Attachment F

ECONOMIC ANALYSIS

Barrelhead Solar, LLC

Wayne County, Kentucky

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TO: Marty Marchaterre
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FROM: Joshua Pinkston

RE: Economic and fiscal impact of Barrelhead Solar, LLC

Copperhead Environmental Consulting needs an economic impact statement for a proposed solar energy project in Wayne County, Kentucky, as part of its application to the Kentucky Public Service Commission's Siting Board. Barrelhead Solar, LLC, will build on 307 acres of leased private land, and have a nominal capacity of approximately 54 MW. The developer is expected to invest nearly $81 million in the project. This report provides estimates of the new local economic and fiscal activity expected from the 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 one year. Combining the developer's estimated construction cost of nearly $35 million and estimates of construction payroll required by the project, I estimate that there will be a total of roughly 184 new jobs in the county that year, with new labor income of over $13 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 and find that Wayne County will gain several new jobs from the operational phase of the project with a combined increase in labor income of over $830,000 per year. Over a horizon of three decades and including the impacts of

construction, I estimate a net increase of roughly 395 job-years and nearly $38 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 $250,597 in occupation tax revenue over three decades, with nearly $75,000 coming from construction in the first year. The exact increase in property tax revenue will depend on a potential Industrial Revenue Bond and Payment in Lieu of Taxes agreement; however, simply converting the land from farm to commercial use would increase property taxes five-fold each year; and that's ignoring both the substantial improvements the project will make and the installation of a large quantity of taxable equipment.

Location and Regional Economy

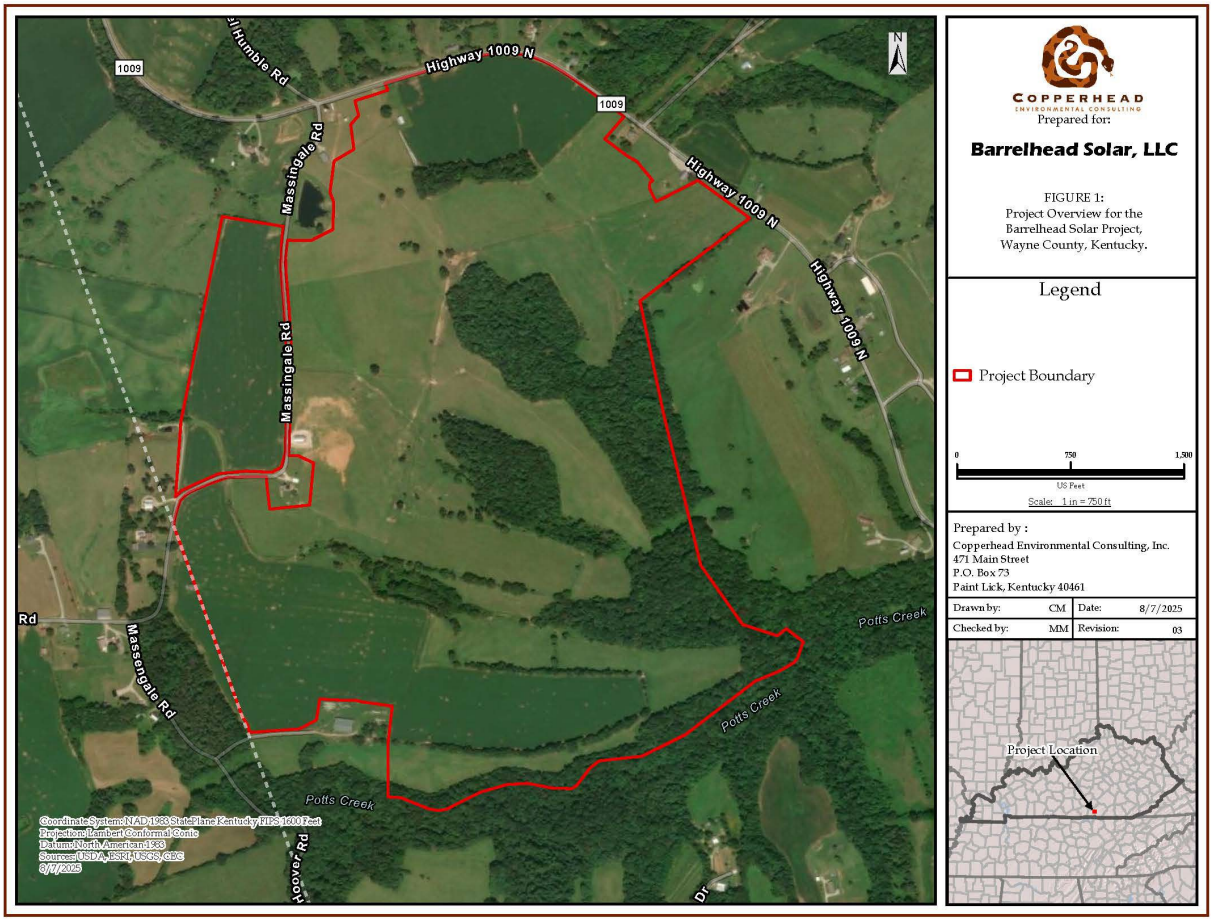
The project site is in southern Kentucky near the Tennessee state line in western Wayne County. The site is southwest of Monticello, just off State Highway 90. The approximate location is indicated by the red star in Figure 1.

Figure 1

Figure 2 is a site map provided by Copperhead Environmental Consulting. The project, which borders Clinton County, will be inside the boundaries indicated by red lines. The

aerial image shows a mix of agricultural lands with some woods. The developer estimates that the land is currently 45.7% grassland/pasture, 24.2% forested, 24.4% cropland (corn and soybeans), and 5.7 % other uses. Counting both pasture and cropland, roughly 215 acres of potential agricultural activity is expected to be displaced.

Figure 2



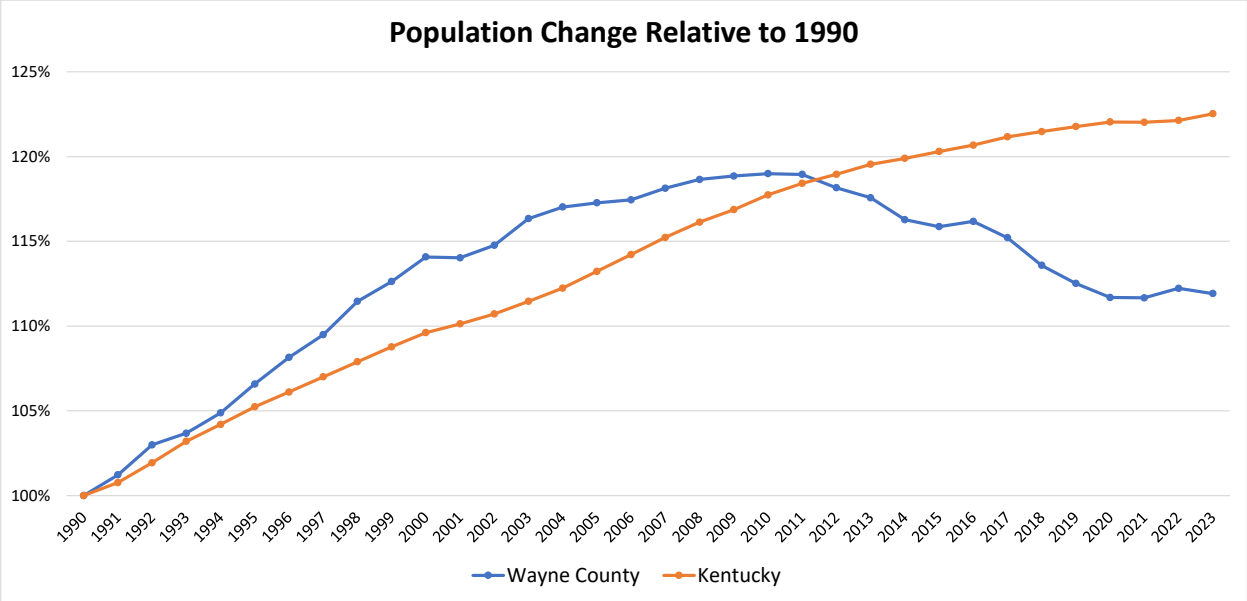
The U.S. Census Bureau's American Community Survey (ACS) provides a summary of Wayne County's demographic and economic characteristics. Appendix 1 provides more detail, as well as a comparison to the State of Kentucky, using the most recent (2023) release of the ACS. Wayne County stands out from the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

- Wayne County ranks 97th out of 120 Kentucky counties in median household income, putting it in the poorest 20% of counties. Median household income is only $41,933 in the county, compared with $62,417 in the state. Furthermore, 24.3% of Wayne County residents live in poverty, compared to 16.1% of the state.

- While nearly 60% of Kentucky's population over the age of 16 is in the labor force, only 47% of Wayne County's is. As a result, only 44.7% of the population of Wayne County is employed, compared to 56.4%.
- Educational attainment is notably lower in Wayne County than in the state. 79.4% of Wayne County residents over the age of 25 graduated from high school, compared to 88.5% statewide; and the percentage of county residents with a bachelor's degree or higher is roughly half of the state percentage.
- The median age of the population is over four years older than the median age of the state, and a higher percentage (21.2% vs 17%) is over the age of 65. Over a quarter of noninstitutionalized Wayne County residents have a disability compared to under 18% of state residents, which may be due in part to the age differences.

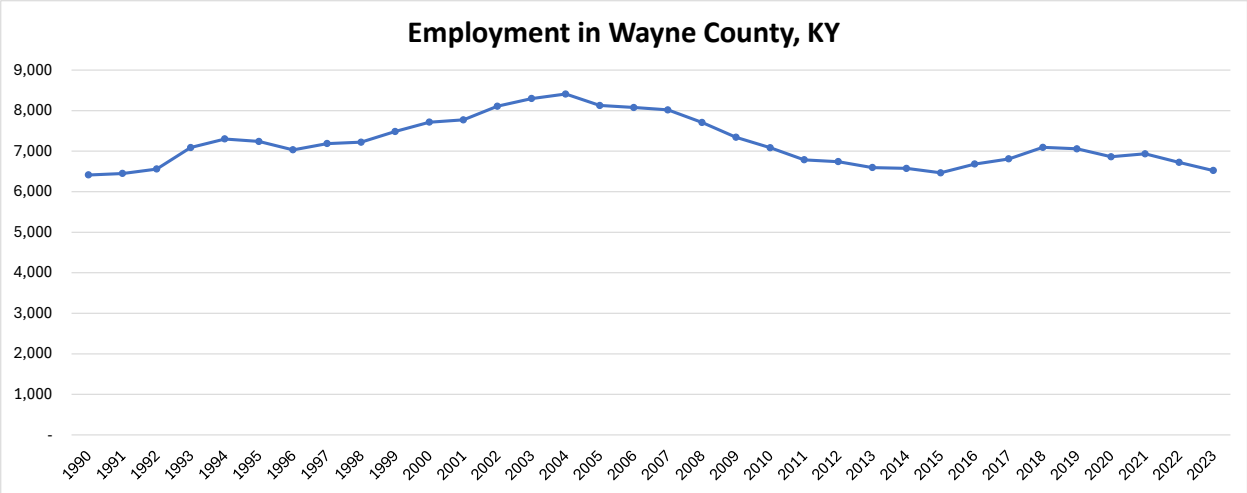
Wayne County's population was estimated to be 19,580 in 2023. As shown in Figure 3, the county's population increased between 1990 and 2010, growing more quickly than the state through much of the 1990s. Wayne County's population peaked at 20,827 in 2010, but it then declined between 2010 and 2020. In contrast, Kentucky's population growth has been relatively steady since 1990.

Figure 3



Wayne County's decline in population since 2010 followed a decline in employment (Figure 4) that began in 2003. Fortunately, that employment decline leveled off and even reversed slightly after 2015.

Figure 4



Wayne County has long been more reliant on transfer payments—including Social Security, Medicare, Medicaid—than Kentucky as a whole (Figure 5), as one would expect given the economic and demographic differences noted above. While the reliance on transfer payments as a share of income has increased since 1990 for both the county and the state, the gap between Wayne County and Kentucky began increasing in the early 2000s, shortly after employment started falling in the county. As of 2023, transfer payments accounted for 48% of personal income in Wayne County, compared to 26% of personal income in Kentucky.

Figure 5

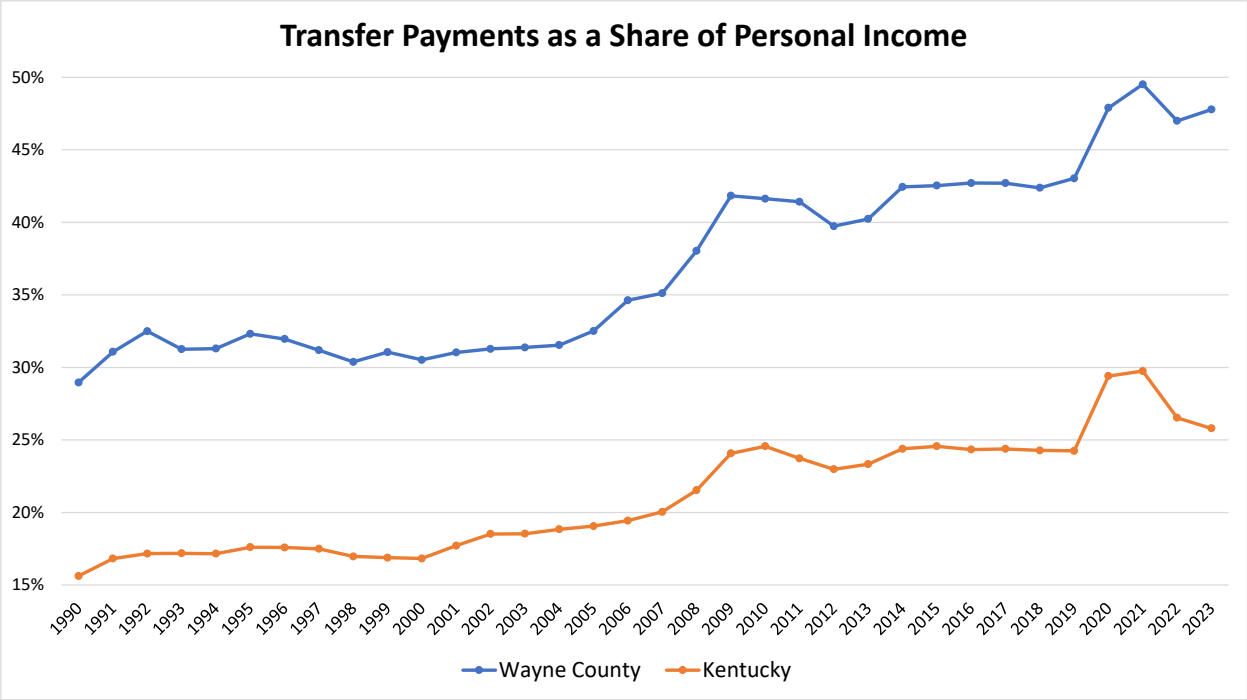
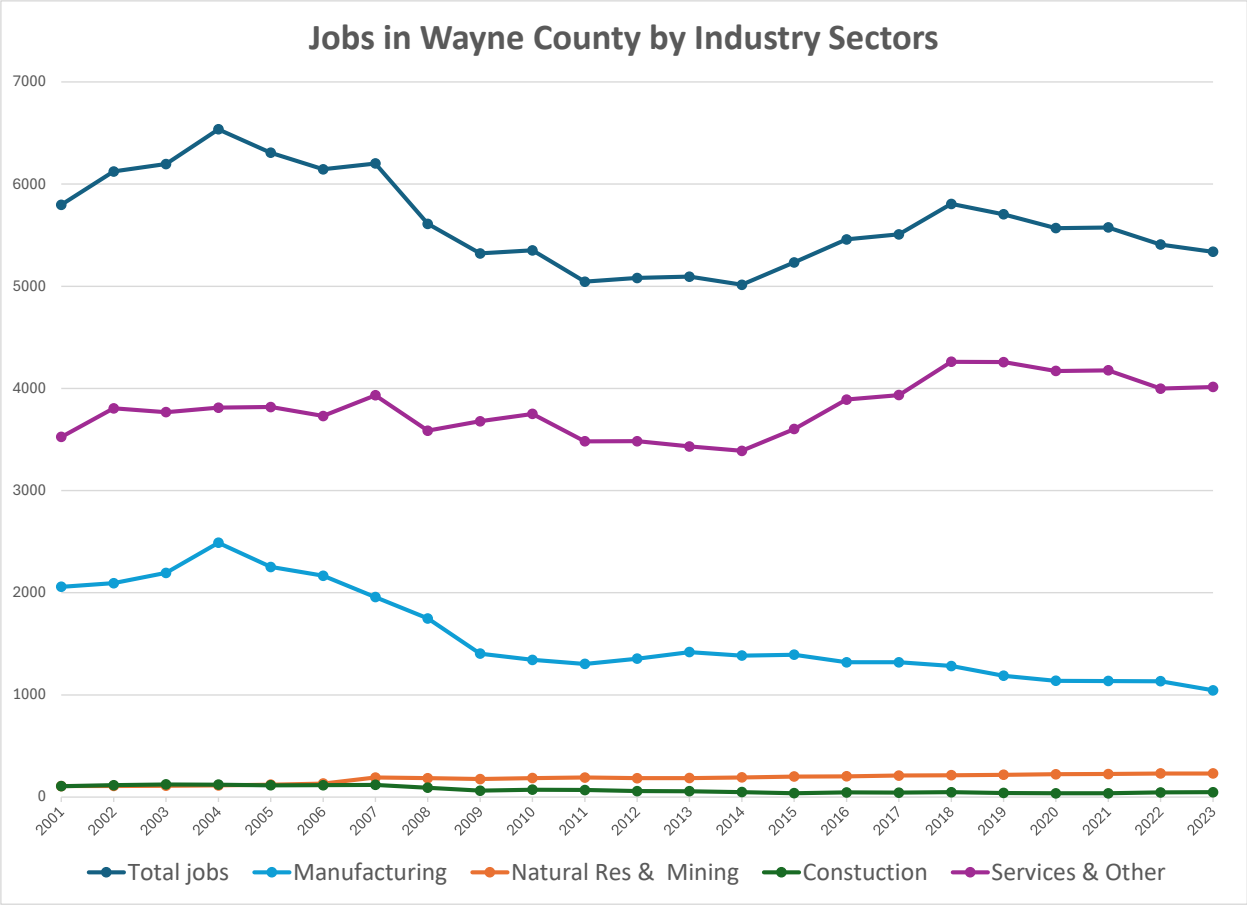


Figure 6 shows the number of jobs in Wayne County broken into broad industry categories from 2001 to 2023[1]. We can see that the early 2000's decrease in employment noted above can be largely accounted for by a decline in manufacturing jobs in Wayne County. It's also worth noting that the construction sector, which will be more affected by this projected than any other sector, currently accounts for fewer than 1% of jobs in Wayne 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. Note that the QCEW counts number of jobs at establishments in Wayne County. The employment numbers in Figure 4 are estimated numbers of employed Wayne County residents, some of

Figure 6



Finally, it's important to acknowledge that some workers employed in Wayne County live in other counties, and some Wayne County residents are employed in other counties. Table 1 shows that fewer than 80% of workers in Wayne County live in the county, with residents of Clinton and Pulaski accounting for most of the rest (7.4% and 6.6% respectively). Looking at where Warne County residents work (Table 2), we see that commuting out of the county is more common than commuting into it. Most residents who commute out of the county and 16.3% of all employed residents commute to Pulaski County, which is Wayne County's largest neighbor measured by either employment or GDP.

Table 1		
County of Residence for Workers Employed in Wayne County		
Wayne County, KY	5,054	79.4%
Clinton County, KY	468	7.4%
Pulaski County, KY	423	6.6%
McCreary County, KY	170	2.7%
Cumberland County, KY	86	1.4%
Pickett County, TN	61	1.0%
Owen County, KY	37	0.6%
All Other	64	1.0%
Total	6,363	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 Wayne County		
Wayne County, KY	5,054	69.1%
Pulaski County, KY	1,193	16.3%
Clinton County, KY	637	8.7%
Shelby County, TN	146	2.0%
Russell County, KY	115	1.6%
All Other	166	2.3%
Total	7,311	100.0%
Community Survey, Residence County to Workplace County Commuting Flows, 5-Year ACS, 2016-2020		

Modelling the Economic Impacts

I model the regional economic impacts of the Barrelhead Solar project using a customized input-output model of Wayne 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*.

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

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

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 Wayne County model is 1.183 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 Wayne 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 Wayne County using data from two other counties in southern Kentucky: Whitley County to the east and Metcalfe County to the west[4]. In any case, the ongoing annual economic impacts are likely to be small relative to the one-time impacts of construction.

Local Economic Impacts of the Construction Phase

The developer estimates total construction costs of $34,969,731. Construction will be contracted out, so it's not possible to know exactly how many workers will be employed or their total compensation. Instead, I'll model the impact using the results of a study from UC-Berkeley that examined five large solar projects in California, finding an average of 2.4 full-time-equivalent (FTE) construction jobs were hired per MW built. Multiplying that by the 54 MW of the Barrelhead Solar project, gives an estimated 129.6 FTE jobs in the year of

[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.

[4] These are the closest two counties I could find for which IMPLAN provides data for industry 37 in 2023, with the halfway point between Metcalfe and Whiley Counties falling inside of Wayne County. Averaging the employment multipliers for this industry in these counties yields an estimated multiplier of 1.97.

construction[5]. IMPLAN uses counts of all jobs, not FTE jobs; so, I use an industry-specific crosswalk they provide to convert FTE to total jobs. Because most construction jobs are full-time this results in a small change of 129.6 FTE jobs to 133.4 total jobs.

I estimate average employee compensation for the construction phase using a weighted average of IMPLAN's estimates for Wayne County and its four neighboring Kentucky counties. This should mitigate any concern that estimated compensation in a single county is unreliable due to the small size of the local industry. The result is an estimated total compensation (including fringe benefits) of $59,339.37 per employee. Multiplying that by the estimated number of jobs yields approximately $7.9 million in employee compensation for the construction phase.

Estimated proprietor income in IMPLAN can be even more volatile in small counties than employee compensation. IMPLAN's estimated proprietor income for Wayne County is far larger than for any surrounding counties, and it's even larger than estimated employee compensation. This is likely an anomaly related to the small size of the county, but it inflates estimated labor income[6]. As a much more conservative alternative, I use the estimated proprietor income from Pulaski County, Wayne County's largest neighbor, which is just approximately $3 million.[7]

Table 3 presents the direct economic effects of the construction phase, the spin-off effects that are expected, and the total economic impact. As discussed above, I estimate a direct employment effect of 133.4 jobs and direct labor income of just over $10.9 million. IMPLAN estimates that direct value added from the construction phase is roughly $15.1 million, implying that roughly 43% of the nearly $35 million in construction costs will stay in Wayne County.

[5] 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. One caveat to note is that the smallest solar project included in the CA study had a nominal size of 250 MW and the average was 590 MW. Using this estimate, therefore, requires strong assumptions about the linearity of the relationship between FTE jobs and MW capacity.
[6] Labor Income = Employee Compensation + Proprietor Income
[7] Because Pulaski is much larger than Wayne County, regardless of whether we look at the overall economy or the size of the industry, this estimate should be much more reliable than the estimate for Wayne County. Given the same construction costs, employment and employee compensation, estimated proprietor income for Pulaski County and the state are nearly identical.

Table 3. Economic Impacts of Construction Phase

Impact	Employment	Labor Income	Value Added	Output
Direct	133.4	$10,924,362.51	$15,125,721.48	$34,969,731.00
Indirect	24.2	$1,115,690.57	$2,210,619.39	$4,576,133.65
Induced	25.93	$1,044,225.56	$2,297,873.60	$4,064,988.40
Total	183.53	$13,084,278.64	$19,634,214.46	$43,610,853.04
Multiplier	1.38	1.20	1.30	1.25

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

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 nearly $4.6 million in output, another 24.2 jobs and $1.1 million in new labor income to Wayne County. The *induced effects* from the increased consumer spending that results from new labor income adds another $4 million to output, nearly 26 more jobs and another $1 million in labor income.

Adding the direct, indirect and induced effects yields an estimated $43.6 million dollars in total economic impact from the construction of the Barrelhead Solar project. I estimate a total of 183.53 jobs will be created, and the project will bring nearly $13.1 million in new labor income. The implied multipliers are all relatively small because both the indirect and induced effects are 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, and the induced effect is small due to a lack of local retail and service firms to meet increased consumer demand.

Multi-County Regional Impacts of Construction

In the main analysis above I focused solely on impacts of construction in Wayne County; however, some readers may be interested in wider regional impacts. While all jobs at the construction site of the Barrelhead Solar project would be counted as Wayne 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 Wayne 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.

To investigate this possibility, I built a multi-region input-output model in IMPLAN that adds the five nearby Kentucky counties that have a commuter flow into (Table 2) or out of (Table

3) Wayne County of 1% or more. That adds Wayne County's four immediate neighbors—Clinton, Russell, Pulaski and McCreary—and Cumberland County[8].

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 increases by over $3 million to just under $46.9 million, with the implied multiplier rising to 1.34. Estimated total new jobs increases from 183.53 (Table 3) to 197.39. Total labor income would increase from approximately $13.1 million to just over $13.7 million, implying a multiplier of 1.26. Including more counties, especially a much larger one like Pulaski, does capture more of the spin-off activities from the project; however, these multipliers are still relatively modest.

Local Economic Impacts of the Operations Phase

Once the project is operational, the developer estimates that three to seven full-time employees will be needed for inspection and maintenance of equipment, as well as maintenance of the site (e.g., mowing). I will err on the conservative side of this estimate and assume the project will employ four full-time workers for ongoing operations. As noted above, I model this impact on Wayne County using the average of Metcalfe and Whitley Counties because the relevant industry—37, "Electric Power Generation – Solar"—has no data for Wayne County.

As shown in Table 4, the model predicts larger multipliers for the operations phase than the construction phase; however, the direct effects are much smaller for the operations phase. The total economic impact of the operations phase is predicted to be $3.64 million per year. The ongoing operations are expected to add an additional 7.88 jobs and $817,384 in labor income per year.

Table 4. Economic Impacts of Operations Phase

Impact	Employment	Labor Income	Value Added	Output
Direct	4.00	$608,266.17	$1,456,757.20	$2,591,191.38
Indirect	2.54	$151,351.98	$240,675.86	$847,358.90
Induced	1.35	$57,765.84	$116,266.10	$201,788.27
Total	7.88	$817,383.99	$1,813,699.16	$3,640,338.55
Multiplier	1.97	1.34	1.25	1.40

Source: IMPLAN model of Wayne County as a 50/50 mix of Metcalfe and Whitley Counties using 2023 economic data.

[8] I cannot include neighboring counties in Tennessee without purchasing additional access from IMPLAN.

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

Wayne County levies an occupational tax on compensation paid to anyone working in the county of 0.9%, regardless of whether they are a resident or not. The employee compensation numbers used above include fringe benefits that, for the most part, are not subject to the occupation tax. Additionally, Wayne County's occupational tax does not have specific provisions taxing net profits of business, so I assume none of the estimated proprietors' income is subject to the occupation tax.

I estimate that $6,708,366 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. 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 $1,612,403 in wages and salaries from spin-off activities in the year of construction. Applying Wayne County's occupational tax rate to these numbers implies that the construction phase of the project will yield $74,887 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. The UC-Berkeley study cited above suggests a fringe rate for workers in solar power generation of around 32%, which would imply $460,808 in taxable wages and salaries from the direct effect of ongoing operations. Using the state average fringe rate of 19% again, I estimate there will be another $189,916 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 $5,857 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 will increase property taxes paid dramatically. The property tax paid on the four parcels of land at the site totaled just over $2,000 in 2024 because the land is taxed based on its agricultural value, not its total fair cash value. Even if the solar project did not otherwise increase taxable value of

these parcels, which it most likely would, simply taxing the parcels based on current fair cash value would result in more than a five-fold increase in property taxes paid on the parcels each year. Most of any increased taxes on real estate will go to Wayne 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 taxed by the County and state governments. Manufacturers' machinery—including panels, inverters, transformers and DC hardware—will comprise a large share of the total CapEx of roughly $80 million, but it will be taxed only by 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 112.24 cents per $100 and the state taxes it at a rate of 45 cents per $100. As an example, if equipment considered tangible personal property were assessed at $5 million, the county would collect over $56,000 in taxes on that equipment and the state would collect another $22,500[9].

Table 5. Wayne County Property Tax Rates
in cents per $100 valuation

Taxing Jurisdictions	Real Estate	Tangible Personal	Manufacturer's Machinery
Extension Services	9.00	19.99	
General Fiscal Court	11.90	31.77	
Health	3.50	3.00	
Library	7.90	8.88	
Soil Conservation	3.02	0.00	
Wayne County Public Schools	44.00	48.60	
County Total	79.32	112.24	
State of Kentucky	11.40	45.00	15.00
County + State Total	90.72	157.24	15.00

Source: Kentucky Department of Revenue

[9] Formal analyses and projections of future property taxes are complicated tasks that require a skilled tax attorney and are outside of the scope of this analysis. Furthermore, the developer may explore and IRB or PILOT that would affect taxes paid. My intention here is to provide a simple illustration of why Wayne County might expect this project to increase its tax revenue.

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 Wayne County's schools. Therefore, an enormous majority of the tax revenue brought to the County by the Barrelhead Solar project will be spent on residents who have no direct connection to the project.

Appendix 1. Demographic and Economic Characteristics of Wayne County		
	Wayne County	**Kentucky**
Total population	19,592	4,510,725
Median age (years)	43.4	39.1
Percent 65 years and over	21.2%	17.0%
Percent White	92.4%	83.7%
Hispanic or Latino (of any race)	4.4%	4.7%
Veterans (civilian pop 18+)	6.4%	6.8%
Percent with disability, noninstitutionalized	25.3%	17.7%
High school attainment rate, 25 & older	79.4%	88.5%
Bachelor's degree attainment, 25 & older	13.7%	27.0%
Number of households	8,028	1,791,991
Average household size	2.41	2.45
with broadband Internet	82.4%	87.2%
Median household income (dollars)	$41,933	$62,417
Percent of Population in Poverty	24.3%	16.1%
Employment Status (16 & older)		
In labor force	47.0%	59.6%
Civilian labor force	47.0%	59.2%
Employed	44.7%	56.4%
Unemployed	2.3%	2.9%
Not in labor force	53.0%	40.4%
Unemployment Rate	4.9%	4.8%
Mean commuting time (minutes)	23.7	24.0
Occupation		
Management, business, science, & arts	24.7%	37.1%
Service occupations	14.6%	15.4%
Sales and office occupations	26.5%	20.3%
Natural resources, construction, and maintenance	9.1%	8.8%
Production, transportation, and material moving	25.0%	18.4%
Industry		
Agriculture, forestry, fishing and hunting, and mining	3.7%	1.8%
Construction	5.5%	6.3%
Manufacturing	18.8%	14.3%
Wholesale trade	1.2%	2.2%
Retail trade	11.6%	11.8%
Transportation and warehousing, and utilities	6.5%	6.9%
Information	0.6%	1.3%
Finance and insurance, real estate and rental	4.7%	5.6%
Prof., scientific, and mgmt; and admin and waste mgmt	8.5%	9.0%
Education, and health care and social assistance	23.2%	24.2%
Arts, entertainment, and rec; and accommodation and food services	7.3%	8.0%
Other services, except public administration	2.9%	4.5%
Public administration	5.4%	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 Wayne 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 75 acres of cropland, which is evenly divided between corn and soybeans, and 140 acres of pasture will be removed from production.

Wayne County contains 38,469 acres of cropland, 87% of which is harvested. Of the harvested cropland, 6,521 acres are corn and 9,266 are soybeans. Assuming the percentage of harvested cropland on the site is the same as the county would suggest the farm accounts for 0.50% of harvested corn in the county and 0.35% of harvested soybeans. The pastureland on the site would account for 0.41% of Wayne County's total.

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[10]. The total value of corn harvested in Wayne County was $7,076,000 in 2022, the most recent year available, 0.50% of which is $35,380. The total value of soybeans harvested in the County was $6,620,000, giving us an estimated $23,170 for the project site. Finally, if 0.41% of pastureland translates to 0.41% of sales from cattle, sheep and horses, then I estimate $42,955.70 in revenue from livestock.

I use these numbers to construct a model in IMPLAN of the impact of lost farming revenues at the project site[11]. 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 livestock to "Beef cattle ranching and farming" (11) because 97% of sales revenue from grazing animals in Wayne County come from beef cattle.

The result of this modeling is an estimated direct loss of $101,506 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 1.66 jobs, most of which is explained by the direct employment effect. Labor income would fall by $21,453, with most of that reduction coming from businesses that supply the farming activity. The overall loss in output due to agricultural activity lost would be $130,993; however, less than half of that lost output, only $61,438, would be lost by the county.

[10] I do not know how much of the site's current cropland is harvested or how many bushels it produces. Likewise, I don't know how many animals of which type graze of the site's pastureland, but I assume it supports a typical mix of livestock.

[11] Once again, some of the estimated parameters IMPLAN used in their model of Wayne County agriculture were unusual in a manner that suggested problems due to small sample size. To address this, I borrowed some parameters affecting direct impacts, including employment and proprietor income, from a model of Pulaski County, Wayne County's largest neighbor.

Table A. Impacts of Lost Agriculture from the Solar Project

Impact	Employment	Labor Income	Value Added	Output
Direct	1.32	$5,050.33	$46,075.68	$101,505.70
Indirect	0.3	$14,560.71	$11,306.16	$22,317.06
Induced	0.05	$1,841.63	$4,056.35	$7,170.16
Total	1.66	$21,452.67	$61,438.19	$130,992.92

Source: IMPLAN model of Wayne County using 2023 data and some Pulaski County parameters

Note that the 1.32 jobs estimated as a direct impact of farming on these parcels include the proprietors' jobs. That number counts the fact the landowners will no longer be farming the land when it counts jobs. If we considered only wage and salary employment the direct employment impact would be only 0.1.

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[12]. I use the midpoint of this range, $800, to estimated lease payments for the 307 acres used by Barrelhead Solar, LLC.

The estimated lease payments of $245,600 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[13]. 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

[12] 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

[13] 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

spent at local businesses does create an induced effect. The result is an increase of 0.83 jobs, $34,292 in new labor income and $71,263 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	0.83	$34,292.04	$71,263.25	$126,880.34
Total	0.83	$34,292.04	$71,263.25	$126,880.34

Source: IMPLAN model of Wayne County using 2023 economic data

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 $122,800, 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. 1.09 new jobs and $59,192 in labor income would be created. The value added to Wayne County in this scenario is estimated to be $118,149.

Table C. Estimated Impacts of Lease Payments

Impact	Employment	Labor Income	Value Added	Output
Direct	0.43	$31,299.22	$63,087.52	$122,800.00
Indirect	0.17	$7,648.62	$12,620.18	$29,427.52
Induced	0.49	$20,243.98	$42,441.41	$75,497.99
Total	1.09	$59,191.83	$118,149.12	$227,725.52

Source: IMPLAN model of Wayne County using 2023 economic data

Note that the value added in Wayne 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 Wayne 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, Wayne County comes out even further ahead. The county would not only gain 7.05 to 7.31 jobs per year, but the jobs gained would pay far more than

those lost. Labor income would increase by over $830,000 per year while the solar farm is in operation, even using the most conservative scenario for the lease payments (Table B).

Finally, note that the developer has discussed harvesting some of trees removed from the property for lumber. I do not have an estimate of how much lumber could be harvested as a result; however, this would be another (likely small) source of economic impact.