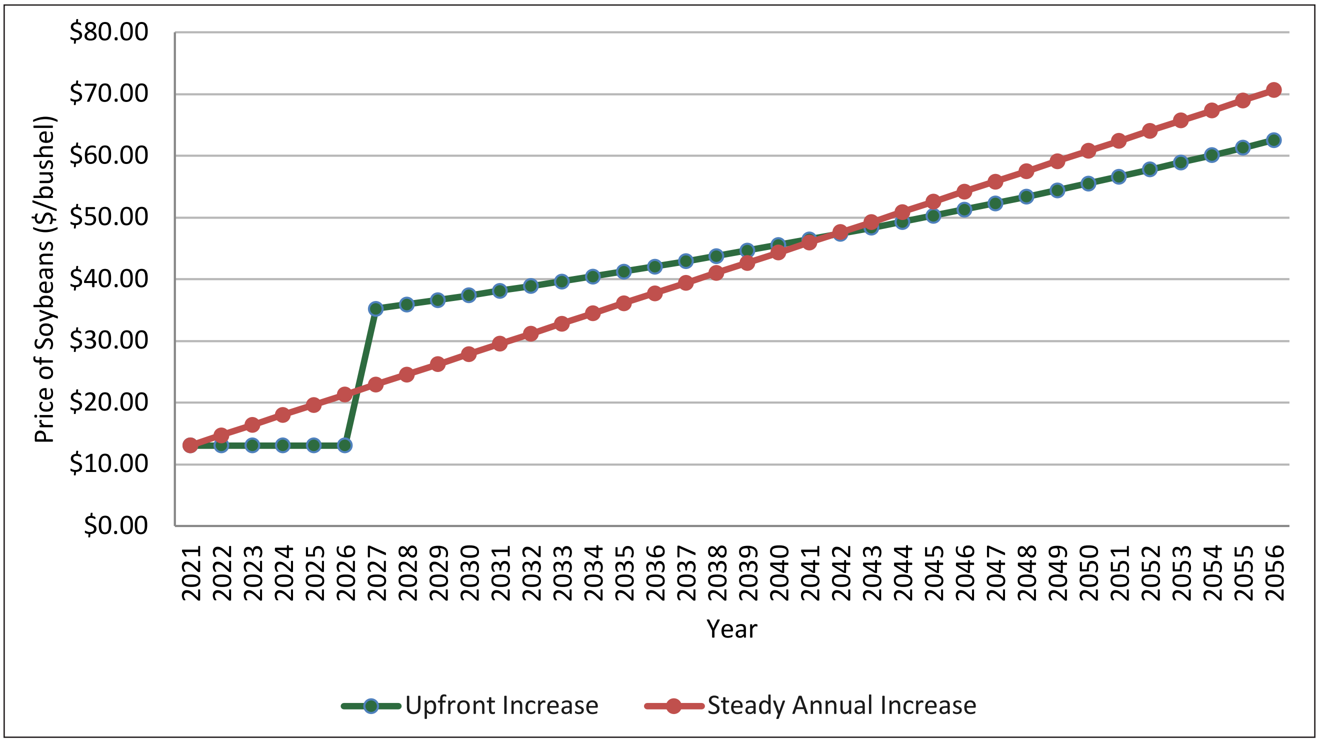
Another way to look at this problem would be to ask: How high would the price of corn have to rise to make farming more profitable than the solar lease? Below we assume that the yields on the land and all other input costs stay the same. In this case, the price of corn would have to rise from $5.45 per bushel in 2021 to $12 in 2027 and rise to $21.31 per bushel by 2056 as shown in Figure 17. Alternatively, the price of corn would need to rise by $0.51 per bushel each year from 2021 to 2056 when it would reach $23.41 per bushel.

Figure 17 – Simulated Price of Corn Per Bushel to Match the Annualized Solar Payment



Now let's turn our attention to soybeans. If we assume the yields and input costs stay the same, the price of soybeans would have to rise from $13.10 per bushel in 2021 to $35.22 per bushel in 2026 and rise to $62.55 by 2056 as shown in Figure 18. For a linear increase, the price of soybeans would need to rise by $1.64 per bushel each year from 2021 to 2056 when it would reach $70.65 per bushel.

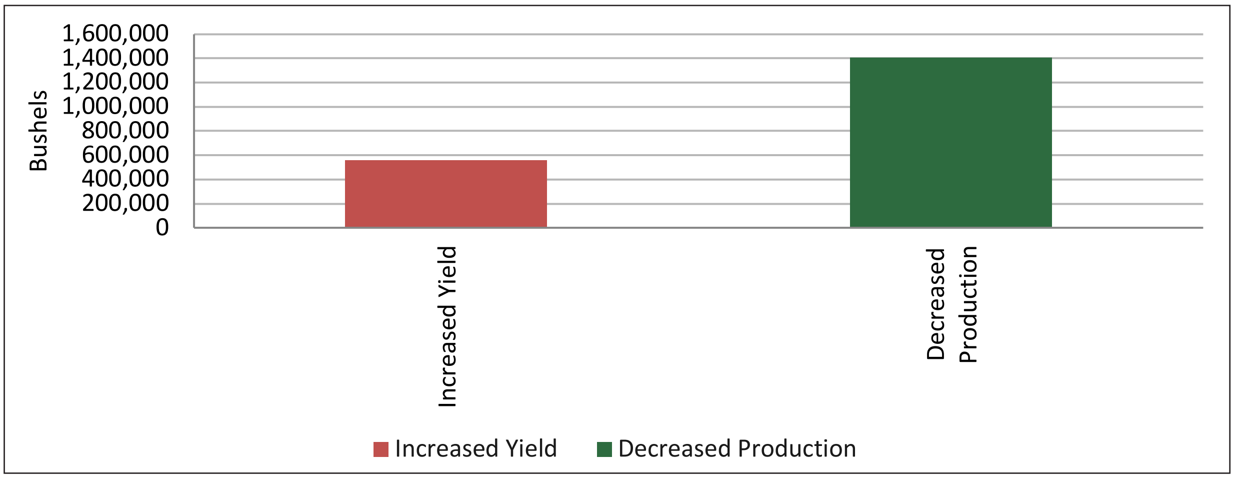
Figure 18 – Simulated Price of Soybeans Per Bushel to Match the Annualized Solar Payment



If we assume that the price of corn stays the same, the yields for corn would need to increase from 210.1 bushels per acre in 2021 to 462.6 bushels per acre in 2027 and stay at that level until 2056. The yields for soybeans would need to rise from 62.2 bushels per acre in 2021 to 167.2 bushels per acre in 2027 and stay there until 2056.

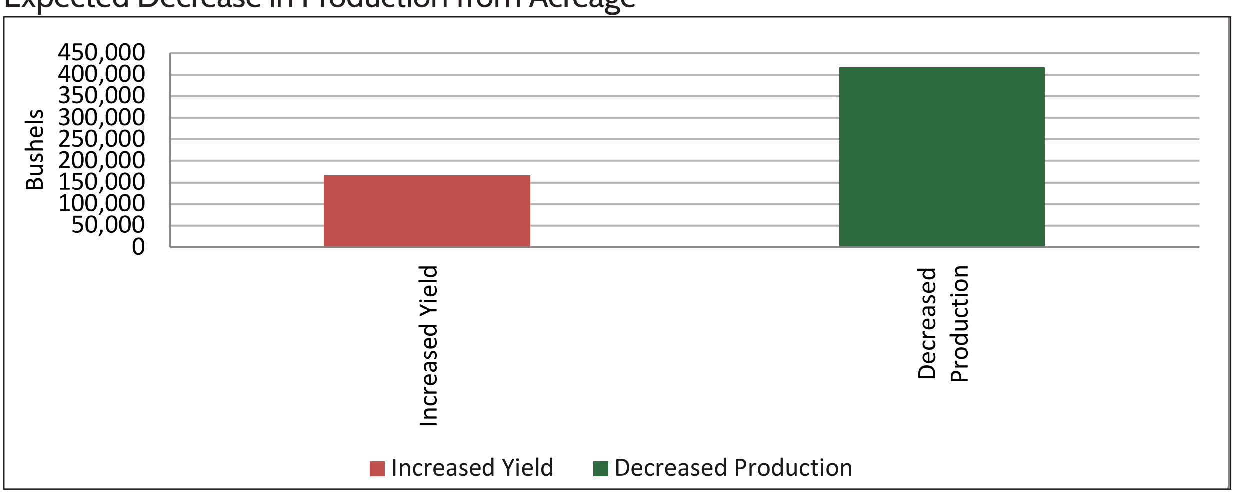
Statewide, over the past 20 years, corn yields have increased by 2.29 bushels per year. If 6,693 acres are taken out of production of the county's 252,392, the remaining 245,699 acres would be expected to produce 562,176 bushels more annually just by being more productive on-trend. At 172.4 bushels per year (2021 State Agriculture Overview yield), the 6,693 acres would reduce production by 1,406,199 bushels. Thus, the increased yields would take just 2 years to make up for the acreage taken out of production from the solar project.

Figure 19 – Expected Annual Increase in Production Due to Higher Yields from Corn Versus Expected Decrease in Production from Acreage



Likewise, over the past 20 years, soybean yields have increased by 0.68 bushels per year. If 6,693 acres are taken out of production of the county's 252,392, the remaining 245,699 acres would be expected to produce 166,784 bushels more annually just by being more productive on-trend. At 54.6 bushels per year (2021 State Agriculture Overview yield), the 6,693 acres would reduce production by 416,305 bushels. Thus, the increased yields would take just 2.13 years to make up for the acreage taken out of production from the solar project.

Figure 20 – Expected Annual Increase in Production Due to Higher Yields from Soybeans Versus Expected Decrease in Production from Acreage



VI. Economic Impact Methodology

The economic analysis of solar PV project presented uses NREL's Jobs and Economic Development Impacts (JEDI) PV Model (PV12.23.16). The JEDI PV Model is an input-output model that measures the spending patterns and location-specific economic structures that reflect expenditures supporting varying levels of employment, income, and output. That is, the JEDI Model takes into account that the output of one industry can be used as an input for another. For example, when a PV system is installed, there are both soft costs consisting of permitting, installation and customer acquisition costs, and hardware costs, of which the PV module is the largest component. The purchase of a module not only increases demand for manufactured components and raw materials, but also supports labor to build and install a module. When a module is purchased from a manufacturing facility, the manufacturer uses some of that money to pay employees. The employees use a portion of their compensation to purchase goods and services within their community. Likewise, when a developer pays workers to install the systems, those workers spend money in the local economy that boosts economic activity and employment in other sectors. The goal of economic impact analysis is to quantify all of those reverberations throughout the local and state economy.

The first JEDI Model was developed in 2002 to demonstrate the economic benefits associated with developing wind farms in the United States. Since then, JEDI models have been developed for biofuels, natural gas, coal, transmission lines and many other forms of energy. These models were created by Marshall Goldberg of MRG & Associates, under contract with the National Renewable Energy Laboratory. The JEDI model utilizes state-specific industry multipliers obtained from IMPLAN (IMpact analysis for PLANning). IMPLAN software and data are managed and updated by the Minnesota IMPLAN Group, Inc., using data collected at federal, state, and local levels. This study analyzes the gross jobs that the new solar energy project development supports and does not analyze the potential loss of jobs due to declines in other forms of electric generation.

The total economic impact can be broken down into three distinct types: direct impacts, indirect impacts, and induced impacts. **Direct impacts** during the construction period refer to the changes that occur in the onsite construction industries in which the direct final demand (i.e., spending on construction labor and services) change is made. Onsite construction-related services include installation labor, engineering, design, and other professional services. Direct impacts during operating years refer to the final demand changes that occur in the onsite spending for the solar operations and maintenance workers.

The initial spending on the construction and operation of the solar PV installation will create a second layer of impacts, referred to as "supply chain impacts" or "indirect impacts." **Indirect impacts** during the construction period consist of changes in inter-industry purchases resulting from the direct final demand changes and include construction spending on materials and PV equipment, as well as other purchases of goods and offsite services. Utility-scale solar PV indirect impacts include PV modules, invertors, tracking systems, cabling, and foundations.

Induced impacts during construction refer to the changes that occur in household spending as household income increases or decreases as a result of the direct and indirect effects of final demand changes. Local spending by employees working directly or indirectly on the Project that receive their paychecks and then spend money in the community is included. The model includes additional local jobs and economic activity that are supported by the purchases of these goods and services.

VII. Economic Impact Results

The economic impact results were derived from detailed project cost estimates supplied by Savion. Savion may include a battery storage system in this Project but the costs were not included in the modeling. These costs were not included as a conservative approach to estimating the economic impacts of the project. In addition, Savion also estimated the percentages of Project materials and labor that will be coming from within Madison County and the State of Ohio. Given the uncertainty of the exact construction cost-spend timeline during the course of construction, the modeling assumes a front loaded construction spend as a conservative estimate for the modeled results.

Two separate JEDI models were produced to show the economic impact of Oak Run Solar Project. The first JEDI model used the 2020 Madison County multipliers from IMPLAN. The second JEDI model used the 2020 IMPLAN multipliers for the State of Ohio and the same project costs. Because all new multipliers from IMPLAN and specific project cost data from Oak Run Solar Project are used, the JEDI model serves only to translate the project costs into IMPLAN sectors.

Tables 5-7 show the output from these models. Table 5 lists the total employment impact from Oak Run Solar Project for Madison County and the State of Ohio. Table 6 shows the impact on total earnings and Table 7 contains the impact on total output.

Table 5 – Total Employment Impact from Oak Run Solar Project

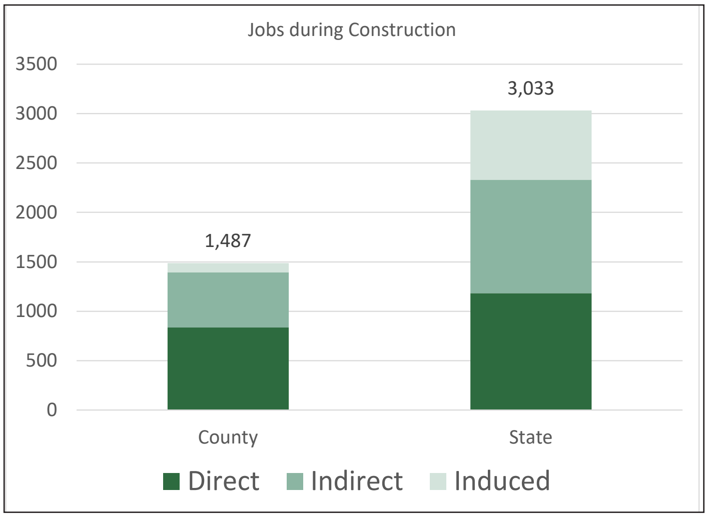
	Madison County Jobs	State of Ohio Jobs
Construction		
Project Development and Onsite Labor Impacts (direct)	833	1,181
Module and Supply Chain Impacts (indirect)	561	1,148
Induced Impacts	93	704
New Local Jobs during Construction	1,487	3,033
Operations		
Onsite Labor Impacts (direct)	18	18
Local Revenue and Supply Chain Impacts (indirect)	8	12
Induced Impacts	9	33
New Local Long-Term Jobs	35	63

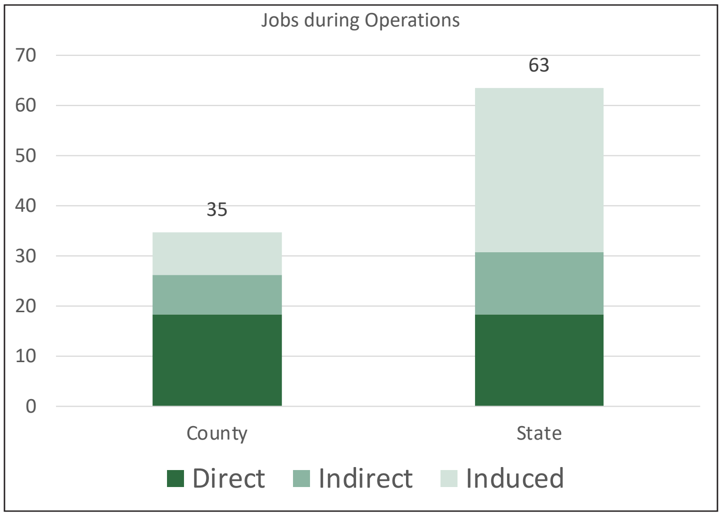
The results from the JEDI model show significant employment impacts from Oak Run Solar Project. Employment impacts can be broken down into several different components. Direct jobs created during the construction phase typically last anywhere from 12 to 18 months depending on the size of the project; however, the direct job numbers present in Table 5 from the JEDI model are based on a full time equivalent (FTE) basis for a year. In other words, 1 job = 1 FTE = 2,080 hours worked in a year. A part time or temporary job would constitute only a fraction of a job according to the JEDI model. For example, the JEDI model results show 833 new direct jobs during construction in Madison County, though the construction of the solar center could involve closer to 1,666 workers working half-time for a year. Thus, due to the short-term nature of construction projects, the JEDI model often significantly understates the number of people actually hired to work on the project. It is important to keep this fact in mind when looking at the numbers or when reporting the numbers.

As shown in Table 5, new local jobs created or retained during construction total over 1,487 for Madison County and over 3,033 for the State of Ohio. New local long-term jobs created from Oak Run Solar Project total over 35 for Madison County and over 63 for the State of Ohio.

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

Figure 21 – Total Employment Impact for Oak Run Solar Project



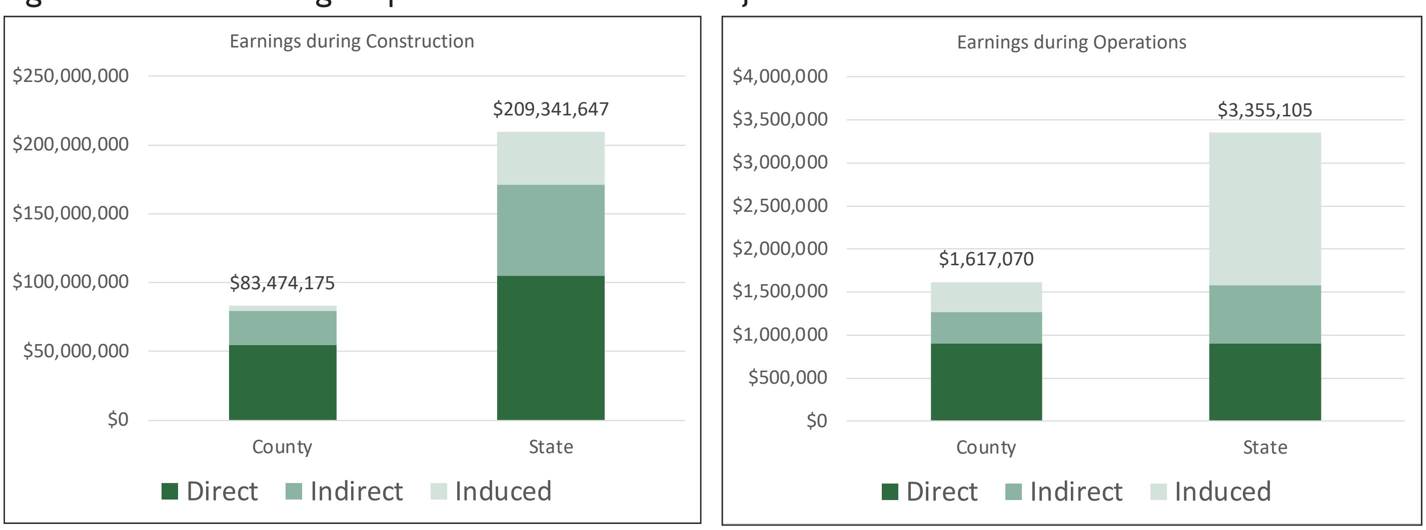


Accordingly, it is important to not just look at the number of jobs but also the earnings that they produce. Table 6 shows the earnings impacts from Oak Run Solar Project, which are categorized by construction impacts and operations impacts. The new local earnings during construction totals over $83.4 million for Madison County and over $209 million for the State of Ohio. The new local long-term earnings totals over $1.6 million for Madison County and over $3.3 million for the State of Ohio.

Table 6 – Total Earnings Impact from Oak Run Solar Project

	Madison County	State of Ohio
Construction		
Project Development and Onsite Earnings Impacts	$54,337,759	$105,122,155
Module and Supply Chain Impacts	$25,239,561	$65,996,825
Induced Impacts	$3,896,855	$38,222,667
New Local Earnings during Construction	$83,474,175	$209,341,647
Operations (Annual)		
Onsite Labor Impacts	$905,687	$905,687
Local Revenue and Supply Chain Impacts	$358,180	$672,565
Induced Impacts	$353,203	$1,776,853
New Local Long-Term Earnings	$1,617,070	$3,355,105

Figure 22 – Total Earnings Impact for Oak Run Solar Project

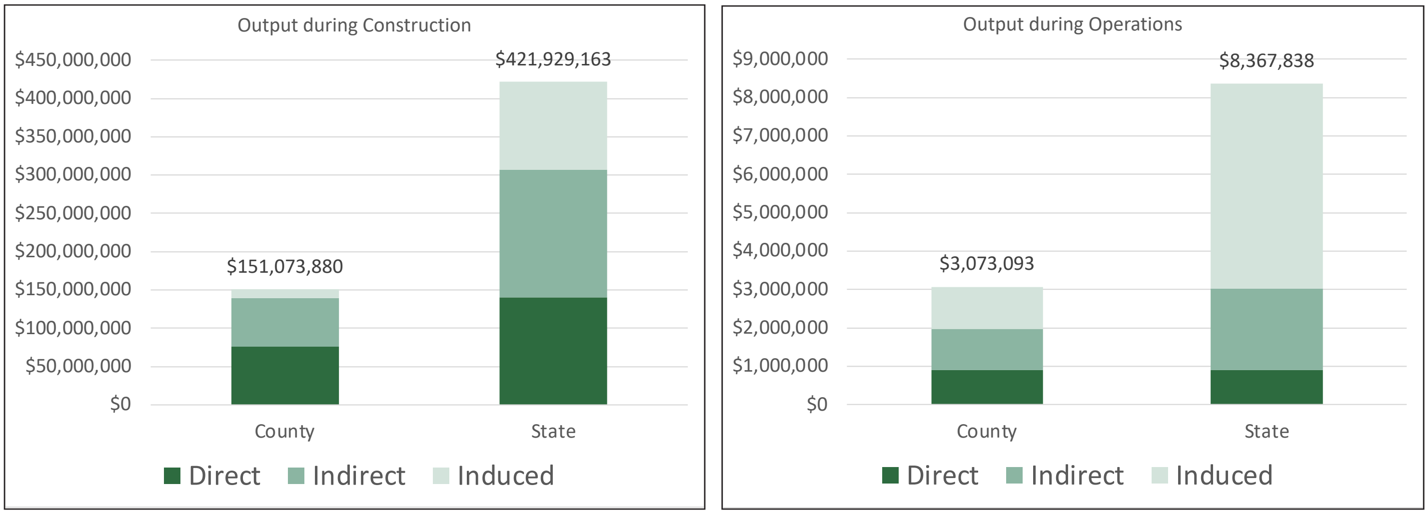


Output refers to economic activity or the value of production in the state or local economy. It is an equivalent measure to the Gross Domestic Product, which measures output on a national basis. According to Table 7, the new local output during construction totals over $151 million for Madison County and over $421 million for the State of Ohio. The new local long-term output totals over $3.0 million for Madison County and over $8.3 million for the State of Ohio.

Table 7 – Total Output Impact from Oak Run Solar Project

	Madison County	State of Ohio
Construction		
Project Development and Onsite Jobs Impacts on Output	$75,805,755	$139,745,458
Module and Supply Chain Impacts	$63,037,754	$167,249,048
Induced Impacts	$12,230,371	$114,934,657
New Local Output during Construction	$151,073,880	$421,929,163
Operations (Annual)		
Onsite Labor Impacts	$905,687	$905,687
Local Revenue and Supply Chain Impacts	$1,059,770	$2,119,561
Induced Impacts	$1,107,636	$5,342,590
New Local Long-Term Output	$3,073,093	$8,367,838

Figure 23 – Total Output Impact for Oak Run Solar Project

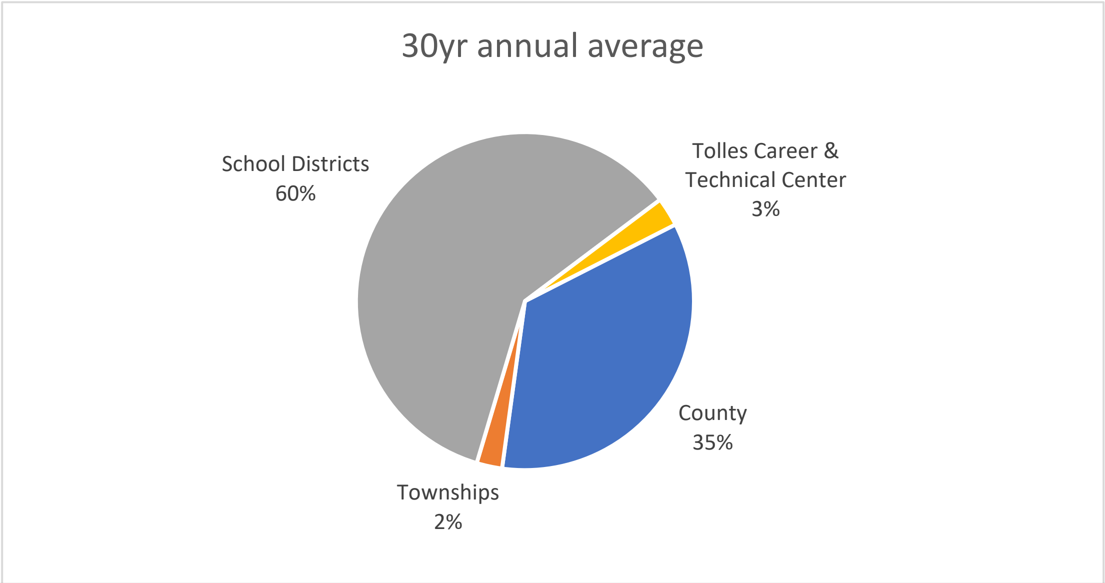


VIII. Tax Revenue

Solar PV projects increase the property tax base of a county, creating a new revenue source for education and other local government services. Although it is difficult to calculate the precise assessed value and taxes of the Project until construction is completed, we can calculate the taxes on an illustrative example to get an idea of the size of the contributions that a project of this magnitude will have on the local tax base.

Table 8 details the government revenue implications of the Oak Run Solar Project. There are several important assumptions built into the analysis in this table. First, the analysis assumes that Savion enters into a Payment in Lieu of Taxes (PILOT) agreement. The PILOT agreement will abate real property and tangible personal property taxes and replace them with a base payment of $9,000 per MWac of installed capacity. For purposes of this report, we have assumed the installed capacity of the Project to be 800 MWac. Second, the table assumes that the county apportions the tax revenue from the PILOT according to their relative effective tax rates (the gross tax rates times a reduction factor). Third, the table assumes the Tax Year 2021 tax rates posted on the Ohio Department of Revenue website for each taxing body. Fourth, the projections assume that the tax rate and the cost do not change through the end of the Project. Fifth, the township revenue assumes that 23% of the assessed value will be in Monroe Township, 40% will be in Deercreek Township, and 37% will be in Somerford Township. Correspondingly, 96% of the Project will be in Jonathan Alder School District and 4% of the Project will be in London City School District.

Figure 24 – Taxes Paid by Oak Run Solar Project



According to Table 8, Jonathan Alder School District will receive over $4.1 million annually from the Project and over $124 million over the 30-year life of the Project. The Fire District, Ambulance and Cemetery will receive over $957 thousand annually from the Project and over $28.7 million over the 30-year life of the Project. MRDD Health will receive over $14.8 million over the life of the Project from the PILOT. The total taxes paid will be $7.2 million annually from the PILOT. Other taxing districts will receive between $43,333 and $370,697 annually as detailed in Table 8.

Table 8 – Illustration of Government Revenue Paid by the Oak Run Solar Project

Taxing District	Estimated Annual Government Revenue from PILOT	30-year Total from PILOT
Madison County General Fund	$370,697	$11,120,920
Veterans Relief	$61,783	$1,853,487
Mental Health	$61,783	$1,853,487
MRDD Health	$494,263	$14,827,893
Health Services	$142,101	$4,263,019
Senior Citizens	$98,853	$2,965,579
911	$123,566	$3,706,973
Library	$185,349	$5,560,460
Fire/Ambulance/Cemetery	$957,635	$28,729,042
Somerford Township	$63,148	$1,894,434
Monroe Township	$43,333	$1,299,986
Deercreek Township	$69,400	$2,082,009
London City School District	$178,341	$5,350,215
Jonathan Alder School District	$4,152,045	$124,561,341
Tolles Career & Technical Center	$197,705	$5,931,157
TOTAL	**$7,200,000**	**$216,000,000**
Annual Average		**$7,200,000**

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X. Curriculum Vitae (Abbreviated)

David G. Loomis
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Education

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

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

Experience

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

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.

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.

- 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

Bryan A. Loomis
Strategic Economic Research, LLC
Vice President

Education

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

Experience

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

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

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

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

Christopher Thankan
Strategic Economic Research, LLC
Economic Analyst

Education

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

Experience

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

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

Strategic Economic Research, LLC

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