CRAB RUN
SOLAR PROJECT

Tab 10
Economic Impact

TAB 10 – ECONOMIC IMPACT

Requirement: ***KRS 278.706(2)(j) An analysis of the proposed facility's economic impact on the affected region and the state.***

An Economic and Fiscal Impact of the Crab Run Solar Project was conducted by Joshua Pinkston, Ph.D., Consulting Economist from the University of Louisville and is provided in Attachment H. It concludes that construction and operation of the Project will have a positive economic impact statewide and on Marion County through job creation and resulting induced impacts, supply chain impacts, lease payments to private landowners, and potential for payment-in-lieu-of-taxes (PILOT) payments to local taxing jurisdictions. The Project will not impose significant additional burdens on local services and thus will not increase costs to the communities in the region.

Attachment:

- Attachment H: Estimated Economic Impact (21 pages)

CRAB RUN
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Attachment H
Estimated Economic Impact

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December 9, 2025

TO: Ellen Mullins
Principal Technical Consultant
ERM
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FROM: Joshua Pinkston

RE: Economic and fiscal impact of the Crab Run Solar Project

ERM has contracted this economic impact study on behalf of Crab Run Solar Project, LLC as part of its Application to the Kentucky Public Service Commission's Siting Board to acquire a Construction Certificate for the proposed solar energy project. The Crab Run Solar Project will be built on 412 acres of leased private land and have a nominal capacity of approximately 45 MW. [redacted] This report provides estimates of the new local economic and fiscal activity expected from the Crab Run Solar Project.

There will be two primary impacts from the project. First, there will be an increase in construction and related jobs as the project is built over approximately eight months. Combining the developer's estimated construction jobs and timeframe, I estimate that there will be a total of 176 new jobs in the county that year, with new labor income of almost $7.6 million.

The ongoing annual economic impacts of the solar farm's operation include the positive effects of operational and maintenance jobs, plus the effects of the new lease payments to the owners of the land. In Appendix 2, I compare these positive effects to the effects of lost agricultural activity. My most conservative estimates find that Marion County will gain more than 3 new jobs from the operational phase of the project with a combined increase in labor income of at least $396,159 per year. Over a period of three decades and including the impacts of construction, I estimate a net increase of roughly 243 job-years and nearly $19.5 million in new labor income.

Tax revenue for the county will also increase because of the project. I estimate that the new labor income will translate to $146,423 in occupational tax revenue over three decades, with $66,953 coming from construction in the first year. The exact increase in property tax revenue will depend on the terms of a potential Industrial Revenue Bond and Payment in Lieu of Taxes agreement; however, Marion County's revenue from the parcels in question can be expected to increase many times over under any agreement.

Location and Regional Economy

The project site is in Marion County, which is in central Kentucky. The site is located between Loretto and Lebanon, just off KY 49. The approximate location is indicated by the red star in Figure 1.

Figure 1

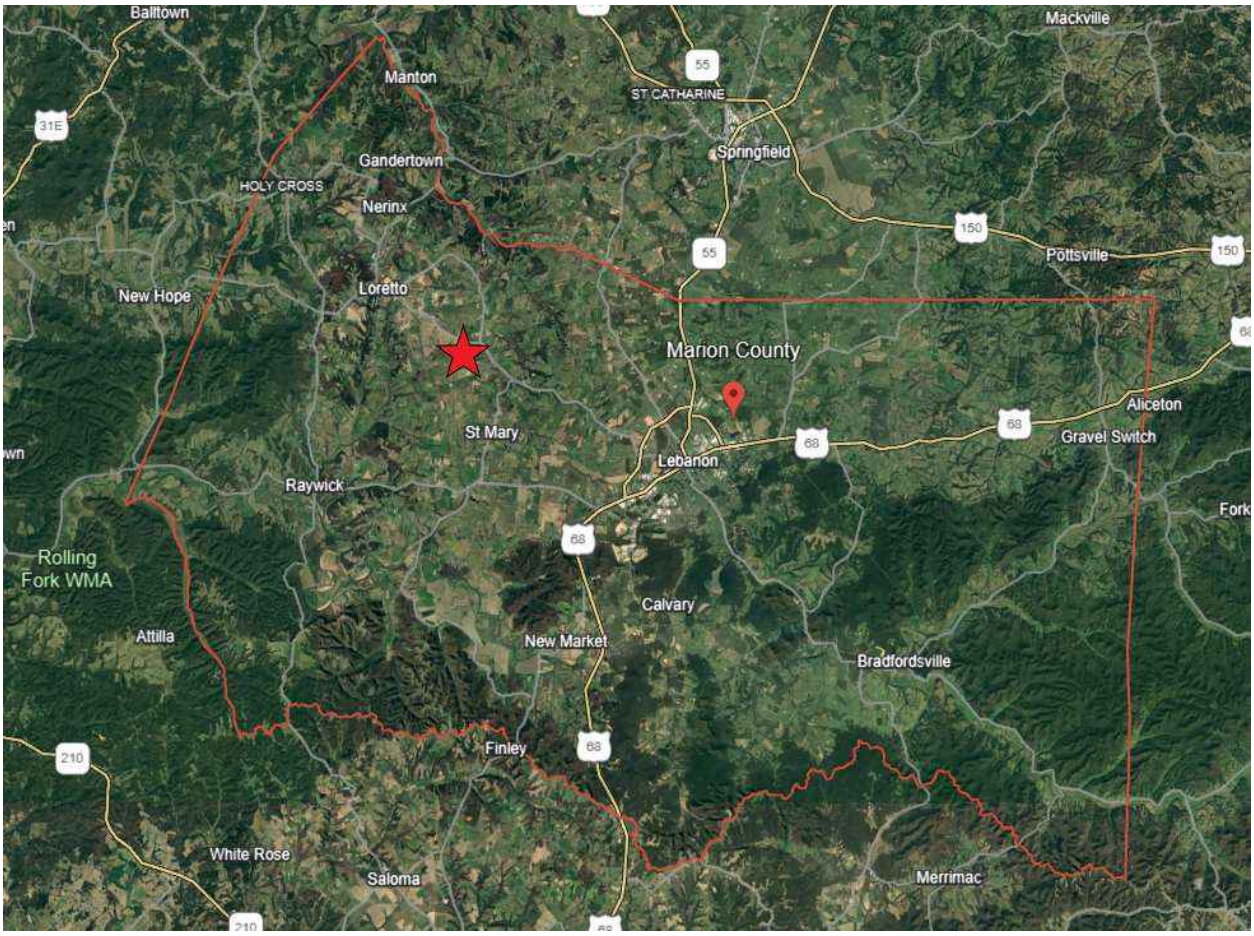


Figure 2 is a site map provided by the developer. The project will be inside the boundaries indicated by red lines. The aerial image shows primarily agricultural land with small

amounts of developed or wooded acreage. The developer estimates that the land is currently 74% pasture or hay and 23% cultivated crops. Counting both pasture and cropland, roughly 399 acres of potential agricultural activity is expected to be displaced.

Figure 2

The U.S. Census Bureau's American Community Survey (ACS) provides a summary of Marion County's demographic and economic characteristics. Appendix 1 provides more detail, as well as a comparison to the State of Kentucky, using the most recent (2023) release of the ACS. Marion County is similar to the state in many ways, but stands out in a few dimensions:

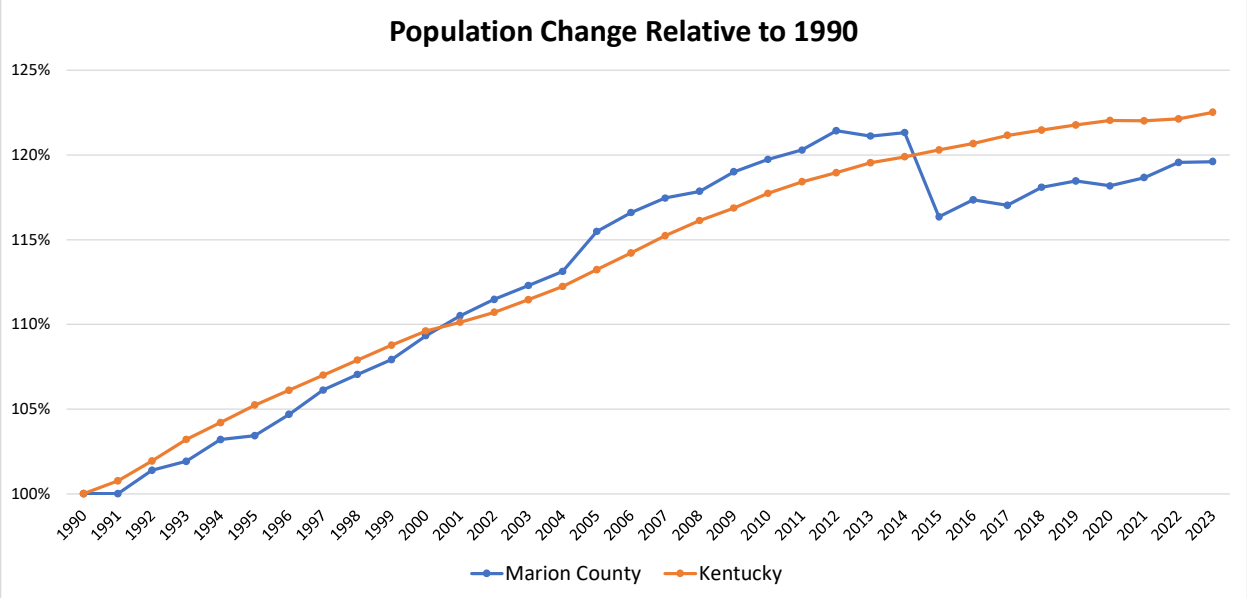
- Marion County is poorer than the state as a whole. Median household income is $55,404 in Marion County, compared to $62,417 in the state; and a higher percentage of Marion County residents live in poverty (19.5% vs 16.1%). That said, statewide income measures are pulled upward by richer, more populous counties in metropolitan areas. Marion County is quite typical of Kentucky counties in terms of median household income, as it ranks 60th out of 120 Kentucky counties.
- Educational attainment is lower in Marion County, especially when we look at college degrees. Only 12.7% of Marion County residents have a bachelor's degree,

which is less than half the percentage of state residents. Only 20 counties in Kentucky have a lower rate of college attainment.

- Marion County's labor force participation rate and employment are also lower than the state's (55.3% vs 59.6% and 52.3% vs 56.4% of residents 16 and older); however, ranking counties by these measures shows that Marion County has better labor force statistics than most Kentucky counties. Again, the state-level numbers are pulled upwards by larger counties in more metropolitan areas.
- The manufacturing sector accounts for a much higher percentage of employment in Marion County (33.4%) than in the state (14.3%). Marion County ranks second among Kentucky counties in this measure. As a result, production, transportation and material moving occupations are also higher in the county than the state. This strong manufacturing base may also explain why Marion County's employment and household income numbers are better than one might expect given its low levels of educational attainment.

Marion County's population was estimated to be 19,680 in 2023. As shown in Figure 3, the county's population growth has largely followed the state's growth since 1990. The exception was a sharp decrease between 2013 and 2014. This drop coincides with the closing of the Marion Adjustment Center, which resulted in the relocation of roughly 800 inmates.

Figure 3



Marion County has long been more reliant on transfer payments—including Social Security, Medicare, Medicaid—than Kentucky as a whole (Figure 4), as one would expect given the economic differences noted above. The difference, however, has been small (between 3 and 6 percentage points) and relatively consistent over time.

Figure 4

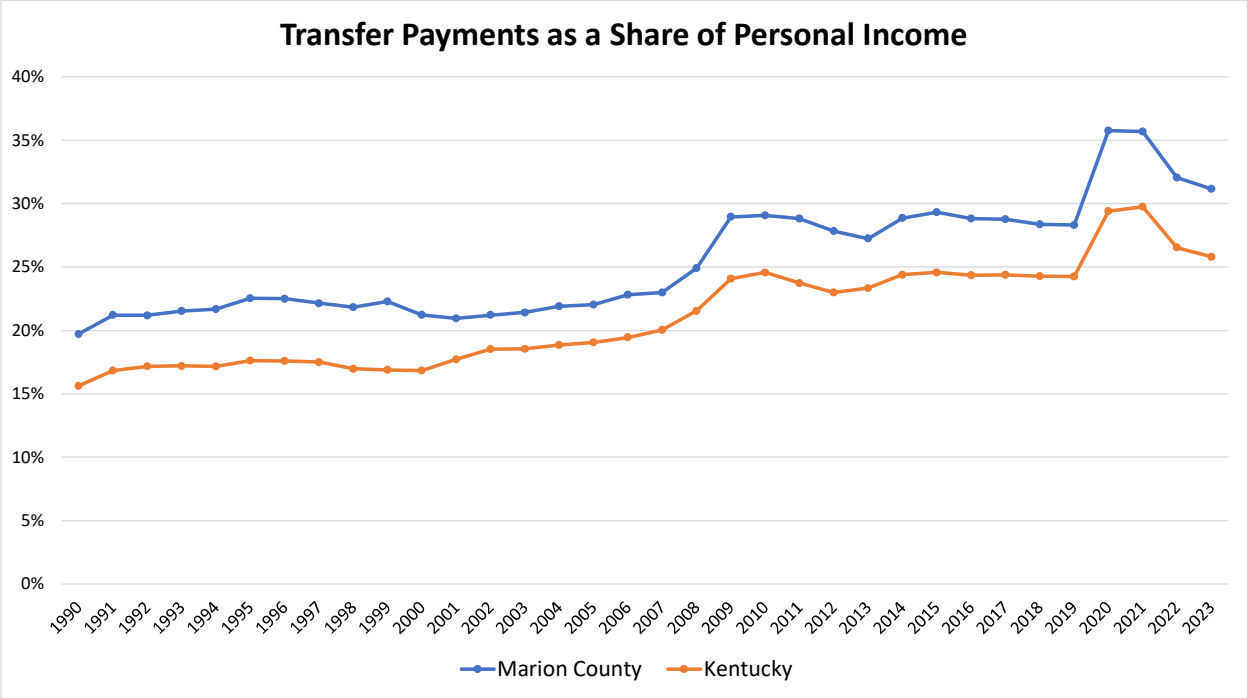
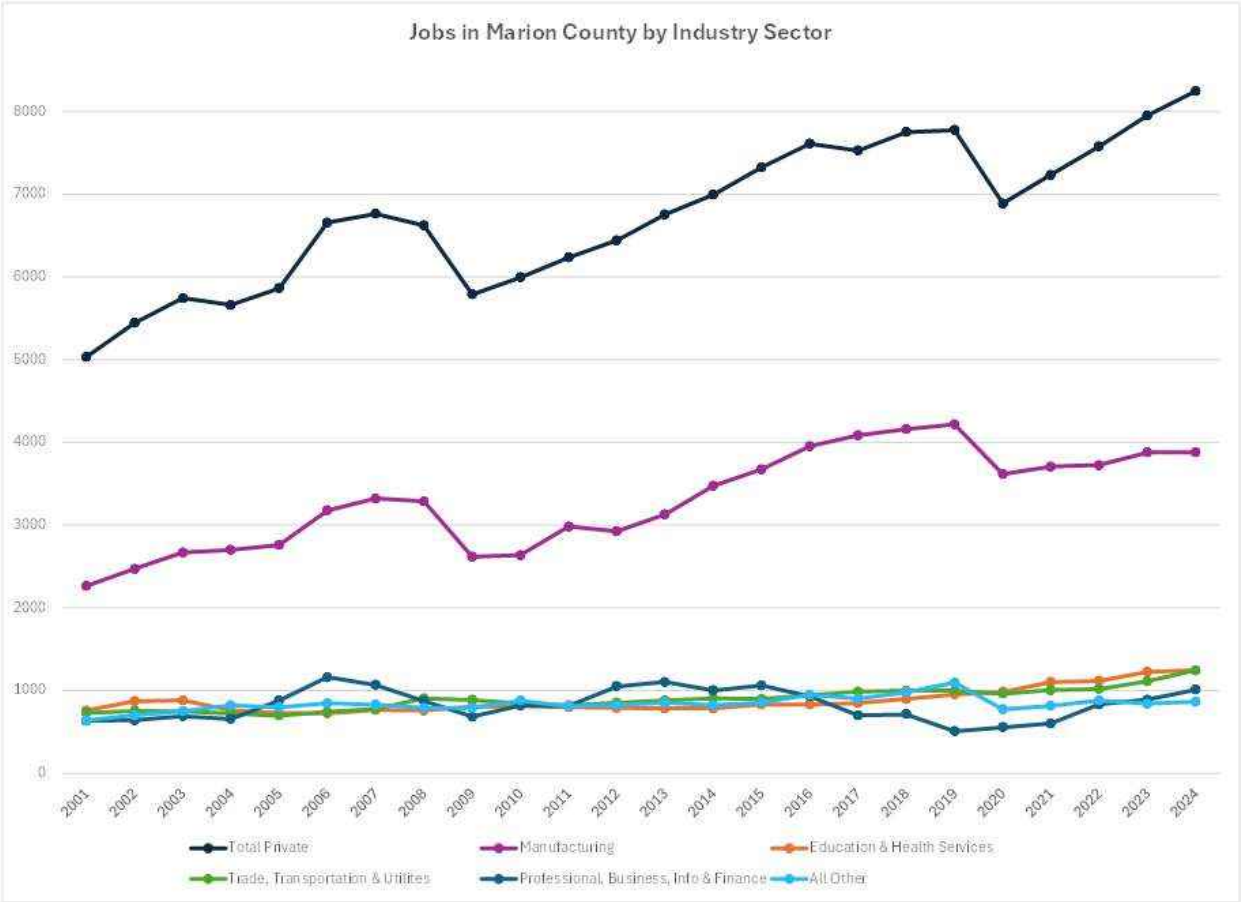


Figure 5 shows the number of jobs in Marion County broken into broad industry categories from 2001 to 2024[1]. The figure shows reasonably steady job growth during this time and further emphasizes the longstanding importance of the manufacturing sector in Marion County. In 2024, the manufacturing sector accounted for 47% of jobs in Marion County. No other sector accounted for much more than 15% of jobs in the county.

[1] These data come from the Quarterly Census of Employment and Wages (QCEW). See https://www.bls.gov/cew/data.htm for more information. The QCEW counts number of jobs at establishments located in Marion County. The employment numbers in Figure 4 are estimated numbers of employed county residents, some of whom may have more than one job or work outside of the county.

Figure 5



Finally, it's important to acknowledge that some workers employed in Marion County live in other counties, and some Marion County residents are employed in other counties. Table 1 shows that 64.2% of workers in Marion County live in the county, with residents of Taylor and Washington counties having the next highest shares (9.8% and 7.3% respectively). Looking at where Marion County residents work (Table 2), we see that commuting out of the county is less common than commuting into it. Nearly three quarters of employed Marion County residents work in the county. Most residents who do commute out of the county commute to Nelson or Washington County.

Table 1		
County of Residence for Workers Employed in Marion County		
Marion County, KY	5,318	64.2%
Taylor County, KY	815	9.8%
Washington County, KY	605	7.3%
Nelson County, KY	318	3.8%
Boyle County, KY	269	3.2%
Green County, KY	146	1.8%
Casey County, KY	136	1.6%
Jefferson County, KY	121	1.5%
Larue County, KY	109	1.3%
Adair County, KY	89	1.1%
Lincoln County, KY	84	1.0%
All Other	273	3.3%
Total	8,283	100.0%

Source: US Census Bureau, American Community Survey, Residence County to Workplace County Commuting Flows, 5-Year ACS, 2016-2020

Table 2		
County of Employment for Residents of Marion County		
Marion County, KY	5,318	74.7%
Nelson County,KY	573	8.0%
Washington County, KY	376	5.3%
Taylor County, KY	292	4.1%
Boyle County, KY	160	2.2%
Jefferson County, KY	123	1.7%
Shelby County, TN	71	1.0%
Bullitt County, KY	67	0.9%
All Other	141	2.0%
Total	7,121	100.0%

Source: US Census Bureau, American Community Survey, Residence County to Workplace County Commuting Flows, 5-Year ACS, 2016-2020

Modeling the Economic Impacts

I model the regional economic impacts of the project using a customized input-output model of Marion County constructed in IMPLAN[2]. I have purchased annual economic data for all 120 Kentucky counties and use these as needed to construct regional models of counties, groups of counties, or the state. The model has detailed information about the linkages among over 500 potential industries in each regional economy, as well as the relationship between household spending and demand for local goods and services spurred by increases in employee compensation or other income.

When there is new industrial activity in a region, there will obviously be a *direct effect* of expenditures, including wages, on the local economy. The strength of the model is that it can also predict how much of the supply chain is likely to be met by local businesses and how much the new wages will lead to additional sales (and hiring) by local businesses. The effects due to local businesses being part of the supply chain are known as *indirect effects*, while the increase in local consumer spending due to increased labor income is an *induced effect*.

[2] For documentation of IMPLAN modeling, see www.implan.com/history/ .

The ratio of the change in total regional economic activity to a direct change in activity by a regional industry is called a multiplier. For example, if a new manufacturing company adds 100 jobs and the County were to ultimately see another 80 jobs due to the combination of indirect and induced effects, the employment multiplier would be 1.8 (180 total jobs divided by 100 direct jobs). Similar multiplier effects are generated for business output, employee compensation, and value-added[3].

A solar project has two phases, construction and operations. The construction phase is expected to last about one year, while the operations phase will last decades. Almost all the employment will occur in the construction phase. The regional economic impacts will consist of the direct effects of spending by the developer, as well as spinoff impacts due to local purchases of supplies and new spending by households due to increased income.

The relevant sector in IMPLAN for the construction phase is number 47, "Construction of new power and communication structures", which is used to model the initial investment. The employment multiplier for this sector in Marion County model is 1.2 in the latest IMPLAN release (2023 data). This is a small multiplier because almost all the materials used to assemble a solar farm are made outside the county, which means that few of the indirect effects of this project will be captured by local industry.

There will also be some economic impact of ongoing operations. Unfortunately, the relevant industry for the operations phase, number 37, "Electric Power Generation – Solar", is empty of data for Marion County and the Kentucky counties it borders because these counties lack a history of solar electricity generation. As an alternative, I will model the impact on Marion County using data from the three closest counties that do contain data: Hardin, Spencer and Metcalfe. In any case, the ongoing annual economic impacts are small relative to the one-time impacts of construction.

Local Economic Impacts of the Construction Phase

The developer expects total construction costs of $37.6 million over an 8-month construction period with an average of 95 workers required during that time. Construction will be contracted out, so it's not possible to know total worker compensation. Instead, I estimate average employee compensation for the construction phase using a weighted average of IMPLAN's estimates of employee compensation in this industry for Marion

[3] Value-added is a measure of how much economic activity "sticks" to a region. For example, if one purchases a new vehicle for $40,000 from a local dealership, only a few thousand dollars is captured in the county. Business revenues rise by $40,000, but most of it flows out to the place where the vehicle was made. Local value-added measures the fraction of the sale that ends up paying workers and owners at the dealership, as well as any local taxes captured from the sale.

County and its six neighboring counties. This should mitigate any concern that estimated compensation in Marion County may be unreliable due to the small size of the local industry. The result is an estimated total compensation (including fringe benefits) of $60,773.13 per employee per year, or $40,515.42 for the estimated 8-month construction phase. Multiplying that by the estimated number of jobs yields approximately $3.85 million in employee compensation for the construction phase.

Estimated proprietor income in IMPLAN is often more volatile in small counties than employee compensation. When I compare estimated proprietor income for this project in Marion to analogous estimates using data from surrounding counties or the state, estimated proprietor income for Marion is larger than the same estimate for all but one of the surrounding counties, and it's over 3.5 times the estimate for Marion County's largest neighbor (Nelson County). If this is an anomaly related to the small size of the county, using it would inflate estimated labor income[4]. As a more conservative alternative, I model direct effect on proprietor income and employment from this project in Marion County using estimates based on IMPLAN's data for the entire state, which is approximately $1.3 million and 27.48 proprietors.[5]

Table 3 presents the direct economic effects of the construction phase, the spin-off effects that are expected, and the total economic impact of the Crab Run Solar Project on Marion County. As discussed above, the direct employment effect is 95 wage and salary jobs, plus roughly 27 proprietors; direct labor income is estimated to be over $5.1 million; and the employer expects total construction costs of $37.6 million. The model estimates that the direct effect on value added in Marion County will be over $13 million.

Table 3. Economic Impacts of Construction Phase

Impact	Employment	Labor Income	Value Added	Output
Direct	122.48	$5,147,403.10	$13,063,486.47	$37,600,000.00
Indirect	37.80	$1,811,881.58	$3,350,014.65	$6,753,065.17
Induced	15.43	$640,428.53	$1,268,185.34	$2,153,153.94
Total	175.71	$7,599,713.21	$17,681,686.46	$46,506,219.11
Multiplier	1.43	1.48	1.35	1.24

Source: IMPLAN model of Marion County using 2023 economic data.

[4] Labor Income = Employee Compensation + Proprietor Income

[5] I also use IMPLAN's estimate of proprietor employment from state-level data. State-level estimates should be more reliable than county estimates because they are based on a larger sample size; however, they require assuming that proprietor income from construction of solar project in Marion County would be similar to proprietor income from analogous projects elsewhere in the state.

Given the direct effects, IMPLAN's model uses detailed information on inter-industry linkages in the local economy and household spending on goods and services to estimate spin-off effects. The *indirect effect* due to local businesses providing some of the supplies for the project is estimated to result in another $3.35 million in value added, another 37.8 jobs and $1.81 million in new labor income to Marion County. The *induced effects* from the increased consumer spending that results from new labor income adds another $1.27 million in value added, 15.4 more jobs and another $640,429 in labor income.

Adding the direct, indirect and induced effects yields an estimated $46.5 million dollars in total economic impact from the construction of the Crab Run project. The value added estimate of $17.68 million implies that over a third of the total effect on output is expected to stay in Marion County. I estimate a total of 175.71 jobs will be created, and the project will bring nearly $7.6 million in new labor income.

The implied multiplier on total output is relatively small, in line with what IMPLAN says is typical for the industry in Marion County. The employment and labor income multipliers are expected to be larger because labor income is a larger share of the total indirect and induced effects; however, the indirect and induced effects are still relatively small. The indirect effect is small due to a lack of local businesses in the county that are likely to supply the construction of a solar farm. The induced effect is small due to a lack of local retail and service firms to meet increased consumer demand, and because workers who commute into Marion County for the project would be expected to spend more of their earnings in their home counties[6].

Multi-County Regional Impacts of Construction

In the main analysis above I focused solely on impacts of construction in Marion County; however, some stakeholders may be interested in wider regional impacts. While all jobs at the construction site of the Crab Run project would be counted as Marion County jobs by Federal and state statistical agencies, there will still be spin-off activity in surrounding counties. Supplies may be purchased in nearby counties and workers may spend their new income at establishments outside of Marion County. As a result, we would expect the indirect and induced effects to be larger when we estimate a multi-region model that includes neighboring counties.

[6] All jobs at the Crab Run Solar Project would be counted as Marion County jobs; however, as shown in Table 1, jobs in Marion County are not all held by residents of the county. We cannot know the ratio at this point, but we should expect the project to hire a mix of Marion County residents and non-residents. The resulting occupational tax will be the same for both. The fact that non-residents are likely to spend more of their earnings outside of the county is one of the "leakages" that IMPLAN's input-output model accounts for when producing the estimates.

To investigate this possibility, I built a multi-region input-output model in IMPLAN that includes Marion and its six neighboring counties. The direct effects, of course, do not change as additional counties are added; however, the indirect and induced effects increase as the larger area is able to capture more spillovers. The total economic impact on these seven counties is almost $50.9 million, with an implied multiplier of 1.35. The estimated number of new jobs increases from around 176 for Marion County alone (Table 3) to 196.69. Total labor income would increase by roughly $1 million to $8.63 million when the neighboring counties are considered.

Local Economic Impacts of the Operations Phase

Once the project is operational, the developer estimates that two full-time employees will be needed for inspection and maintenance of equipment and the site. As noted above, I model this impact on Marion County using an average of impacts from Hardin, Spencer and Metcalfe counties because the relevant industry—37, "Electric Power Generation – Solar"—has no data for Marion County.[7]

As shown in Table 4, the direct effect of hiring two workers for the ongoing operations on labor income is expected to be $280,266, as the workers who operate solar projects are well paid on average. The model predicts a slightly larger employment multiplier for the operations phase than the construction phase, but the other multipliers are similar. That said, the direct effects are much smaller for the operations phase. The total economic impact of the operations phase is predicted to be $1.65 million per year. The ongoing operations are expected to add an additional 3.34 jobs and $342,841.93 in labor income per year.

Table 4. Economic Impacts of Operations Phase

Impact	Employment	Labor Income	Value Added	Output
Direct	2	$280,266.00	$756,827.25	$1,324,044.34
Indirect	0.88	$44,893.05	$98,064.30	$253,098.81
Induced	0.46	$17,682.89	$44,348.98	$75,084.74
Total	3.34	$342,841.93	$899,240.53	$1,652,227.89
Multiplier	1.67	1.22	1.19	1.25

Source: IMPLAN model of Marion County using 2023 economic data from Hardin, Spencer and Metcalfe counties

[7] Hardin County is several times larger than Marion County regardless of whether we look at GDP, population or employment. To create an average county that looks more like Marion County, I put half as much weight on Hardin County in this average as on Spencer and Metcalfe.

There will also be positive local economic impacts from the annual lease payments to the owners of the land the project is built on; however, that will come at the cost of some lost agricultural activity. I examine this further in Appendix 2 and I estimate that the lease payments will result in a greater increase in labor income each year than are lost from decreased farming.

Local Tax Revenues

Marion County levies an occupational tax on compensation paid to anyone working in the county of 1%, regardless of whether they reside in the county or not. The employee compensation numbers used above include fringe benefits that, for the most part, are not subject to the occupational tax. Furthermore, Marion County's occupational tax ordinance has provisions that apply this 1% tax to the net profits of business, so I assume that estimated proprietors' income is also subject to the occupational tax.

I estimate that $3.26 million in wages and salaries from the direct effects of construction phase will be subject to the occupational tax based on the state average fringe rate of 18% for the construction industry, as well as nearly 1.3 million in proprietor income. Because the new employee compensation associated with indirect and induced effects will be spread across a range of industries, I use the overall average fringe benefit rate for the state (19%) to estimate another $1.76 million in taxable wages and salaries from spin-off activities in the year of construction, plus another $372,329 in proprietor income. Applying Marion County's occupational tax rate to these numbers implies that the construction phase of the project will yield $66,953 in occupational taxes for the county.

Looking at occupational taxes each year from ongoing operations, the first thing to note is that all the estimated labor income from the operations phase would be employee compensation. A study of the industry from UC-Berkeley suggests a fringe rate for workers in solar power generation of around 32%, which would imply $212,322.73 in taxable wages and salaries per year from the direct effect of ongoing operations[8]. Using the state average fringe rate of 19% again, I estimate there will be another $52,585 in taxable compensation each year from the spinoff activities of ongoing operations. Bringing these numbers together suggests that the ongoing operations of the project will yield another $2,649 of occupational taxes in each year the project is operational.

The issue of property taxes paid on the parcels at the project site is more complicated; however, simply converting the land from farm use to commercial would increase property taxes paid dramatically. The property tax paid on the parcels of land at the site totaled $2,740.82 in 2024 because the land is currently taxed based on its agricultural value, not its total fair cash value. Even if the solar project did not otherwise increase the taxable value of these parcels, which it certainly would, simply taxing the parcels based on current fair cash value would result in a five to six-fold increase in property taxes paid on the parcels each year. Looking at how the county taxes real estate (Table 5), we see that

[8] See *Economic and Environmental Benefits of Building Solar in California*, by Peter Philips, November 10, 2014, https://laborcenter.berkeley.edu/pdf/2014/building-solar-ca14.pdf.

almost three quarters of any increased taxes on real estate will go to Marion County Public Schools.

The project will also involve improvements to the land, a substantial increase in the amount of tangible personal property, and very large investments in solar panels and other equipment classified as “manufacturers’ machinery”. Table 5 shows how each of those categories would be typically taxed by the County and state governments. Manufacturers’ machinery—including panels, inverters, transformers and DC hardware—will comprise a large share of the total investment of roughly $66 million in the project, but it would be taxed only by the state at a rate of 15 cents per $100. Tangible person property—including AC transmission equipment and security, control and monitoring systems— will be a smaller part of the total investment; however, the county taxes this category at a rate of 80.4 cents per $100 and the state taxes it at a rate of 45 cents per $100.

Table 5. Marion County Property Tax Rates

in cents per $100 valuation

Taxing Jurisdictions	Real Estate	Tangible Personal	Manufacturer's Machinery
Extension Services	3.20	3.20	
General Fiscal Court	8.40	10.90	
Health	3.00	3.00	
Library	4.50	4.50	
Marion/Washington Air Board	1.10	1.10	
Wayne County Public Schools	57.70	57.70	
County Total	77.90	80.40	
State of Kentucky	11.40	45.00	15.00
County + State Total	89.30	125.40	15.00

Source: Kentucky Department of Revenue

The developer may pursue an Industrial Revenue Bond (IRB) with a Payment in Lieu of Taxes (PILOT). An IRB is a type of economic incentive that would provide a temporary state and local tax abatement for the Project. IRBs have been widely used across the Commonwealth to encourage new capital investments, including other solar projects. The PILOT would then be used to offset the tax loss to Marion County. Whatever the details of any potential IRB/PILOT are, the revenue Marion County can expect in the future from these parcels will increase many times over due to the Crab Run Solar Project.

Finally, it is worth pointing out that solar projects like this tend to require very little in the way of public services. Furthermore, given how few employees are expected to be hired to support the ongoing operations of the project, it is unlikely that the project will add noticeably to the number of students in Marion County's schools. Therefore, an enormous majority of the tax revenue brought to the County by the Crab Run project will be spent on residents who have no direct connection to the project.

Appendix 1. Demographic and Economic Characteristics of Marion County		
	Marion County	**Kentucky**
Total population	19,680	4,510,725
Median age (years)	39.6	39.1
Percent 65 years and over	16.9%	17.0%
Percent White	88.2%	83.7%
Hispanic or Latino (of any race)	3.5%	4.7%
Veterans (civilian pop 18+)	7.5%	6.8%
Percent with disability, noninstitutionalized	20.5%	17.7%
High School attainment rate, 25 & older	86.3%	88.5%
Bachelor's degree attainment, 25 & older	12.7%	27.0%
Number of Households	7,590	1,791,991
Average Household Size	2.46	2.45
with Broadband Internet	85.0%	87.2%
Median Household Income (dollars)	$55,404	$62,417
Percent of Population in Poverty	19.5%	16.1%
Employment Status (16 & older)		
In labor force	55.3%	59.6%
Civilian labor force	55.3%	59.2%
Employed	52.3%	56.4%
Unemployed	3.0%	2.9%
Not in labor force	44.7%	40.4%
Unemployment Rate	5.5%	4.8%
Mean Commuting Time (minutes)	20.8	24.0
Occupation		
Management, business, science, & arts	30.6%	37.1%
Service occupations	11.9%	15.4%
Sales and office occupations	14.9%	20.3%
Natural resources, construction, and maintenance	8.8%	8.8%
Production, transportation, and material moving	33.9%	18.4%
Industry		
Agriculture, forestry, fishing and hunting, and mining	2.2%	1.8%
Construction	6.1%	6.3%
Manufacturing	33.4%	14.3%
Wholesale trade	2.6%	2.2%
Retail trade	10.2%	11.8%
Transportation and warehousing, and utilities	5.0%	6.9%
Information	0.5%	1.3%
Finance and insurance, real estate and rental	2.1%	5.6%
Prof., scientific, and mgmt; and admin and waste mgmt	6.6%	9.0%
Education, and health care and social assistance	21.0%	24.2%
Arts, entertainment, and rec; and accommodation and food services	3.7%	8.0%
Other services, except public administration	2.6%	4.5%
Public administration	4.0%	4.2%

Source: US Census Bureau, American Community Survey, 5-year profile, 2019-2023.
https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/

Appendix 2

The conversion of agricultural land to a solar farm brings substantial benefits to the local economy, but it does come at a cost. The *costs* involve reduced farming activity, as well as reduced business for any local suppliers of seed, fertilizer, feed, equipment and labor. Most of the *benefits* of the project—one-time impacts of construction, ongoing impacts of operation, and increased tax revenues—are described in the body of the report; however, another benefit is the impact of annual lease payments to the landowners. This not only includes the new income received by the landowners, but also regional spinoff impacts from the some of that income being spent on goods and services in the local economy.

In this appendix, I attempt to account for lost agricultural activity and the new lease payments to estimate the net economic impact of the change in land use. No direct accounting information is available on actual farm operations at the solar site, but rich data are available on farmland activity at the county level. I use county data on crop yields, livestock production and prices to estimate existing farm output that would be lost at the solar site. Additionally, annual lease payments to the farmland owners are not available; however, I use studies of typical lease payments to approximate the rate per acre. Then I use a custom IMPLAN model of the county to predict the linkages of both farm output and new lease income to the local economy.

Estimating Lost Economic Activity from Farming

The first step in estimating lost farm activity is to determine the project parcels' share of Marion County's cropland and land for livestock. The Census of Agriculture is published every five years, with 2022 being the most recent; and provides detailed information on farming activity in all Kentucky counties. The developer estimates that 94.82 acres of cropland and 304.23 acres of pasture or hay will be removed from production.

Marion County contains 89,538 acres of cropland, 85% of which is harvested. Of the harvested cropland, 41% is used for hay, grass silage, etc.; 25% is used for corn; and 31% for soybeans. Since the developer estimates crop acreage separately from land used for pasture or hay, I'll assume the cropland is 45% corn and 55% soybeans and that 85% of it is harvested. This suggests the farm accounts for roughly 0.19% of both harvested corn and harvested soybeans in the county. If 85% of the land dedicated to pasture or hay is harvested as forage, the site would account for 0.83% of Marion County's total forage.

I assume that the farmland at the project site is typical of County farmland so that farm revenue can be estimated using countywide revenues and the percentages above[9]. The total value of corn harvested in Marion County was roughly $19 million in 2022, the most recent year available, 0.19% of which is $36,852. The total value of soybeans harvested in the County was $18.2 million, giving us an estimated $34,373 for the project site. Finally, I estimate the value of the hay or other forage from the land as 0.83% of the total value of "Other crops and hay" in the county, which produces an estimate of $35,203.

I use these numbers to construct a model in IMPLAN of the impact of lost farming revenues at the project site. The lost soybean revenue is modeled using "Oilseed Farming" (1) as the industry, and "Grain Farming" (2) is used for lost corn production. I allocate all the estimated revenue from hay and other forage to "Other Crop Farming" (10) because that category is most in line with the Census of Agriculture.

The result of this modeling is an estimated direct loss of $106,428 in agricultural output; but it's important to keep in mind that it is value added, not output, that stays in (or, in this case, is lost by) the county. The landowners do not keep all the revenue generated. They buy inputs and only some of the purchase price of those inputs stays in the county.

Table A presents more results from this model. The total loss of employment from the lost agricultural output would be 1.28 jobs, most of which is explained by the direct employment effect. The overall loss in output due to reduced agricultural activity would be $135,943; however, less than half of at lost output, only $62,859, would be lost by the county. Of that lost value added, $19,130 would be labor income.

Table A. Impacts of Lost Agriculture from the Solar Project

Impact	Employment	Labor Income	Value Added	Output
Direct	1.05	$10,950.04	$47,730.02	$106,428.00
Indirect	0.19	$6,494.51	$11,790.07	$23,846.87
Induced	0.04	$1,685.67	$3,339.23	$5,668.70
Total	1.28	$19,130.23	$62,859.32	$135,943.57

Source: IMPLAN model of Marion County using 2023 data

Note that most of the 1.05 jobs estimated as a direct impact of farming on these parcels include the proprietors' jobs. In other words, that number counts the fact the landowners

[9] I do not know how much of the site's current cropland is harvested or how much is produced. Likewise, I don't know if the land dedicated to hay or pasture is harvested or used for grazing; however, I use estimates of the value of hay that might be harvested to approximate revenue from that land.

farm the land when it counts jobs. If we exclude the direct effect due to the landowners no longer farming these acres, the total lost employment in the county from this land being removed from agricultural production is only 0.42 jobs.

New Income from Leasing the Land for the Solar Project

Given the confidential nature of lease payments to the landowner, I used published ranges to make an educated guess of the amount paid. A 2021 report from the University of Kentucky provides a range of $400 to $1,200 per acre for farmlands leased to solar projects[10]. I use the midpoint of this range, $800, to estimate lease payments of $329,600 per year for the 412 acres used.

The lease payments will obviously increase the household income of the landowners substantially. This could be modeled in IMPLAN purely as an increase in household income, which would have predictable induced effects; however, such lease payments are sometimes also used to pay off debt. As a result, I present two sets of results: one that assumes the lease payments purely represent an increase in household income, and a second that assumes the lease payments are allocated 50/50 to household income and debt repayment[11]. In both cases, I will assume the household receiving the new income previously had an income between $70k and $100k.

Table B presents results from the scenario in which the landowner has no debt, and the entirety of lease payments are treated as increased household income. This has no direct or indirect impact on the county; however, the fact that some of the new income will be spent at local businesses creates an induced effect. The result is an increase of 1.25 jobs, $53,318 in new labor income and $100,779 in value added.

Table B. Estimated Impacts of Lease Payments

Impact	Employment	Labor Income	Value Added	Output
Direct	0	$0.00	$0.00	$0.00
Indirect	0	$0.00	$0.00	$0.00
Induced	1.25	$53,318.48	$100,778.91	$171,966.62
Total	1.25	$53,318.48	$100,778.91	$171,966.62

Source: IMPLAN model of Marion County using 2023 economic data

[10] Davis, A. “Solar Farming Considerations." Economic and Policy Update (21):5, Department of Agricultural Economics, University of Kentucky, May 28th, 2021.
https://agecon.ca.uky.edu/sites/agecon.ca.uky.edu/files/Solar%20Farming%20Considerations.pdf

[11] The 50/50 split follows the work of “Economic Impacts of a Proposed Solar Energy Project in Freeborn County, Minnesota”, by Brigid Tuck, University of Minnesota Extension, April 2021
https://conservancy.umn.edu/items/19f41ad8-f362-4de0-af60-12cc341cba54

Table C presents results from the model that assumes half the lease payments are used to repay debt and the other half kept as increased household income. The debt repayment creates a direct impact on the banking industry (423, "Monetary authorities and depository credit intermediation") of $164,800, which has its own modest indirect and induced effects. As a result, the economic impact of lease payments is larger by any measure if some of the payments are used to repay debt. 1.74 new jobs and $84,009 in labor income would be created. The value added to Marion County in this scenario is estimated to be $157,225.

Table C. Estimated Impacts of Lease Payments

Impact	Employment	Labor Income	Value Added	Output
Direct	0.63	$38,233.30	$77,405.06	$164,800.00
Indirect	0.38	$14,622.46	$20,537.06	$49,295.63
Induced	0.73	$31,153.41	$59,283.19	$101,086.59
Total	1.74	$84,009.16	$157,225.30	$315,182.22

Source: IMPLAN model of Marion County using 2023 economic data

Note that the value added in Marion County is greater for the lease payments than the value added lost from reduced farming in both scenarios. The same is true for labor income. The amount of money Marion County will lose from reduced agricultural activity is less than will be gained from the lease payments, and the value of lost farming was already dwarfed by the economic impact of the solar project.

If we consider both the ongoing impacts of the solar project's operation and the positive effects of the lease payments, Marion County comes out even further ahead. The county would not only gain 3.31 to 3.8 jobs per year, but the jobs gained would pay far more than those lost. Labor income would increase by over $396,159 per year while the solar farm is in operation, even using the most conservative scenario for the lease payments (Table B).