Strategic Economic Research, LLC

ECONOMIC IMPACT & LAND USE ANALYSIS OF THE RED CREEK SOLAR PROJECT

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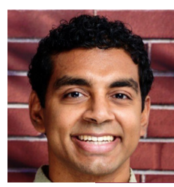

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I. Executive Summary

NextEra Energy is developing the Rock Creek Solar Project in Clinton County, Iowa. The purpose of this report is to aid decision makers in evaluating the economic impact of this project on Clinton County and the State of Iowa. The basis of this analysis is to study the direct, indirect, and induced impacts on job creation, wages, and total economic output.

The Rock Creek Solar Project is a 150-megawatt alternating current (MWac) utility-scale solar powered-electric generation facility that will utilize photovoltaic (PV) panels installed on a single-axis tracking system. The Project will also include a 100 MW battery energy storage system (BESS). The total Project represents an investment in excess of $320 to $390 million. The total development is anticipated to result in the following:

Economic Impact

Jobs – all numbers are full-time equivalents

- Between 311 and 361 new local jobs during construction for Clinton County
- Between 610 and 709 new local jobs during construction for the State of Iowa
- Between 12.2 and 15.2 new local long-term jobs for Clinton County
- Between 24.4 and 32.1 new local long-term jobs for the State of Iowa

Earnings

- Between $19.5 and $22.8 million in new local earnings during construction for Clinton County
- Between $43.2 and $50.4 million in new local earnings during construction for the State of Iowa
- Between $584 and $744 thousand in new local long-term earnings for Clinton County annually
- Between $1.9 and $2.6 million in new local long-term earnings for the State of Iowa annually

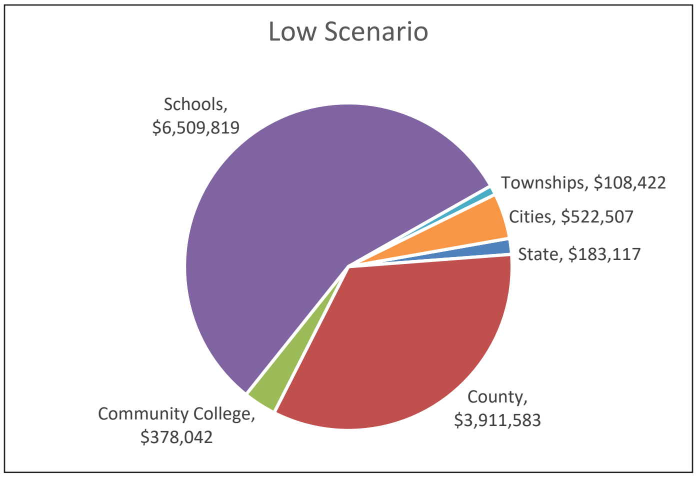
Output

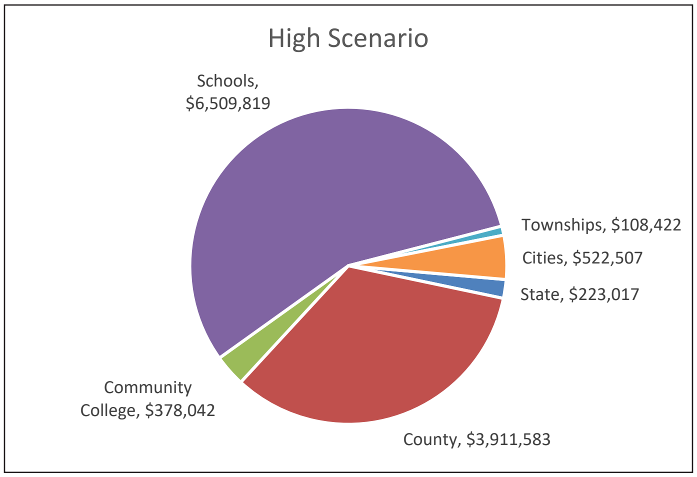
- Between $44.4 and $51.6 million in new local output during construction for Clinton County
- Between $98.8 and $114 million in new local output during construction for the State of Iowa
- Between $1.8 and $2.1 million in new local long-term output for Clinton County annually
- Between $4.1 and $5.2 million in new local long-term output for the State of Iowa annually

Property Taxes

- Over $6.5 million in total school district revenue over the life of the Project
- Over $3.9 million in total county property taxes for Clinton County over the life of the Project
- Over $11.6 million in property taxes in total for all taxing districts over the life of the Project

Figure 1 – Total Property Taxes Paid by the Rock Creek Solar Project





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

Land Use

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

Clinton County:

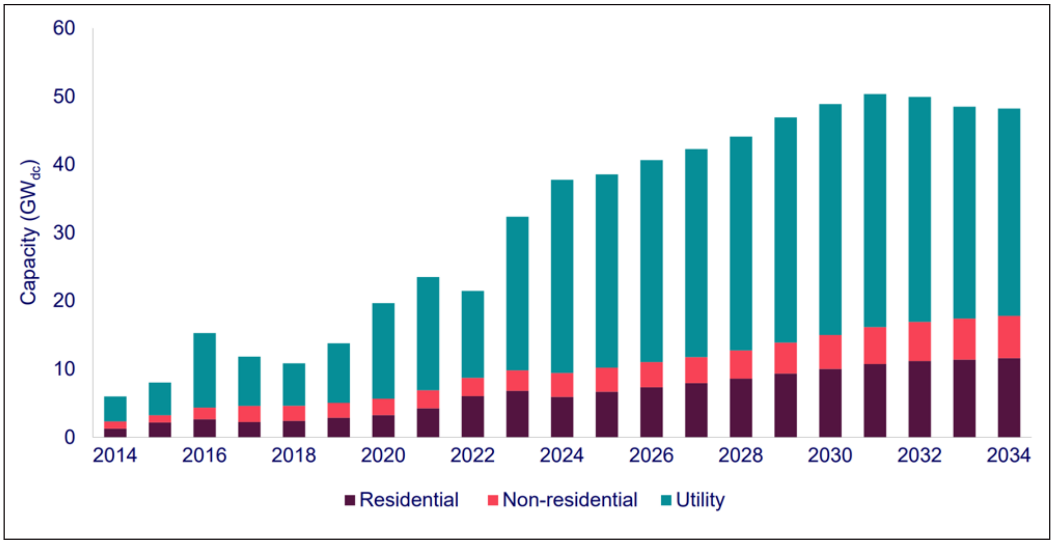
- For corn farming to generate more income for the landowner and local community than the solar lease, corn prices would need to rise to $21.86 per bushel by the year 2063 or corn yields would need to rise to 334.5 bushels per acre by the year 2024.
- Alternatively, soybean prices would need to rise to $55.33 per bushel by the year 2063 or soybean yields would need to rise to 118 bushels per acre by the year 2024 for soybean farming to generate more income for the landowner and local community than the solar lease.
- At the time of this report, corn and soybean prices are $6.80 and $14.30 per bushel respectively and yields are 225.2 and 66 bushels per acre respectively.

a. U.S. Solar PV Industry Growth

The U.S. solar industry is growing at a rapid but uneven pace. Solar energy systems are installed for onsite use, including residential, commercial, and industrial properties, and utility-scale solar powered-electric generation facilities intended for wholesale distribution. Rock Creek Solar is a utility-scale solar PV project intended for wholesale markets through the transmission grid. 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 2 shows the historical capacity additions as well as the forecasted additions into 2034. The primary driver of this overall sharp pace of growth is large price declines in solar equipment. According to Figure 3, utility-scale solar fixed tilt and single-axis tracking have decreased from an average of $6/watt in 2010 to slightly more than $1/watt in 2022. Solar PV also benefits from the Federal Investment Tax Credit (ITC) which provides a tax credit for residential and commercial properties.

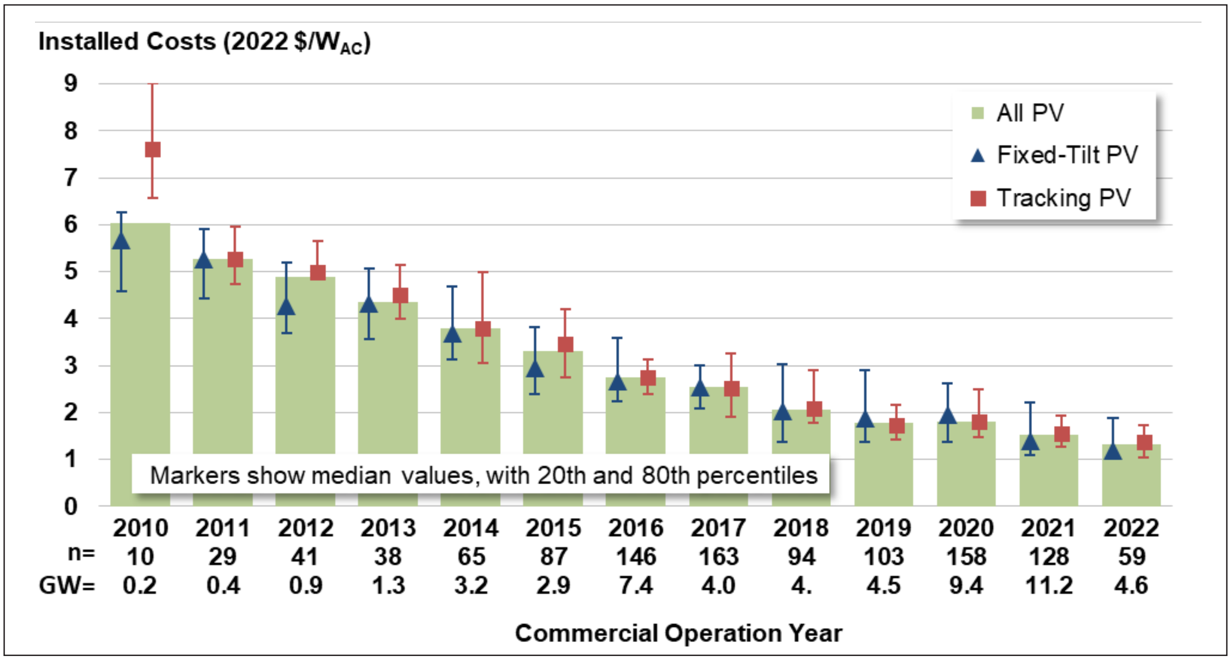
According to Figure 4, utility-scale PV installations jumped in the fourth quarter of 2023 to over 10,000 MWdc. Even with this large ramp-up of installations, there are an additional 82,000 MWdc of contracted utility-scale installations that have not been built yet.

Figure 2 – Annual U.S. Solar PV Installations, 2014 – 2034E



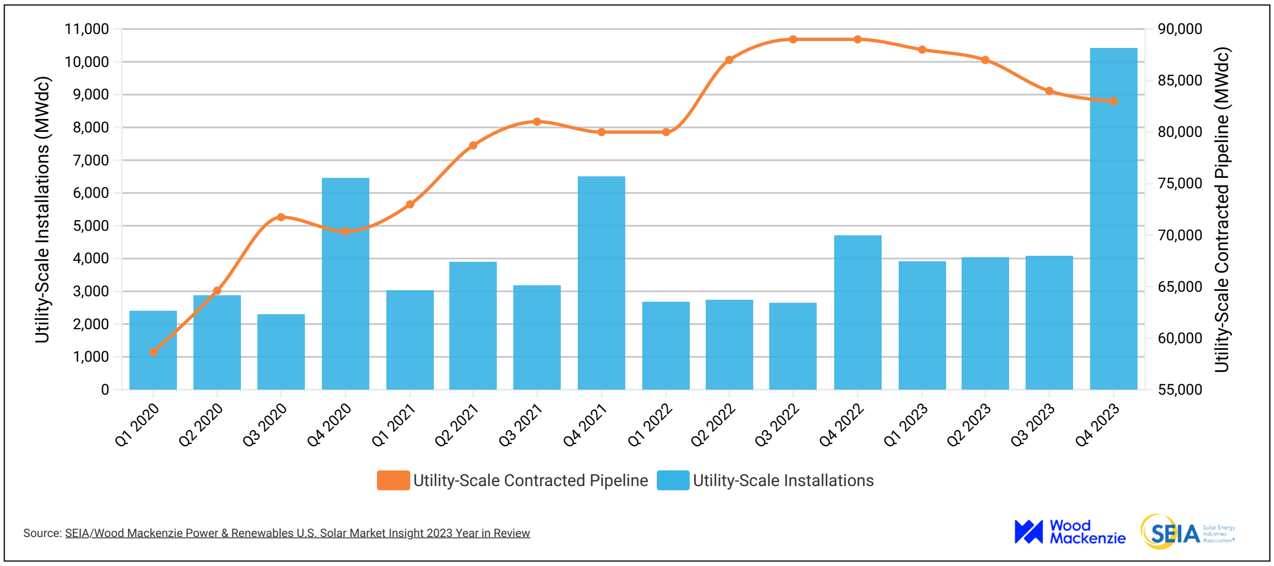
Source: Solar Energy Industries Association, Solar Market Insight Report 2023

Figure 3 – Installed Costs of Utility-Scale Solar from 2010 to 2022 (adjusted for inflation)



Source: Lawrence Berkeley National Laboratory, Utility-Scale Solar, 2023 Edition

Figure 4 – U.S. Utility PV Installations vs. Contracted Pipeline

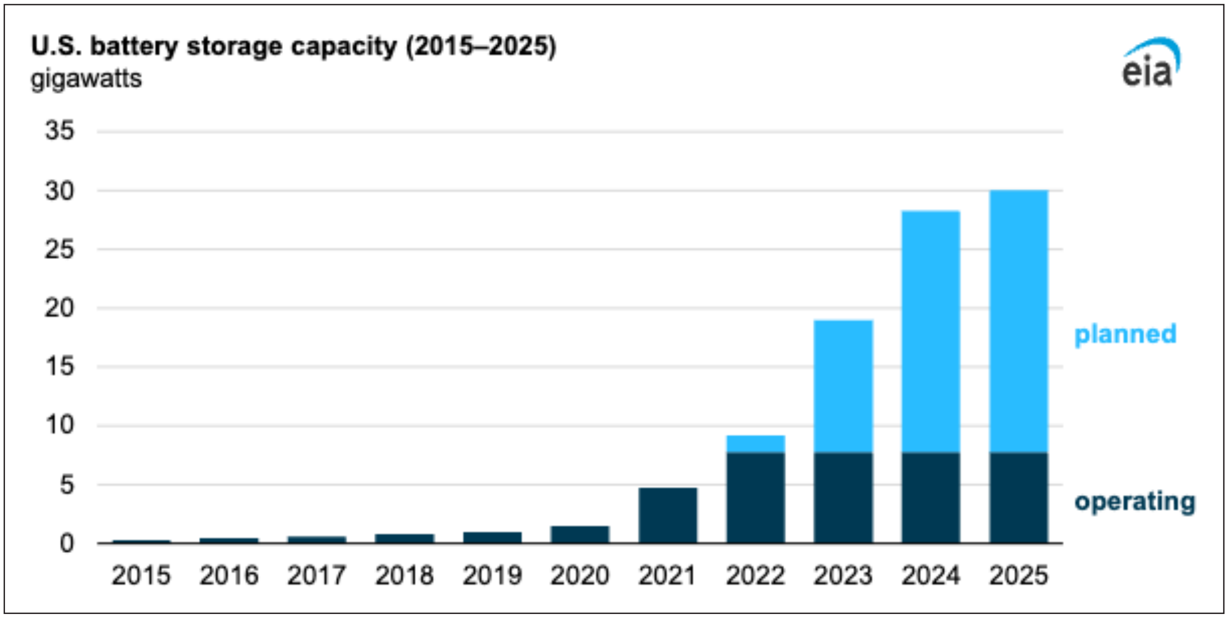


Source: Solar Energy Industries Association, Solar Market Insight Report Q4 2023

b. U.S. Energy Storage Industry Growth

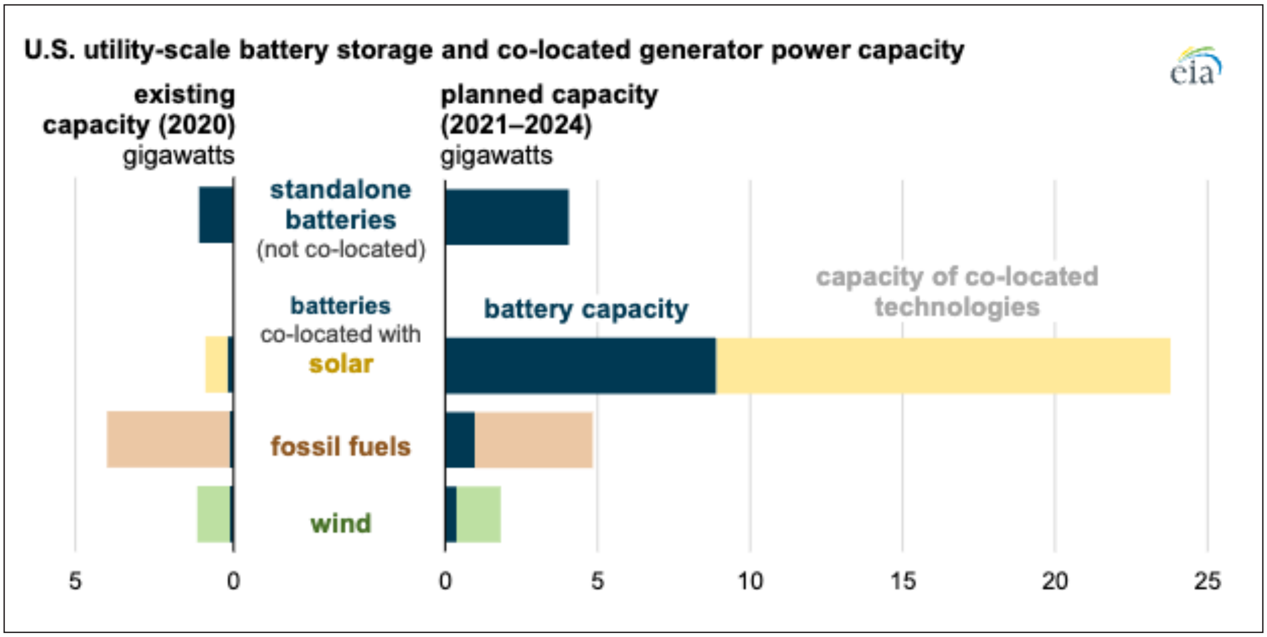
The U.S. energy storage industry is composed primarily of large-scale battery energy storage systems (BESS) and is a recent addition to the electrical grid system. As shown in Figure 5, the large-scale battery capacity has grown rapidly since 2015 but is expected to see accelerated growth over the next few years. The U.S. Energy Information Administration (U.S. EIA) expects the installation of 10,000 megawatts of BESS in the next few years – 10 times the capacity installed in 2019 (U.S. EIA, 2021). The primary driver of this overall sharp pace of growth is large price declines in BESS equipment. Battery systems are used for price arbitrage, to store electricity when prices are low and discharge electricity when prices are high. Batteries also maintain grid reliability through frequency regulation, ramp generation, spinning reserves, absorbing excess generation and, in some cases, black start capabilities.Some battery storage systems are paired with solar energy generators, wind energy generators, or fossil fuel generators. Standalone battery storage systems are increasingly common according to Figure 6.

Figure 5 – Large-Scale Battery Storage Cumulative Power Capacity, 2015-2025E



Source: U.S. Energy Information Administration, U.S. Battery Storage Capacity, 2022

Figure 6 – U.S. Large-Scale Battery Storage Power Capacity Additions, Standalone and Co-located



Source: U.S. Energy Information Administration, Battery Storage Additions, 2021

c. Iowa Solar PV Industry

According to SEIA, Iowa is ranked 31st 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 Iowa rank highly including New Jersey (8th), New York (9th), Virginia (10th), and Massachusetts (11th). In 2022, Iowa installed 212 MW of solar electric capacity bringing its cumulative capacity to 678 MW.

Iowa has great potential to expand its solar installations. Iowa has several utility-scale solar farms in operation: Holliday Creek (100 MW) in Webster County; Wapello Solar (100 MW) in Louisa County; and Arbor Hill Solar (24 MW) in Adair County.[1] The 150 MW Rock Creek Solar Project will be one of the largest installations in Iowa to date.

There are 78 solar companies in Iowa including 12 manufacturers, 38 installers/developers, and 28 others.[2] Figure 7 shows the locations of solar companies in Iowa as of the time of this report. Currently, there are 892 solar jobs in the State of Iowa according to SEIA.

Figure 8 shows the Iowa historical installed capacity by year according to the SEIA. Huge growth was seen in 2022 and is forecasted to continue to grow in 2023 and beyond. Over the next five years, solar in Iowa is projected to grow by 1,414 MW.

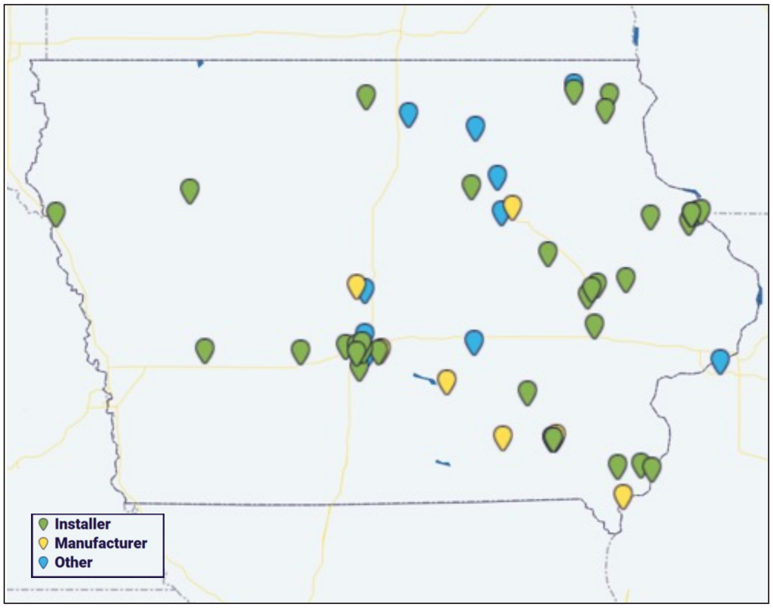
The Energy Information Administration (EIA) calculated the number of megawatt-hours generated from different energy sources in 2022. As shown in Figure 9, the greatest percentage of electricity generated in Iowa comes from wind with 62.6% followed by coal with 25.5% and natural gas with 9.2%. Approximately 0.6% of the total electricity power generated in Iowa came from solar thermal and solar PV in 2022.

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 10, employment in Iowa in the solar energy industry (1,152) trails behind wind electric generation (3,929) and coal generation (1,363) but is larger than nuclear generation (650).

[1] The megawatts listed in this paragraph are MWac. To convert to MWdc, multiply the MWac by 1.3 to get the approximate MWdc capacity.

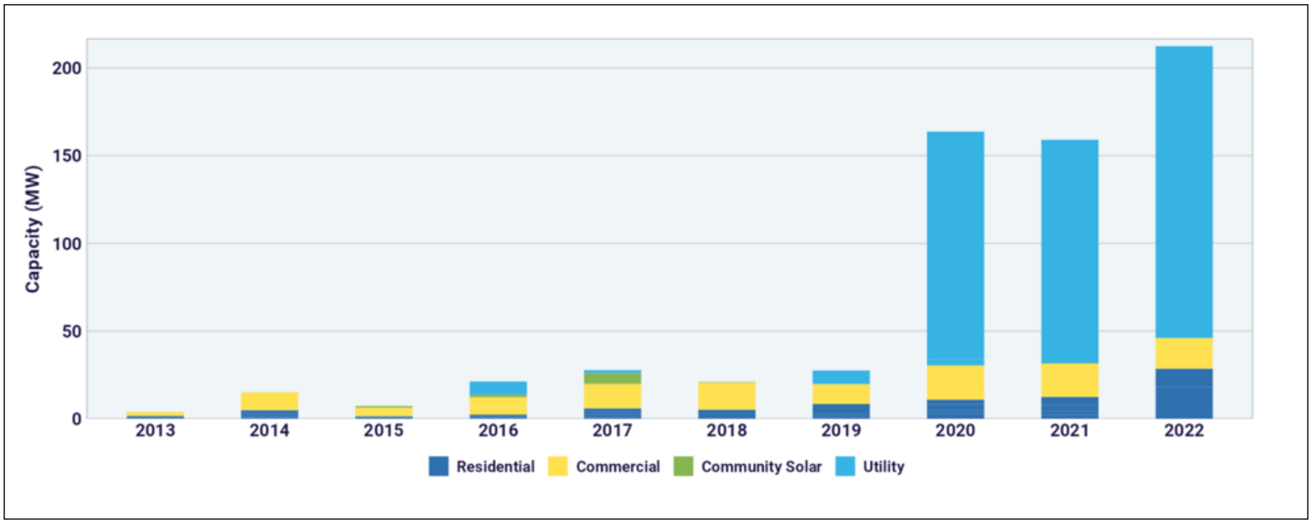
[2] "Other" includes Sales and Distribution, Project Management, and Engineering.

Figure 7 – Solar Company Locations in Iowa



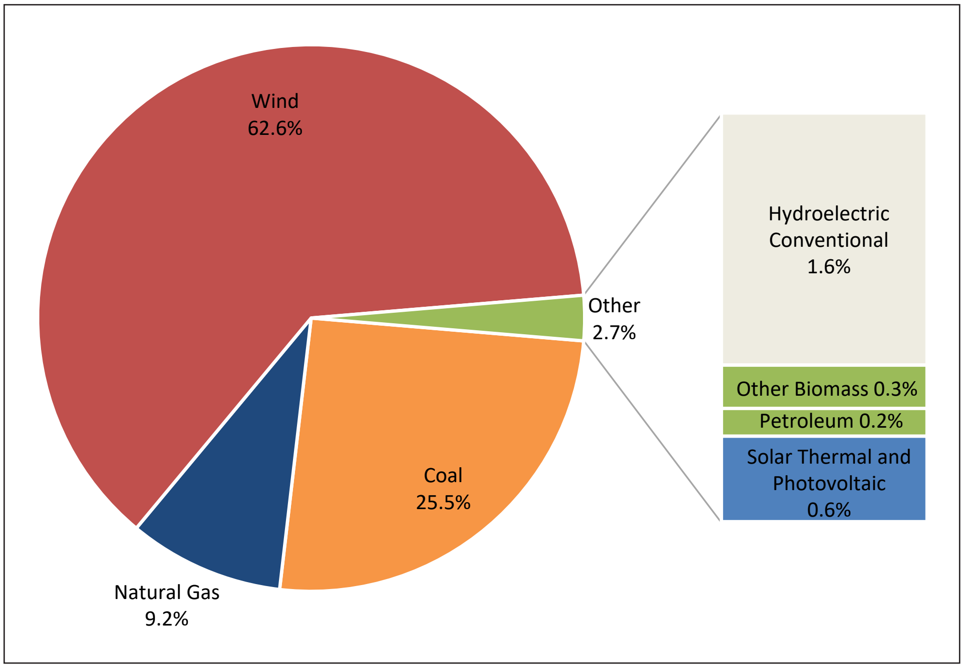
Source: Solar Energy Industries Association, Solar Spotlight: Iowa, Q1 2023

Figure 8 – Iowa Annual Solar Installations



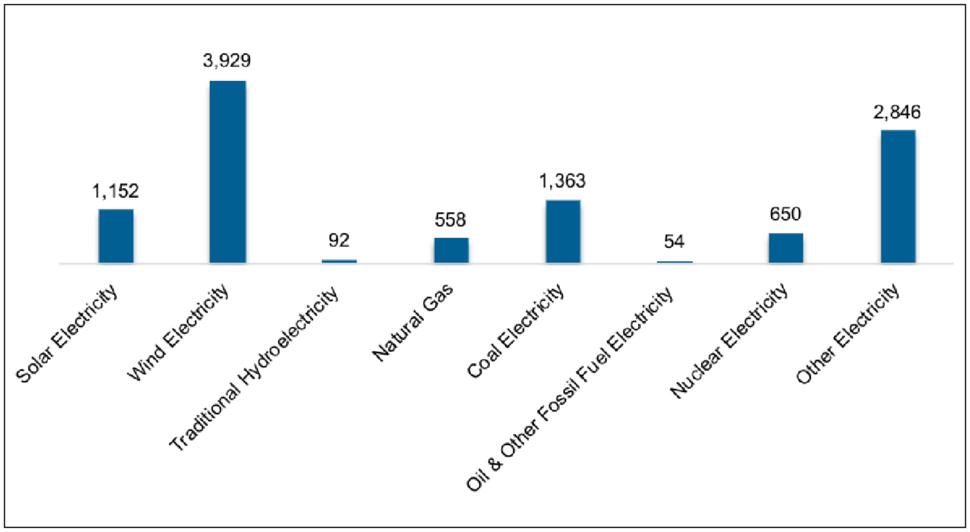
Source: Solar Energy Industries Association, Solar Spotlight: Iowa, Q1 2023

Figure 9 - Electric Generation by Fuel Type for Iowa in 2022



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

Figure 10 - Electric Generation Employment by Technology



Source: US Energy and Employment Report 2023: Iowa

d. 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.

Bessette et al. (2024) state that the potential economic benefits of a utility-scale solar project would include "increased property tax revenue, landowner payments, and increased employment" (Bessette et al., 2024, 7). They highlight the fact that the tax benefits have been difficult for residents to understand – perhaps because they have not been quantified clearly. They also mention both the direct and indirect (supply chain) economic impacts.

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.

Goss, Strain and Deviller (2022) projected that in 2025 alone, solar energy will support 2,721 jobs, $125.6 million in wages and salaries and $467.3 million in economic output. Between 2020 and 2025, the industry will support an average of 3,238 jobs each year, $669.6 million in total wages and salaries and $3.0 billion in economic output. During this same period, wind energy construction increased state and local tax collections by $93.3 million and operations in 2025 will increase collections by an additional $21.8 million.

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.

e. Economic Benefits of Energy Storage

Stand-alone battery storage facilities have numerous economic benefits. BESS installations create job opportunities in the local area during both the construction phase and the operational phase. In addition to the workers directly involved in the construction and maintenance of the project, numerous other jobs are supported through indirect supply chain purchases and the higher spending that is induced by these workers. Battery storage projects strengthen the local tax base and help improve county services, and local infrastructure, such as public roads.

Several studies have quantified the economic benefits of battery storage projects across the United States. Gorman et al. (2020) demonstrate the economic value that battery storage brings to the electric grid. Using wholesale market prices, they find that the additional revenues from adding batteries to solar are higher than the additional costs. They do not quantify the economic impact that battery storage will make.

Truitt et al. (2022) is an NREL study that makes state-level employment projections for battery storage (along with wind, solar and energy storage). For the total U.S., they find that 66,751 were employed in the battery storage sector in 2020 and that 126,000-181,000 jobs will be in the sector by 2025 and 197,000-376,000 jobs will be in the sector by 2030 (Truitt, 2022, vi). The study used the IMPLAN model multipliers which are the same multipliers used in this present study.

The Energy Storage Association (2020) predicted that energy storage would create at least 200,000 jobs by 2030. They cite a "2017 Navigant analysis that assumed that industry jobs per new MW of storage capacity installed would decline from 50 per MW in 2021 to 34 per MW by 2025. The attainment of 100 GW by 2030 would involve rapidly growing annual installations between 2025 and 2030, but a continued decline in jobs/MW as the industry continues to refine construction techniques and management." (ESA, 2020, p. 8-9) We avoid such projections by analyzing the company's costs of construction and operation rather than using broad industry assumptions.

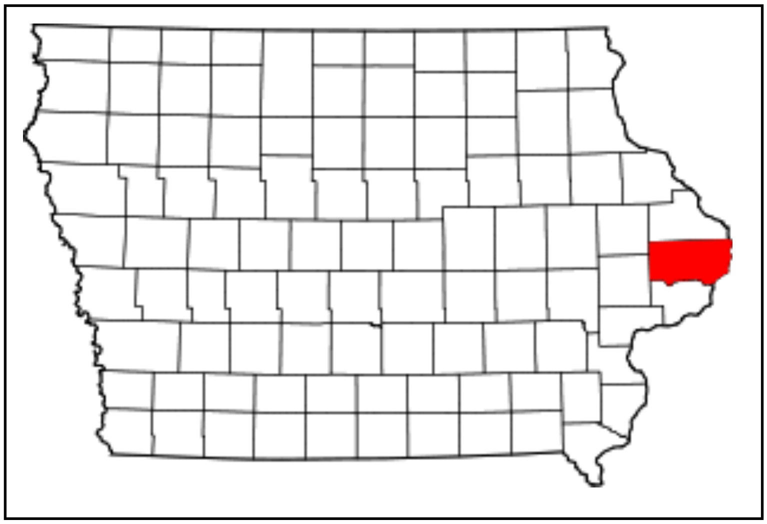
a. Rock Creek Solar Project

NextEra Energy is developing the Rock Creek Solar Project in Clinton County, Iowa. The Project consists of an estimated 150-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 Project will also include a 100 MW battery energy storage system (BESS). The total Project represents an investment of $320 to 390 million.

b. Clinton County, Iowa

Clinton County is located in the eastern part of Iowa (see Figure 11). It has a total area of 710 square miles, and the U.S. Census estimates that the 2022 population was 46,344 with 21,589 housing units. The county has a population density of 65 (persons per square mile) compared to 56 for the State of Iowa (2020). Median household income in the county was $56,345 (U.S. Census Bureau, 2021).

Figure 11 – Location of Clinton County, Iowa



i. Economic and Demographic Statistics

As shown in Table 1, the largest industries in the county are “Manufacturing” followed by “Health Care and Social Assistance,” “Retail Trade” and “Administrative Government.” These data for Table 1 come from IMPLAN covering the year 2021 (the latest year available).

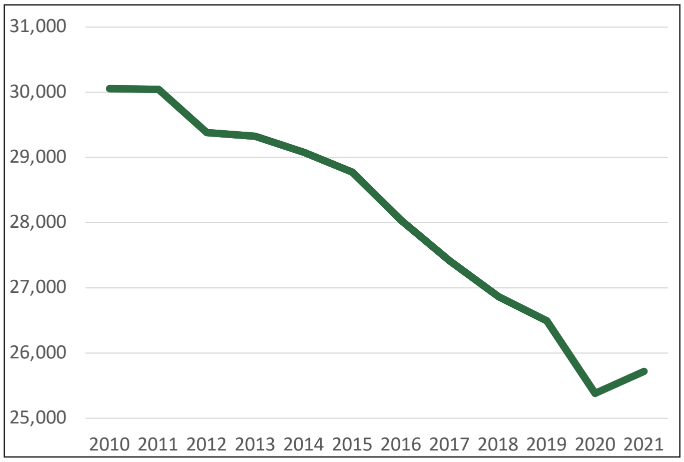
Table 1 provides the most recent snapshot of total employment but does not examine the historical trends within the county. Figure 12 shows employment from 2010 to 2021. Total employment in Clinton County was at its highest at 30,058 in 2010 and its lowest at 25,386 in 2020 (BEA, 2023).

Table 1 – Employment by Industry in Clinton County

Industry	Number	Percent
Manufacturing	4,153	16.6%
Health Care and Social Assistance	3,036	12.1%
Retail Trade	2,568	10.2%
Administrative Government	2,254	9.0%
Accommodation and Food Services	1,855	7.4%
Other Services (except Public Administration)	1,659	6.6%
Agriculture, Forestry, Fishing and Hunting	1,389	5.5%
Construction	1,332	5.3%
Administrative and Support and Waste Management and Remediation Services	1,286	5.1%
Transportation and Warehousing	1,083	4.3%
Finance and Insurance	927	3.7%
Professional, Scientific, and Technical Services	818	3.3%
Real Estate and Rental and Leasing	780	3.1%
Wholesale Trade	472	1.9%
Arts, Entertainment, and Recreation	336	1.3%
Educational Services	282	1.1%
Mining, Quarrying, and Oil and Gas Extraction	257	1.0%
Information	238	1.0%
Management of Companies and Enterprises	139	0.6%
Government Enterprises	125	0.5%
Utilities	81	0.3%

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

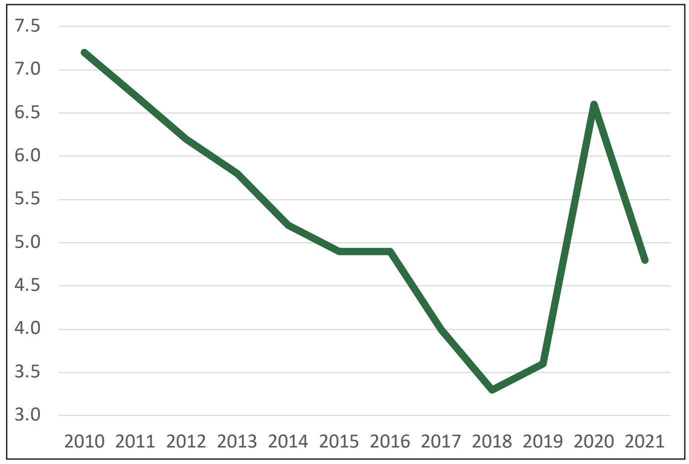
Figure 12 – Total Employment in Clinton County from 2010 to 2021



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

The unemployment rate signifies the percentage of the labor force without employment in the county. Figure 13 shows the unemployment rates from 2010 to 2021. Unemployment in Clinton County was at its highest at 7.2% in 2010 and its lowest at 3.3% in 2018 (FRED, 2023).

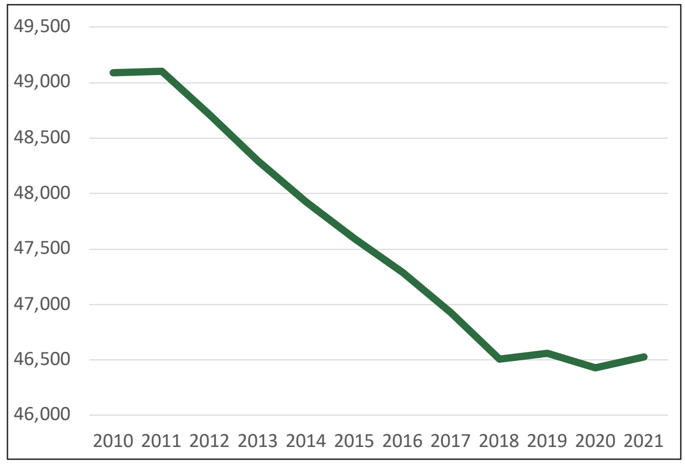
Figure 13 – Unemployment Rate in Clinton County from 2010 to 2021



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

The overall population in the county has decreased steadily, as shown in Figure 14. Clinton County's population was 49,091 in 2010 and 46,526 in 2021, a loss of 2,565 people (FRED, 2023). The average annual population decrease over this time period was 233 people.

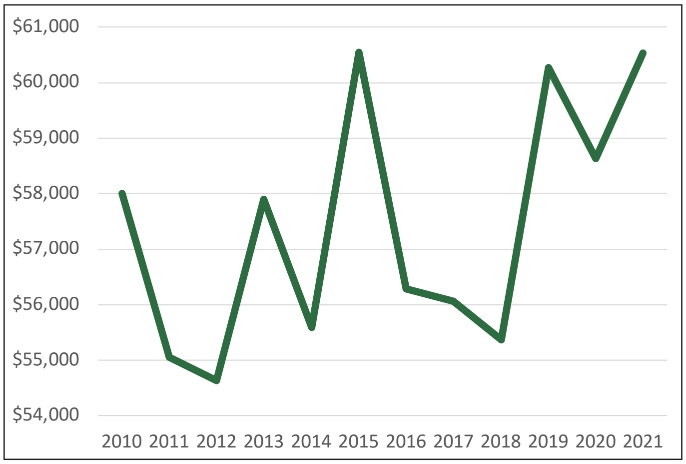
Figure 14 – Population in Clinton County from 2010 to 2021



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

Household income has fluctuated greatly in the county. Figure 15 shows the real median household income in Clinton County from 2010 to 2021. Using the national Consumer Price Index (CPI), the nominal median household income for each year was adjusted to 2021 dollars. Household income was at its lowest at $54,639 in 2012 and its highest at $60,548 in 2015 (FRED, 2023).

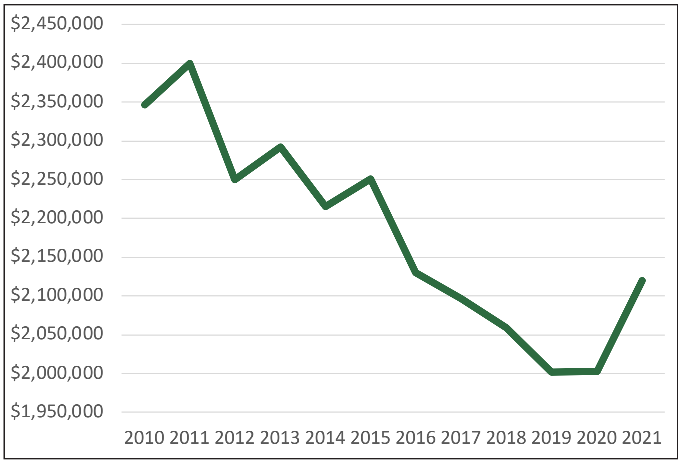
Figure 15 – Real Median Household Income in Clinton County from 2010 to 2021



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

Real Gross Domestic Product (GDP) is a measure of the value of goods and services produced in an area and adjusted for inflation over time. The Real GDP for Clinton County has fluctuated since 2010, as shown in Figure 16 (BEA, 2023).

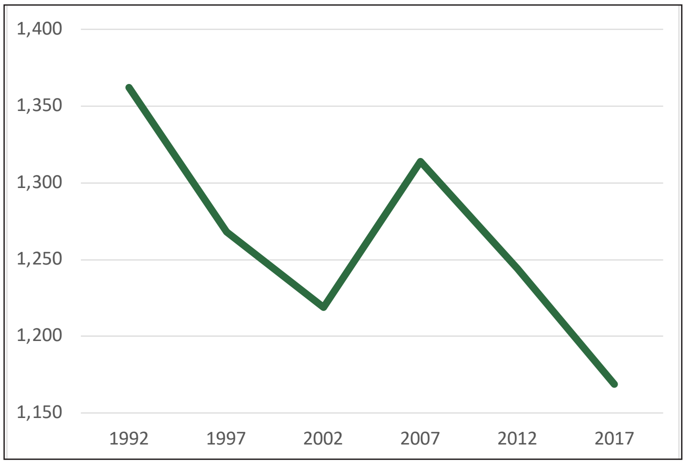
Figure 16 – Real Gross Domestic Product (GDP) in Clinton County from 2010 to 2021



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

The farming industry has fluctuated in Clinton County. As shown in Figure 17, the number of farms hit a high of 1,362 in 1992 and a low of 1,169 in 2017.

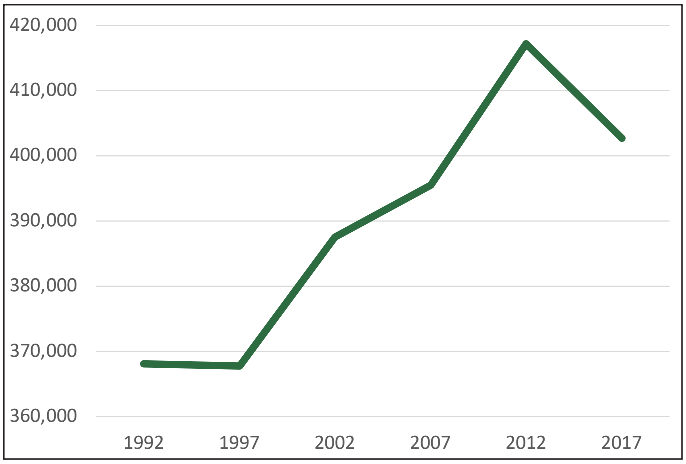
Figure 17 - Number of Farms in Clinton County from 1992 to 2017



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

The amount of land in farms has increased overall. The county farmland hit a low of 367,764 acres in 1997 and a high of 417,189 acres in 2012, according to Figure 18. Since 2012, the county has seen a decline in the amount of farmland.

Figure 18 - Land in Farms in Clinton County from 1992 to 2017



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

ii. Agricultural Statistics

Iowa is ranked second among U.S. states in total value of agricultural products sold (Census, 2017). It is ranked second in the value of livestock and third in the value of crops (Census, 2017). In 2022, Iowa had 84,900 farms and 30.5 million acres in operation with the average farm being 359 acres (State Agricultural Overview, 2022). Iowa had 234 thousand cattle and produced 5.77 billion pounds of milk (State Agricultural Overview, 2022). In 2022, Iowa yields averaged 200 bushels per acre for grain corn with a total market value of $16.8 billion (State Agricultural Overview, 2022). Soybean yields averaged 58.5 bushels per acre with a total market value of $8.39 billion (State Agricultural Overview, 2022). The average net cash farm income per farm is $86,878 (Census, 2017).

In 2017, Clinton County had 1,169 farms covering 402,733 acres for an average farm size of 345 acres (Census, 2017). The total market value of products sold was $339 million, with 38% coming from livestock sales and 62% coming from crop sales (Census, 2017). The average net cash farm income of operations was $71,048 (Census, 2017).

The 1,378 acres planned to be used by the Rock Creek Solar Project represents just 0.3% of the acres used for farming in Clinton County. 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.

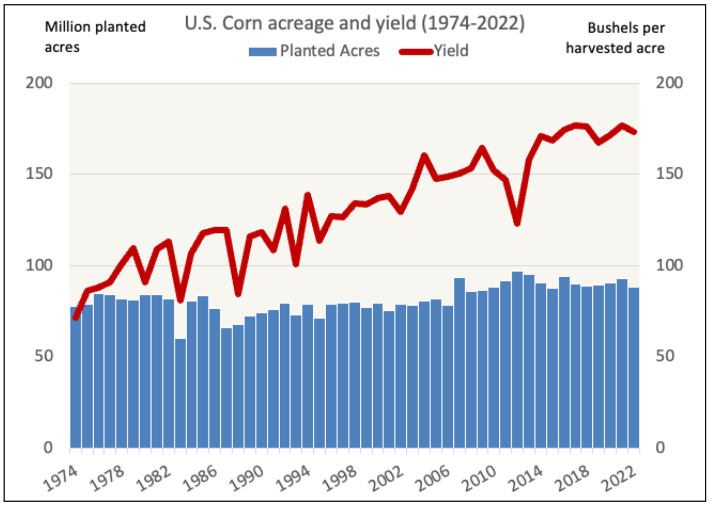
For the landowner, the key analysis will be comparing the net present value of the annual solar lease payments to expected profits from farming. The farmer will choose the solar farm lease if:

$$NPV\ (Solar\ Lease\ Payment_t) > NPV\ (P_t * Yield_t - Cost_t)$$

Where NPV is the net present value; Solar Lease $Payment_t$ is the lease 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).

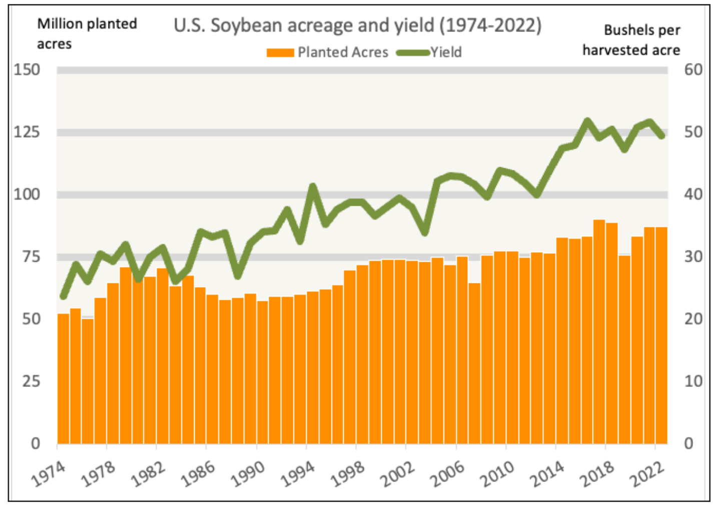
Figure 19 shows the dramatic increase in U.S. corn yields since 1974. Soybean yields have also increased though not as dramatically. Figure 20 displays the soybean yields in the U.S. since 1974.

Figure 19 – U.S. Corn Acreage and Yield



Source: USDA National Agricultural Statistics Service, Quick Stats, 2023

Figure 20 – U.S. Soybean Acreage and Yield



Source: USDA National Agricultural Statistics Service, Quick Stats, 2023

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 Clinton 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 Clinton County, Iowa

	1992	1997	2002	2007	2012	2017
Total Farm Income Per Farm	NA	$5,860	$9,546	$13,609	$31,152	$23,222
Total Farm Production Expenses (average/farm)	$82,873	$88,884	$97,410	$138,405	$245,305	$241,844
Average Farm Size (acres)	270	290	318	301	335	345
Net Cash Income per Farm[3]	$15,062	$24,091	$23,632	$50,624	$89,157	$71,048
Average Market Value of Machinery Per Farm	$63,487	$71,626	$97,349	$144,814	$228,046	$252,926

Source: United States Department of Agriculture's National Agricultural Statistics Service (NASS), Census of Agriculture, 1992-2017

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.

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

	1992	1997	2002	2007	2012	2017
Average Market Value Machinery Per Farm	$63,487	$71,626	$97,349	$144,814	$228,046	$252,926
Annual Machinery Depreciation over 30 years - Straight Line (Market Value divided by 30)	$2,116	$2,388	$3,245	$4,827	$7,602	$8,431
Mean Hourly Wage in WI for Farming (Bureau of Labor Statistics)	$7.40	$8.41	$9.10	$10.77	$12.09	$13.32
Annual Opportunity Cost of Farmer's Time (Wage times 16 weeks times 40 Hours/Week)	$4,735	$5,382	$5,824	$6,893	$7,738	$8,525

[3] 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."

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).[4] These calculations and results are shown in Table 4.

Table 4 – Profit Per Farm Calculations for Clinton County, Iowa

	1992	1997	2002	2007	2012	2017
Net Cash Income per Farm	$15,062	$24,091	$23,632	$50,624	$89,157	$71,048
Machinery Depreciation	($2,116)	($2,388)	($3,245)	($4,827)	($7,602)	($8,431)
Opportunity Cost of Farmer's Time	($4,735)	($5,382)	($5,824)	($6,893)	($7,738)	($8,525)
Profit	$8,211	$16,321	$14,563	$38,904	$73,818	$54,092
Average Farm Size (Acres)	270	290	318	301	335	345
Profit Per Acre	$30.41	$56.28	$45.80	$129.25	$220.35	$156.79
CPI	141.9	161.3	180.9	210.036	229.601	246.524
Profit Per Acre in 2017 Dollars	$52.83	$86.02	$62.41	$151.70	$236.59	$156.79

Using an unsophisticated static analysis, the farmer would be better off using his land for solar if the solar lease rental per acre exceeds the 2017 profit per acre of $156.79 which adjusts to $194.05 after accounting for inflation in Clinton 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.

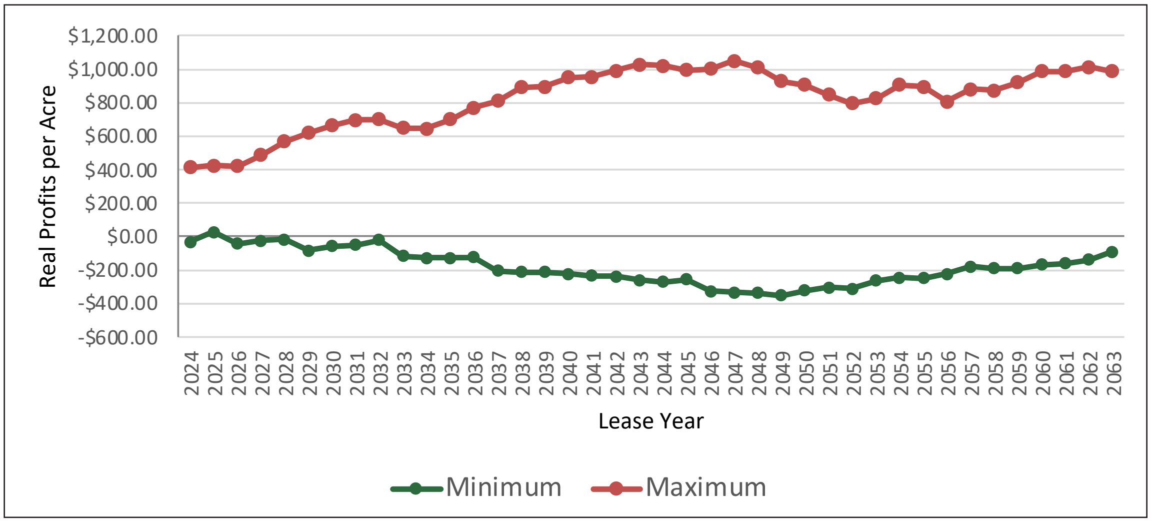
Using the Census of Agriculture data from 1992 to the present, the intercept is $42.56 with a standard error of $35.71. The time trend is $6.06 with a standard error of 2.24. This means that agriculture profits are expected to rise by $6.06. Both the intercept and the coefficient on the time trend have 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 2063, 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 a Monte Carlo simulation. We assume that the solar farm will begin operation in 2024 and operate through 2063. Using 500 different simulations, the real profit per acre never exceeds $1,061 in any single year. Overall, the maximum average annual profit over the 40 years is $835 and the maximum average annual loss is $69.

[4] 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.

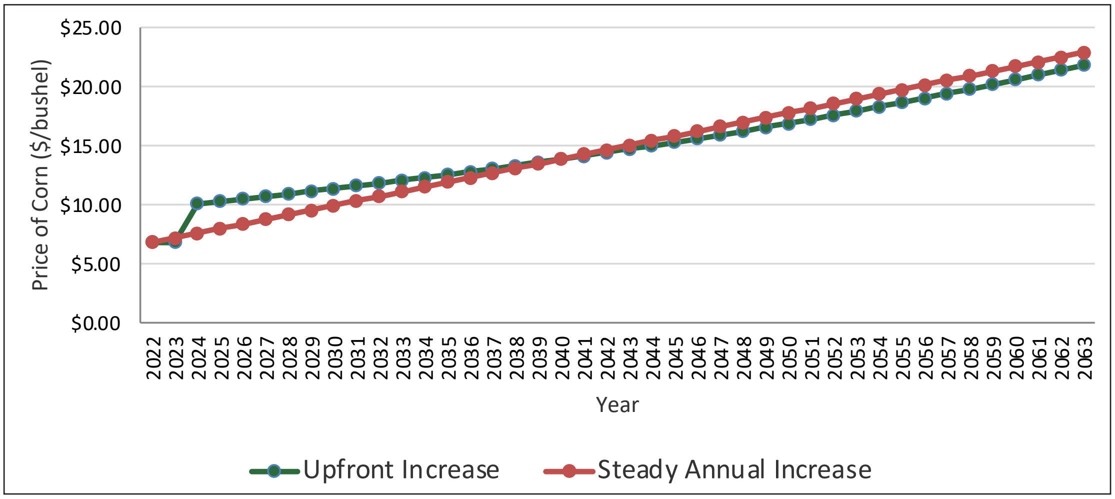
Figure 21 is a graph of the highest and lowest real profit per acre simulations. When comparing the average annual payment projected in the maximum simulation by 2063 to the solar lease per acre payment, the solar lease provides higher returns than farming in all of the 500 simulations. This means the farmer is financially better off under the solar lease in 100% of the 500 scenarios analyzed.

Figure 21 - Simulations of Real Profits Per Acre Based on Data from 1992



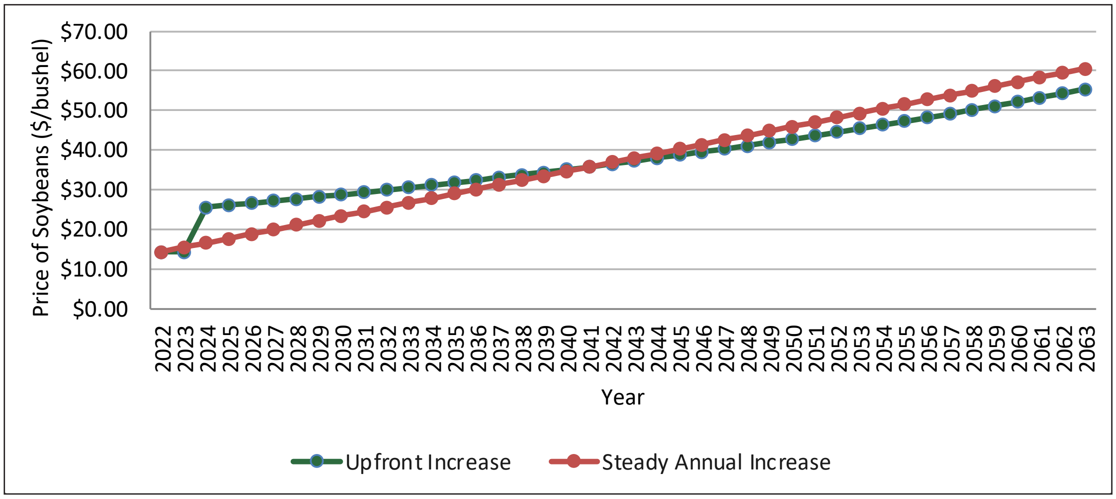
Another way to look at this problem would be to ask: How high would corn prices have to rise to make farming more profitable than the solar lease? Below we assume that the yields on the land and all other input costs stay the same. In this case, corn prices would have to rise from $6.80 per bushel in 2022 to $10.10 in 2024 and rise to $21.86 per bushel by 2063 as shown in Figure 22. Alternatively, corn prices would need to rise by $0.39 per bushel each year from 2022 to 2063 when it would reach $22.90 per bushel.

Figure 22 - Simulated Price of Corn Per Bushel to Match the Solar Lease



Now let's turn our attention to soybean prices. If we assume the yields and input costs stay the same, soybean prices would have to rise from $14.30 per bushel in 2022 to $25.56 per bushel in 2024 and rise to $55.33 by 2063 as shown in Figure 23. For a linear increase, soybean prices would need to rise by $1.13 per bushel each year from 2022 to 2063 when it would reach $60.58 per bushel.

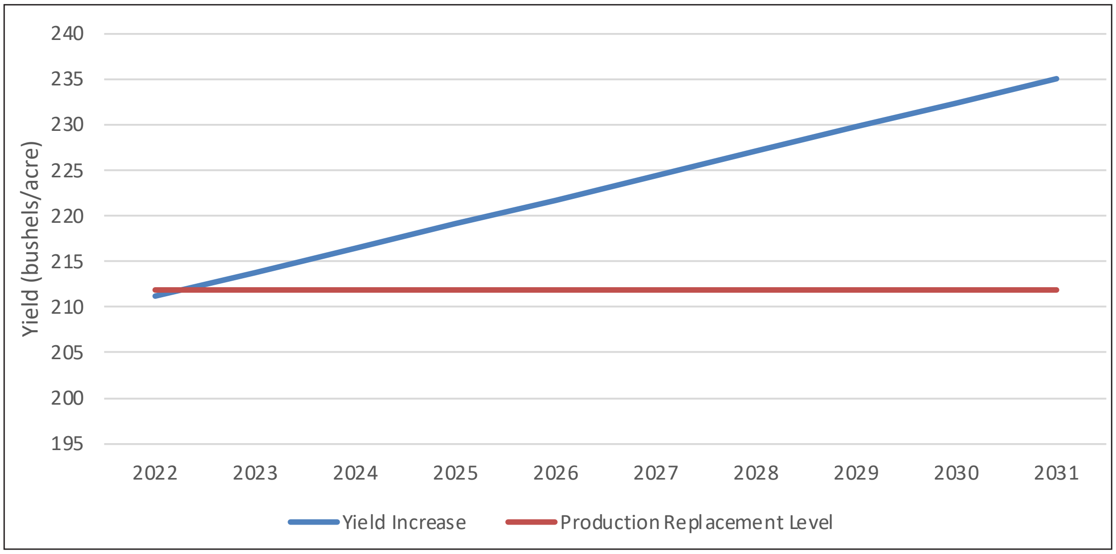
Figure 23 - Simulated Price of Soybeans Per Bushel to Match the Solar Lease



If we assume that the price of corn stays the same, the yields for corn would need to increase from 225.2 bushels per acre in 2022 to 334.5 bushels per acre in 2024 and stay at that level until 2063. The yields for soybeans would need to rise from 66 bushels per acre in 2022 to 118 bushels per acre in 2024 and stay there until 2063.

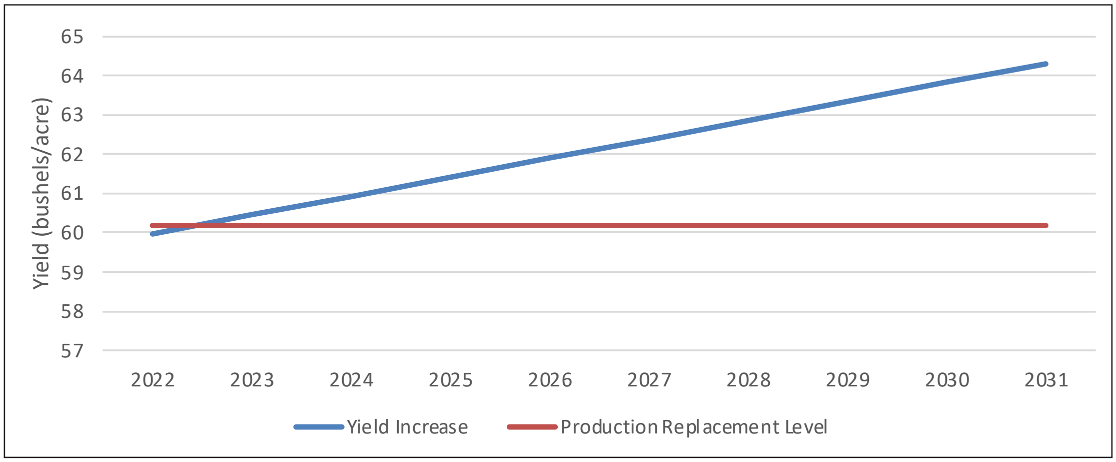
Statewide, over the past 30 years, corn yields have increased by 2.66 bushels per year. If 1,378 acres are taken out of production of the county's 402,733, the remaining 401,355 acres would be expected to produce 1,066,515 bushels more annually just by being more productive on-trend. At 178.4 bushels per year (2022 State Agriculture Overview yield), the 1,378 acres would reduce production by 310,326 bushels. Thus, the increased yields would take just 0.23 years to make up for the acreage taken out of production from the solar project.

Figure 24 - Expected Annual Increase in Production Due to Higher Yields from Corn Versus Expected Decrease in Production from Acreage



Likewise, over the past 30 years, soybean yields have increased by 0.48 bushels per year. If 1,378 acres are taken out of production of the county's 402,733, the remaining 401,355 acres would be expected to produce 193,286 bushels more annually just by being more productive on-trend. At 57 bushels per year (2022 State Agriculture

Figure 25 - Expected Annual Increase in Production Due to Higher Yields from Soybeans Versus Expected Decrease in Production from Acreage



Solar energy projects are compatible with agricultural land use by benefiting the land while solar farms are in operation. Some of these benefits include increased pollination, improved soil quality, and increased future production from soil fallowing.

Recent research has shown that pollinating insects can help soybean yields and improvement in pollinator habitats has been shown to boost soybean production (Garibaldi et. al. 2021; de O. Milfant, 2013). Walston, et al. (2018) shows the potential for agricultural benefits from pollinator habitats in the United States. Using native plant species in the land around solar projects can improve pollinator habitats which leads to increased yields, and the partial shading caused by solar panels can be quite beneficial to pollinators (Graham, et. al. 2021). Additionally, BRE (2014) shows that utility-scale solar can increase biodiversity.

Solar energy projects built on agricultural lands will allow the soil to rest for around 30 years. The U.S. Department of Energy (2022) states that “land can be reverted back to agricultural uses at the end of the operational life for solar installations. A life of a solar installation is roughly 20-25 years and can provide a recovery period, increasing the value of that land for agriculture in the future. Giving soil rest can also maintain soil quality and contribute to the biodiversity of agricultural land. Planting crops such as legumes underneath the solar installation can increase nutrient levels in the soil."

Several studies have shown that leaving the soil fallow for an extended period of time increases the productivity of the land when it is returned to crop production. Cusimano et al. (2014) found that the use of land fallowing can induce significant improvements to soil quality and crop production in California. Kozak and Pudelko (2021) studied abandoned land in Poland and showed that fallowed land could be restored to agricultural production.

VI. Economic Impact Methodology

The economic analysis of the 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. 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.

The economic impact results use two scenarios concerning the project costs for the Rock Creek Solar Project. The economic impact results were derived from detailed project cost estimates supplied by the Rock Creek Solar Project, with a low-end scenario and high-end scenario. In addition, we assumed that none of the materials and equipment, 50% of the installation labor, 100% of the permitting, and 50% of the business overhead and other costs were sourced from Iowa. For operations, we assumed that 50% of the technician labor and 25% of the materials and equipment would be sourced within Iowa. For the county model, we assumed that only 30% of the installation labor and 25% of the business overhead and other costs during construction and 20% of the operations technician labor would come from Clinton County. All the other percentages remained the same from the state modeling. The same local percentage assumptions were used in both the low and high scenarios.

Two separate JEDI models were produced to show the economic impact of the Rock Creek Solar Project. The first JEDI model used the 2022 Clinton County multipliers from IMPLAN. The second JEDI model used the 2022 IMPLAN multipliers for the State of Iowa and the same project costs. Because all new multipliers from IMPLAN and specific project cost data from the Rock Creek Solar Project are used, the JEDI model serves only to translate the project costs into IMPLAN sectors.

Tables 5 to 7 show the output from these models. Table 5 lists the total employment impact from the Rock Creek Solar Project for Clinton County and the State of Iowa. Table 6 shows the impact on total earnings and Table 7 contains the impact on total output.

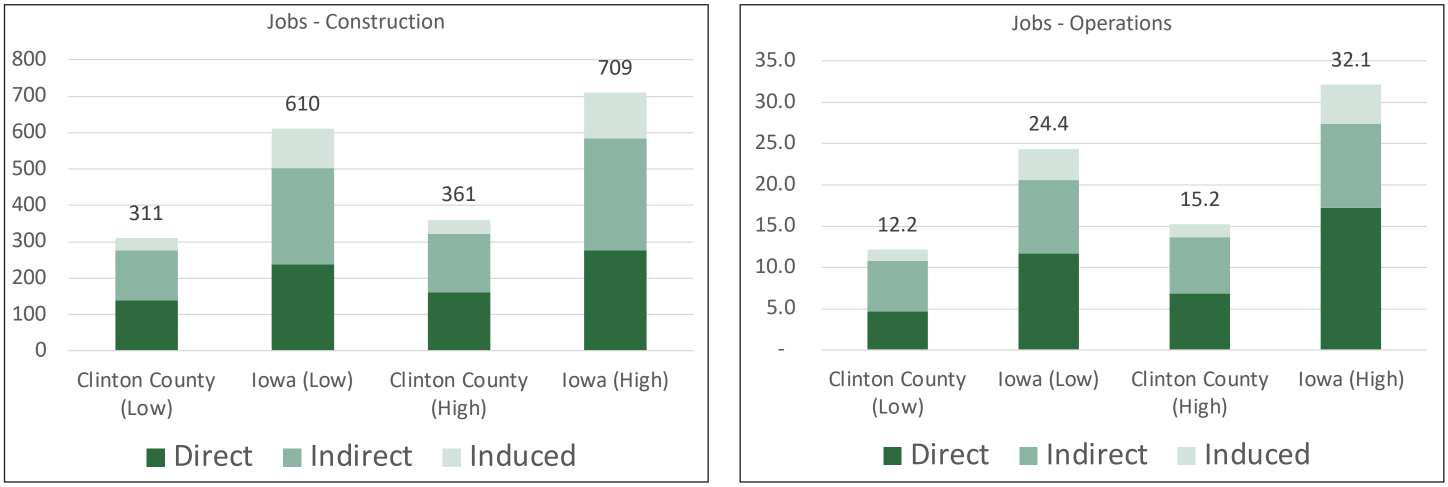
Table 5 - Total Employment Impact from the Rock Creek Solar Project

	Clinton County Jobs	State of Iowa Jobs
Construction		
Project Development and Onsite Labor Impacts (direct)	138 - 162	237 - 277
Module and Supply Chain Impacts (indirect)	140 - 160	264 - 306
Induced Impacts	33 - 39	109 - 126
New Local Jobs during Construction	311 -361	610 - 709
Operations		
Onsite Labor Impacts (direct)	4.7 - 6.9	11.7 - 17.2
Local Revenue and Supply Chain Impacts (indirect)	6.1 - 6.7	8.9 - 10.2
Induced Impacts	1.4 - 1.6	3.8 - 4.7
New Local Long-Term Jobs	12.2 - 15.2	24.4 - 32.1

The results from the JEDI model show significant employment impacts from the Rock Creek 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 138 to 162 new direct jobs during construction in Clinton County in the low scenario, though the construction of the solar center could involve closer to 276 to 324 workers working half-time for a year. Thus, due to the short-term nature of construction projects, the JEDI model often significantly understates the actual number of people 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 between 311 and 361 for Clinton County and between 610 and 709 for the State of Iowa. New local long-term jobs created from the Rock Creek Solar Project total between 12.2 and 15.2 for Clinton County and between 24.4 and 32.1 for the State of

Figure 26 – Total Employment Impact from the Rock Creek Solar Project



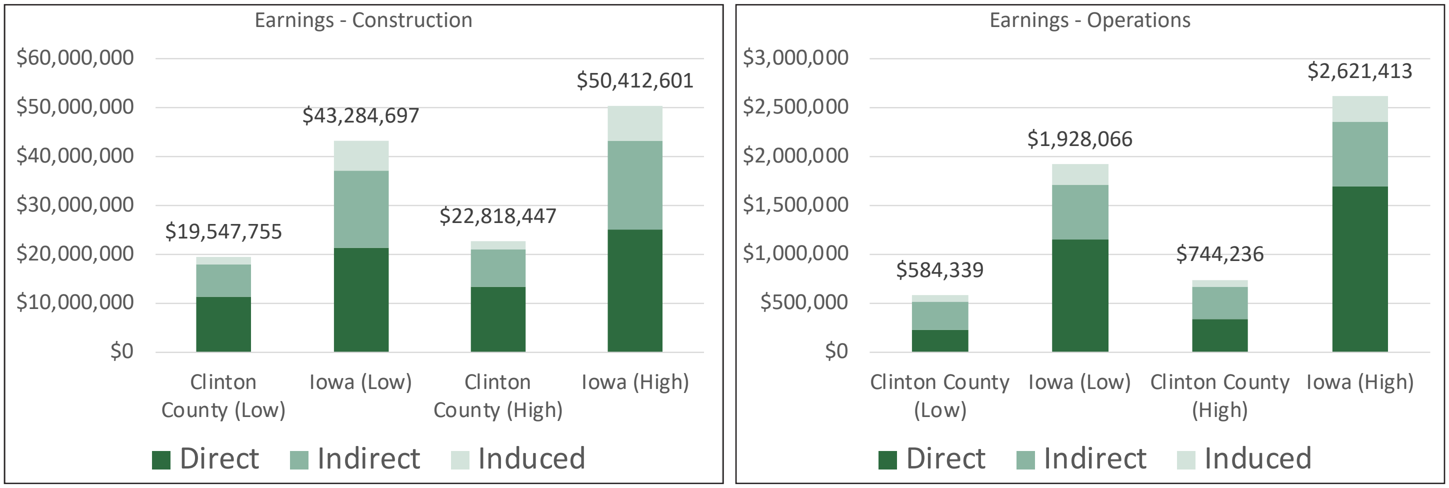
Direct jobs created during the operational phase last the life of the solar PV project, typically 20-30 years. Both direct construction jobs and operations and maintenance jobs require highly-skilled workers in the fields of construction, management, and engineering.

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 the Rock Creek Solar Project, which are categorized by construction impacts and operations impacts. The new local earnings during construction totals between $19.5 and $22.8 million for Clinton County and between $43.2 and $50.4 million for the State of Iowa. The new local long-term earnings totals between $584 and $744 thousand for Clinton County and between $1.9 and $2.6 million for the State of Iowa.

Table 6 – Total Earnings Impact from the Rock Creek Solar Project

	Clinton County	State of Iowa
Construction		
Project Development and Onsite Earnings Impacts	$11,398,187- $13,400,369	$21,453,780 - $25,169,480
Module and Supply Chain Impacts	$6,680,494 - $7,716,784	$15,706,352 - $18,150,977
Induced Impacts	$1,469,074 - $1,701,294	$6,124,565 - $7,092,144
New Local Earnings during Construction	$19,547,755 - $22,818,447	$43,284,697 - $50,412,601
Operations (Annual)		
Onsite Labor Impacts	$231,664 - $340,710	$1,155,388 - $1,699,241
Local Revenue and Supply Chain Impacts	$292,257 - $334,271	$556,465 - $656,484
Induced Impacts	$60,418 - $69,255	$216,213 - $265,688
New Local Long-Term Earnings	$584,339 - $744,236	$1,928,066 - $2,621,413

Figure 27 – Total Earnings Impact from the Rock Creek Solar Project

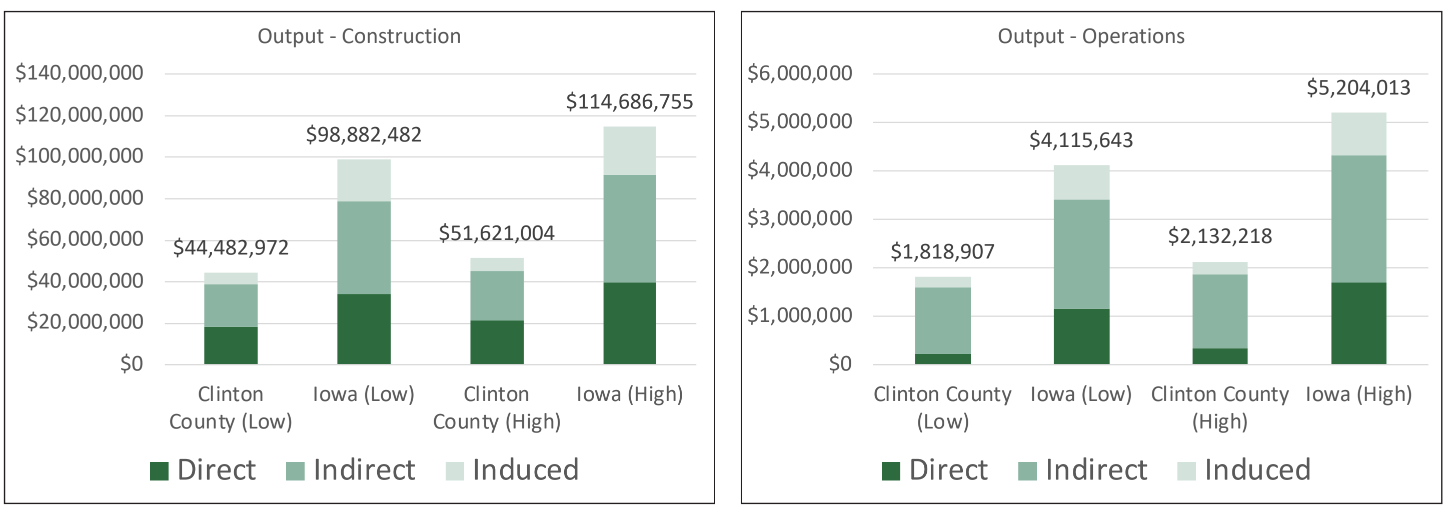


Output refers to economic activity or the value of production in the state or local economy. It is an equivalent measure to the Gross Domestic Product, which measures output on a national basis. According to Table 7, the new local output during construction totals between $44.4 and $51.6 million for Clinton County and between $98.8 and $114 million for the State of Iowa. The new local long-term output totals between $1.8 and $2.1 million for Clinton County and between $4.1 and $5.2 million for the State of Iowa.

Table 7 – Total Output Impact from the Rock Creek Solar Project

	Clinton County	State of Iowa
Construction		
Project Development and Onsite Jobs Impacts on Output	$18,474,299 - $21,542,825	$34,146,291 - $39,791,223
Module and Supply Chain Impacts	$20,568,555 - $23,778,122	$44,563,980 - $51,536,439
Induced Impacts	$5,440,118 - $6,300,057	$20,172,211 - $23,359,093
New Local Output during Construction	$44,482,972 - $51,621,004	$98,882,482 - $114,686,755
Operations (Annual)		
Onsite Labor Impacts	$231,664 - $340,710	$1,155,388 - $1,699,241
Local Revenue and Supply Chain Impacts	$1,365,108 - $1,536,649	$2,249,256 - $2,630,808
Induced Impacts	$222,135 - $254,859	$710,999 - $873,964
New Local Long-Term Output	$1,818,907 - $2,132,218	$4,115,643- $5,204,013

Figure 28 – Total Output Impact from the Rock Creek Solar Project



VIII. Tax Revenue

Solar energy projects increase the property tax base of a county, creating a new revenue source for education and other local government services, such as fire protection, parks, health and safety. The Rock Creek Solar Project would be subject to Iowa's Replacement Tax and the statewide property tax. In this section, we used the methodology set forth in the Center for Rural Affairs' Taxing Utility-Scale Solar Projects in Iowa (2021).

Tables 8 to 12 detail the tax implications of the Rock Creek Solar Project. There are several important assumptions built into the analysis in these tables.

- The analysis assumes that the production of the Project will be 505,890 MWh per year and that the Project will degrade by 0.3% every year.
- The analysis assumes that the total replacement tax revenue will be $0.0006 per kWh produced.
- The replacement tax is assumed to be distributed to the local jurisdictions according to their relative millage rates.
- The analysis assumes a statewide property tax levy of three cents per $1,000 of assessed value for the Project. The total assessed value is assumed to be $320-390 million with a 30-year straight line depreciation down to a minimum taxable value of 30% of the book value. The statewide property tax levy is paid to the state.
- The analysis assumes that the Project will be decommissioned in 40 years and will pay no more property taxes after decommissioning.
- All tax rates are assumed to stay constant at their 2023 (2024 tax year) rates.
- The analysis assumes that the Project will be placed in service on January 1st, 2026.
- The names of the taxing bodies used in this section come from the county and state tax websites.
- The comprehensiveness and accuracy of the analysis below is dependent upon the assumptions listed above and used to calculate the property tax results. The analysis is to serve as a projection of property tax benefits to the local community and is not a guarantee of property tax revenue.
- If the inputs received from NextEra Energy Energy Resources, the laws surrounding renewable energy taxation in Iowa, or the millage rates in Clinton County change in a material way after the completion of this report, this analysis may no longer accurately reflect the property taxes to be paid by the Rock Creek Solar Project.
- No comprehensive tax payment was calculated, and these calculations are only to be used to illustrate the economic impact of the Project.

Figure 29 - Percentages of Property Taxes Paid to Taxing Jurisdictions

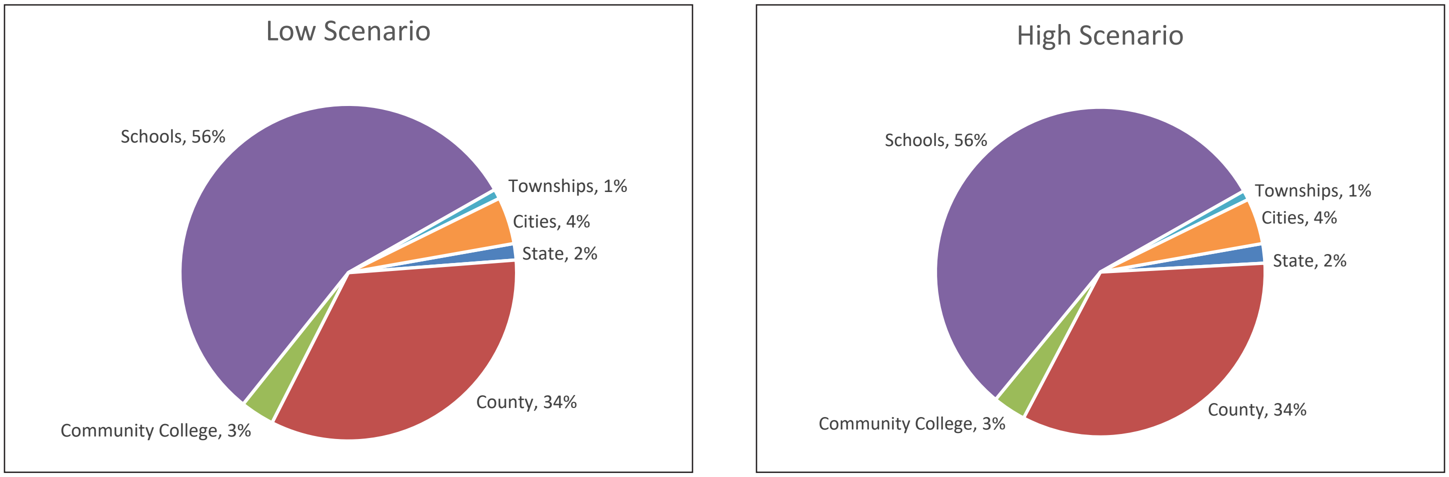


Table 8 – Total Property Taxes Paid by the Rock Creek Solar Project

Tax Year	Low Scenario	High Scenario
2026	$312,814	$314,844
2027	$311,583	$313,543
2028	$310,353	$312,243
2029	$309,122	$310,942
2030	$307,892	$309,642
2031	$306,661	$308,341
2032	$305,430	$307,040
2033	$304,200	$305,740
2034	$302,969	$304,439
2035	$301,739	$303,139
2036	$300,508	$301,838
2037	$299,277	$300,537
2038	$298,047	$299,237
2039	$296,816	$297,936
2040	$295,586	$296,636
2041	$294,355	$295,335
2042	$293,124	$294,034
2043	$291,894	$292,734
2044	$290,663	$291,433
2045	$289,433	$290,133
2046	$288,202	$288,832
2047	$287,291	$287,921
2048	$286,381	$287,011
2049	$285,470	$286,100
2050	$284,560	$285,190
2051	$283,649	$284,279
2052	$282,738	$283,368
2053	$281,828	$282,458
2054	$280,917	$281,547
2055	$280,007	$280,637
2056	$279,096	$279,726
2057	$278,185	$278,815
2058	$277,275	$277,905
2059	$276,364	$276,994
2060	$275,454	$276,084
2061	$274,543	$275,173
2062	$273,632	$274,262
2063	$272,722	$273,352
2064	$271,811	$272,441
2065	$270,901	$271,531
40 YEAR TOTAL	$11,613,490	$11,653,390
AVG ANNUAL	$290,337	$291,335

As shown in Table 8, a conservative estimate of the total property taxes paid by the Project starts out between $312 and $314 thousand and declines due to depreciation throughout the life of the Project. The expected total property taxes paid over the 40-year lifetime of the Project are between $11.62 and $11.66 million, and the average annual property taxes paid will be between $290 and $291 thousand.

Table 9 shows an estimate of the likely taxes paid to the Brucellosis and Tuberculosis Eradication Fund, General Basic Fund, Pioneer Cemetery, General Supplemental Fund, Debt Service Fund, Rural Basic Fund, Assessor, and Agriculture Extension.

According to Table 9, the total property taxes paid will be $717 for the Brucellosis and Tuberculosis Eradication Fund, over $1.5 million for the General Basic Fund, over $12.6 thousand for Pioneer Cemetery, over $1.1 million for the General Supplemental Fund, over $360 thousand for the Debt Service Fund, over $612 thousand for the Rural Basic Fund, over $142 thousand for the Assessor, and over $48.4 thousand for the Agriculture Extension over the life of the Project.

Table 10 shows an estimate of the likely taxes paid to Camanche Township Cemetery, Camanche Township Fire District, Camanche Township Reserve Levy, Camanche Township Ambulance, Eden Township Non/Owned Cemetery, Eden Township Fire District, Eden Township Reserve Levy, and Eden Township Ambulance.

According to Table 10, the total property taxes paid will be over $17.0 thousand for Camanche Township Cemetery, over $45.7 thousand for Camanche Township Fire District, over $14.4 thousand for Camanche Township Reserve Levy, over $5.1 thousand for Camanche Township Ambulance, over $2.6 thousand for Eden Township Non/Owned Cemetery, over $17.9 thousand for Eden Township Fire District, over $2.3 thousand for Eden Township Reserve Levy, and over $2.9 thousand for Eden Township Ambulance over the life of the Project.

Table 9 – Tax Revenue from the Rock Creek Solar Project for the County[5]

Tax Year	Brucellosis and Tuberculosis Eradication Fund	General Basic Fund	Pioneer Cemetery	General Supplemental Fund	Debt Service Fund	Rural Basic Fund	Assessor	Agriculture Extension
2026	$19	$42,456	$337	$30,166	$9,584	$16,266	$3,771	$1,286
2027	$19	$42,329	$336	$30,075	$9,556	$16,217	$3,760	$1,282
2028	$19	$42,201	$335	$29,985	$9,527	$16,168	$3,749	$1,278
2029	$19	$42,074	$334	$29,894	$9,498	$16,119	$3,737	$1,274
2030	$19	$41,947	$333	$29,804	$9,469	$16,071	$3,726	$1,270
2031	$19	$41,819	$332	$29,713	$9,441	$16,022	$3,715	$1,266
2032	$19	$41,692	$331	$29,623	$9,412	$15,973	$3,703	$1,262
2033	$19	$41,565	$330	$29,532	$9,383	$15,924	$3,692	$1,259
2034	$19	$41,437	$329	$29,442	$9,354	$15,876	$3,681	$1,255
2035	$19	$41,310	$328	$29,351	$9,326	$15,827	$3,669	$1,251
2036	$18	$41,182	$327	$29,261	$9,297	$15,778	$3,658	$1,247
2037	$18	$41,055	$326	$29,170	$9,268	$15,729	$3,647	$1,243
2038	$18	$40,928	$325	$29,080	$9,239	$15,680	$3,635	$1,239
2039	$18	$40,800	$324	$28,989	$9,211	$15,632	$3,624	$1,235
2040	$18	$40,673	$323	$28,899	$9,182	$15,583	$3,613	$1,232
2041	$18	$40,546	$322	$28,808	$9,153	$15,534	$3,602	$1,228
2042	$18	$40,418	$321	$28,718	$9,124	$15,485	$3,590	$1,224
2043	$18	$40,291	$320	$28,627	$9,096	$15,436	$3,579	$1,220
2044	$18	$40,164	$319	$28,537	$9,067	$15,388	$3,568	$1,216
2045	$18	$40,036	$318	$28,446	$9,038	$15,339	$3,556	$1,212
2046	$18	$39,909	$317	$28,356	$9,009	$15,290	$3,545	$1,208
2047	$18	$39,781	$316	$28,265	$8,981	$15,241	$3,534	$1,205
2048	$18	$39,654	$315	$28,175	$8,952	$15,192	$3,522	$1,201
2049	$18	$39,527	$314	$28,084	$8,923	$15,144	$3,511	$1,197
2050	$18	$39,399	$313	$27,994	$8,894	$15,095	$3,500	$1,193
2051	$18	$39,272	$312	$27,903	$8,866	$15,046	$3,488	$1,189
2052	$18	$39,145	$311	$27,813	$8,837	$14,997	$3,477	$1,185
2053	$18	$39,017	$310	$27,722	$8,808	$14,948	$3,466	$1,181
2054	$17	$38,890	$309	$27,632	$8,779	$14,900	$3,454	$1,178
2055	$17	$38,762	$307	$27,541	$8,750	$14,851	$3,443	$1,174
2056	$17	$38,635	$306	$27,451	$8,722	$14,802	$3,432	$1,170
2057	$17	$38,508	$305	$27,360	$8,693	$14,753	$3,421	$1,166
2058	$17	$38,380	$304	$27,270	$8,664	$14,704	$3,409	$1,162
2059	$17	$38,253	$303	$27,179	$8,635	$14,656	$3,398	$1,158
2060	$17	$38,126	$302	$27,089	$8,607	$14,607	$3,387	$1,154
2061	$17	$37,998	$301	$26,998	$8,578	$14,558	$3,375	$1,151
2062	$17	$37,871	$300	$26,908	$8,549	$14,509	$3,364	$1,147
2063	$17	$37,744	$299	$26,817	$8,520	$14,460	$3,353	$1,143
2064	$17	$37,616	$298	$26,727	$8,492	$14,412	$3,341	$1,139
2065	$17	$37,489	$297	$26,636	$8,463	$14,363	$3,330	$1,135
TOTAL	$717	$1,598,900	$12,684	$1,136,041	$360,946	$612,573	$142,025	$48,415
AVG ANNUAL	$18	$39,972	$317	$28,401	$9,024	$15,314	$3,551	$1,210

[5] The assumed millage rates are 0.0018 for the Brucellosis and Tuberculosis Eradication Fund, 4.01118 for the General Basic Fund, 0.03182 for Pioneer Cemetery, 2.85 for the General Supplemental Fund, 0.90551 for the Debt Service Fund, 2.43 for the Rural Basic Fund, 0.3563 for the Assessor, and 0.12146 for the Agriculture Extension.

Table 10 - Tax Revenue from the Rock Creek Solar Project for Comanche and Eden Townships[6]

	Camanche Township				Eden Township			
Tax Year	Cemetery	Fire District	Reserve Levy	Ambulance	Non/Owned Cemetery	Fire District	Reserve Levy	Ambulance
2026	$454	$1,216	$383	$138	$71	$477	$62	$79
2027	$452	$1,212	$381	$137	$71	$476	$62	$79
2028	$451	$1,208	$380	$137	$71	$474	$61	$79
2029	$450	$1,205	$379	$137	$70	$473	$61	$79
2030	$448	$1,201	$378	$136	$70	$471	$61	$79
2031	$447	$1,197	$377	$136	$70	$470	$61	$78
2032	$445	$1,194	$376	$135	$70	$468	$61	$78
2033	$444	$1,190	$375	$135	$70	$467	$60	$78
2034	$443	$1,186	$373	$135	$69	$466	$60	$78
2035	$441	$1,183	$372	$134	$69	$464	$60	$77
2036	$440	$1,179	$371	$134	$69	$463	$60	$77
2037	$439	$1,175	$370	$133	$69	$461	$60	$77
2038	$437	$1,172	$369	$133	$68	$460	$60	$77
2039	$436	$1,168	$368	$132	$68	$458	$59	$76
2040	$435	$1,164	$367	$132	$68	$457	$59	$76
2041	$433	$1,161	$365	$132	$68	$456	$59	$76
2042	$432	$1,157	$364	$131	$68	$454	$59	$76
2043	$431	$1,154	$363	$131	$67	$453	$59	$75
2044	$429	$1,150	$362	$130	$67	$451	$58	$75
2045	$428	$1,146	$361	$130	$67	$450	$58	$75
2046	$426	$1,143	$360	$130	$67	$448	$58	$75
2047	$425	$1,139	$359	$129	$67	$447	$58	$74
2048	$424	$1,135	$357	$129	$66	$446	$58	$74
2049	$422	$1,132	$356	$128	$66	$444	$57	$74
2050	$421	$1,128	$355	$128	$66	$443	$57	$74
2051	$420	$1,124	$354	$128	$66	$441	$57	$74
2052	$418	$1,121	$353	$127	$65	$440	$57	$73
2053	$417	$1,117	$352	$127	$65	$438	$57	$73
2054	$416	$1,113	$351	$126	$65	$437	$57	$73
2055	$414	$1,110	$349	$126	$65	$436	$56	$73
2056	$413	$1,106	$348	$125	$65	$434	$56	$72
2057	$411	$1,102	$347	$125	$64	$433	$56	$72
2058	$410	$1,099	$346	$125	$64	$431	$56	$72
2059	$409	$1,095	$345	$124	$64	$430	$56	$72
2060	$407	$1,092	$344	$124	$64	$428	$55	$71
2061	$406	$1,088	$342	$123	$64	$427	$55	$71
2062	$405	$1,084	$341	$123	$63	$425	$55	$71
2063	$403	$1,081	$340	$123	$63	$424	$55	$71
2064	$402	$1,077	$339	$122	$63	$423	$55	$70
2065	$401	$1,073	$338	$122	$63	$421	$55	$70
TOTAL	$17,084	$45,777	$14,410	$5,192	$2,674	$17,964	$2,325	$2,994
AVG ANNUAL	$427	$1,144	$360	$130	$67	$449	$58	$75

[6] The assumed millage rates are 0.10039 for Camanche Township Cemetery, 0.269 for Camanche Township Fire District, 0.08468 for Camanche Township Reserve Levy, 0.03051 for Camanche Township Ambulance, 0.03265 for Eden Township Non/Owned Cemetery, 0.21931 for Eden Township Fire District, 0.2839 for Eden Township Reserve Levy, and 0.03655 for Eden Township Ambulance.

Table 11 – Property Tax Revenue from Rock Creek Solar Project for the State, City, and College Taxing Bodies[7]

Tax Year	State General Fund		City of Clinton Agriculture Land	City of Camanche Agriculture Land	City of Camanche General Fund	City of Camanche Debt Services	City of Camanche Employee Benefits	Eastern Iowa Community College
	Low Scenario	High Scenario						
2026	$9,280	$11,310	$3,578	$7,413	$1,876	$582	$426	$10,038
2027	$8,960	$10,920	$3,567	$7,391	$1,870	$580	$424	$10,008
2028	$8,640	$10,530	$3,556	$7,369	$1,865	$578	$423	$9,978
2029	$8,320	$10,140	$3,546	$7,347	$1,859	$577	$422	$9,948
2030	$8,000	$9,750	$3,535	$7,324	$1,853	$575	$421	$9,918
2031	$7,680	$9,360	$3,524	$7,302	$1,848	$573	$419	$9,888
2032	$7,360	$8,970	$3,513	$7,280	$1,842	$571	$418	$9,858
2033	$7,040	$8,580	$3,503	$7,258	$1,836	$570	$417	$9,827
2034	$6,720	$8,190	$3,492	$7,235	$1,831	$568	$415	$9,797
2035	$6,400	$7,800	$3,481	$7,213	$1,825	$566	$414	$9,767
2036	$6,080	$7,410	$3,470	$7,191	$1,820	$564	$413	$9,737
2037	$5,760	$7,020	$3,460	$7,169	$1,814	$563	$412	$9,707
2038	$5,440	$6,630	$3,449	$7,146	$1,808	$561	$410	$9,677
2039	$5,120	$6,240	$3,438	$7,124	$1,803	$559	$409	$9,647
2040	$4,800	$5,850	$3,427	$7,102	$1,797	$557	$408	$9,617
2041	$4,480	$5,460	$3,417	$7,080	$1,791	$556	$407	$9,587
2042	$4,160	$5,070	$3,406	$7,057	$1,786	$554	$405	$9,556
2043	$3,840	$4,680	$3,395	$7,035	$1,780	$552	$404	$9,526
2044	$3,520	$4,290	$3,385	$7,013	$1,774	$550	$403	$9,496
2045	$3,200	$3,900	$3,374	$6,991	$1,769	$549	$401	$9,466
2046	$2,880	$3,510	$3,363	$6,969	$1,763	$547	$400	$9,436
2047	$2,880	$3,510	$3,352	$6,946	$1,758	$545	$399	$9,406
2048	$2,880	$3,510	$3,342	$6,924	$1,752	$543	$398	$9,376
2049	$2,880	$3,510	$3,331	$6,902	$1,746	$542	$396	$9,346
2050	$2,880	$3,510	$3,320	$6,880	$1,741	$540	$395	$9,316
2051	$2,880	$3,510	$3,309	$6,857	$1,735	$538	$394	$9,285
2052	$2,880	$3,510	$3,299	$6,835	$1,729	$536	$392	$9,255
2053	$2,880	$3,510	$3,288	$6,813	$1,724	$535	$391	$9,225
2054	$2,880	$3,510	$3,277	$6,791	$1,718	$533	$390	$9,195
2055	$2,880	$3,510	$3,266	$6,768	$1,713	$531	$389	$9,165
2056	$2,880	$3,510	$3,256	$6,746	$1,707	$529	$387	$9,135
2057	$2,880	$3,510	$3,245	$6,724	$1,701	$528	$386	$9,105
2058	$2,880	$3,510	$3,234	$6,702	$1,696	$526	$385	$9,075
2059	$2,880	$3,510	$3,224	$6,679	$1,690	$524	$384	$9,045
2060	$2,880	$3,510	$3,213	$6,657	$1,684	$522	$382	$9,014
2061	$2,880	$3,510	$3,202	$6,635	$1,679	$521	$381	$8,984
2062	$2,880	$3,510	$3,191	$6,613	$1,673	$519	$380	$8,954
2063	$2,880	$3,510	$3,181	$6,590	$1,668	$517	$378	$8,924
2064	$2,880	$3,510	$3,170	$6,568	$1,662	$516	$377	$8,894
2065	$2,880	$3,510	$3,159	$6,546	$1,656	$514	$376	$8,864
TOTAL	$182,400	$222,300	$134,736	$279,186	$70,642	$21,912	$16,031	$378,042
AVG ANNUAL	$4,560	$5,558	$3,368	$6,980	$1,766	$548	$401	$9,451

[7] The assumed millage rates are 0.9484 for Eastern Iowa Community College, 3.00375 for City of Clinton Agriculture Land, 3.00375 for City of Camanche Agriculture Land, 8.1 for City of Camanche General Fund, 2.51247 for City of Camanche Debt Services, 1.83813 for City of Camanche Employee Benefits, and 0.03 for the State's General Fund.

Table 12 - Tax Revenue from Rock Creek Solar Project for the School Districts[8]

Tax Year	Central DeWitt Community School District	Camanche Community School District
2026	$21,203	$151,655
2027	$21,139	$151,200
2028	$21,076	$150,745
2029	$21,012	$150,290
2030	$20,948	$149,835
2031	$20,885	$149,380
2032	$20,821	$148,925
2033	$20,758	$148,470
2034	$20,694	$148,015
2035	$20,630	$147,560
2036	$20,567	$147,105
2037	$20,503	$146,650
2038	$20,440	$146,195
2039	$20,376	$145,740
2040	$20,312	$145,285
2041	$20,249	$144,830
2042	$20,185	$144,375
2043	$20,122	$143,920
2044	$20,058	$143,465
2045	$19,994	$143,010
2046	$19,931	$142,555
2047	$19,867	$142,101
2048	$19,803	$141,646
2049	$19,740	$141,191
2050	$19,676	$140,736
2051	$19,613	$140,281
2052	$19,549	$139,826
2053	$19,485	$139,371
2054	$19,422	$138,916
2055	$19,358	$138,461
2056	$19,295	$138,006
2057	$19,231	$137,551
2058	$19,167	$137,096
2059	$19,104	$136,641
2060	$19,040	$136,186
2061	$18,977	$135,731
2062	$18,913	$135,276
2063	$18,849	$134,821
2064	$18,786	$134,366
2065	$18,722	$133,911
TOTAL	$798,500	$5,711,319
AVG ANNUAL	$19,963	$142,783

[6] The assumed millage rates are 13.52311 for Central DeWitt Community School District and 16.81958 for Camanche Community School District.

Table 11 shows an estimate of the likely taxes paid to the State's General Fund, City of Clinton Agriculture Land, City of Camanche Agriculture Land, City of Camanche General Fund, City of Camanche Debt Services, City of Camanche Employee Benefits, and Eastern Iowa Community College.

According to Table 11, the total property taxes paid is projected to be between $182 and $222 thousand for the State's General Fund over the life of the Project, over $134 thousand for City of Clinton Agriculture Land, over $279 thousand for City of Camanche Agriculture Land, over $70.6 thousand for City of Camanche General Fund, over $21.9 thousand for City of Camanche Debt Services, over $16.0 thousand for City of Camanche Employee Benefits, and over $378 thousand for Eastern Iowa Community College.

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

Although the exact amount of the reduction in state aid to the school districts is uncertain, local project tax revenue is superior to relying on state aid for the following reasons: (1) the solar project can't relocate – it is a permanent structure that will be within the school district's footprint for the life of the Project; (2) the school district can raise the tax rate and increase its revenues as needed; (3) the school district does not have to deal with the year-to-year uncertainty of state aid amounts; (4) the school district does not have to wait for months (or even into the next Fiscal Year!) for payment; (5) the Project does not increase the overall cost of education in the way that a new residential development would.

Table 12 shows the direct property tax revenue coming from the Project to Central DeWitt Community School District and Camanche Community School District. This tax revenue uses the assumptions outlined earlier to calculate the other tax revenue and assumes that 14.8% of the project area is in Central DeWitt Community School District and 85.2% is in Camanche Community School District. Over the 40-year life of the Project, the school districts are expected to receive over $6.5 million in tax revenue.

X. Glossary

Bb

Battery Energy Storage Systems (BESS)

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

Cc

Consumer Price Index (CPI)

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

Dd

Direct impacts

During the construction period: the changes that occur in the onsite construction industries in which the direct final demand change is made.
During operating years: the final demand changes that occur in the onsite spending for the solar operations and maintenance workers.

Ee

Equalized Assessed Value (EAV)

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

Ff

Farming profit

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

Full-time equivalent (FTE)

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

Hh

HV line extension

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

Ii

IMPLAN (IMpact analysis for PLANning)

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

Indirect impacts

Impacts that occur in industries that make up the supply chain for that industry.
During the construction period: the changes in inter- industry purchases resulting from the direct final demand changes, including construction spending on materials and wind farm equipment and other purchases of good and offsite services.
During operating years: the changes in inter-industry purchases resulting from the direct final demand changes.

Induced impacts

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

Inflation

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

Mm

Median Household Income (MHI)

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

Millage rate

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

Multiplier

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

MW

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

MWac (megawatt alternating current)

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

MWdc (megawatt direct current)

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

Nn

Net economic impact

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

Net Present Value (NPV)

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

National Renewable Energy Laboratory's (NREL) Jobs and Economic Development Impacts (JEDI) Model

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

Oo

Output

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

Pp

PV (photovoltaic) system

Solar modules, each comprising a number of solar cells, which generate electrical power.

Rr

Real Gross Domestic Product (GDP)

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

Real-options analysis

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

Ss

Stochastic

To have some randomness.

Tt

Tax rate

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

Total economic output

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

Uu

Utility-scale solar

Solar powered-electric generation facilities intended for wholesale distribution typically over 5MW in capacity.

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XII. Curriculum Vitae (Abbreviated)

David G. Loomis
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Education

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

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

Experience

2011-present Strategic Economic Research, LLC
President

- Performed economic impact analyses on policy initiatives and energy projects such as wind energy, solar energy, natural gas plants and transmission lines at the county and state level
- Provided expert testimony before state legislative bodies, state public utility commissions, and county boards
- Wrote telecommunications policy impact report comparing Illinois to other Midwestern states

1996-2023 Illinois State University, Normal, IL
Professor Emeritus – Department of Economics (2023 - present)
Full Professor – Department of Economics (2010-2023)
Associate Professor - Department of Economics (2002-2009)
Assistant Professor - Department of Economics (1996-2002)

- Taught Regulatory Economics, Telecommunications Economics and Public Policy, Industrial Organization and Pricing, Individual and Social Choice, Economics of Energy and Public Policy and a Graduate Seminar Course in Electricity, Natural Gas and Telecommunications Issues
- Supervised as many as 5 graduate students in research projects each semester
- Served on numerous departmental committees

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

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

<u>**2006-2018**</u> 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

<u>**2007-2018**</u> Center for Renewable Energy, Normal, IL
Director

- Created founding document approved by the Illinois State University Board of Trustees and Illinois Board of Higher Education
- Secured over $150,000 in funding from private companies
- Hired and supervised 4 professional staff members and supervised 3 faculty members as Associate Directors
- Reviewed renewable energy manufacturing grant applications for Illinois Department of Commerce and Economic Opportunity for a $30 million program
- Created technical "Due Diligence" documents for the Illinois Finance Authority loan program for wind farm projects in Illinois

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

Bryan A. Loomis
Strategic Economic Research, LLC
Vice President

Education

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

Experience

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

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

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

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

Christopher Thankan
Strategic Economic Research, LLC
Director of Economic Analysis

Education

Bachelor of Science in Sustainable & Renewable Energy (B.S.), 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

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