

Tab 10
Economic Impact

TAB 10 ECONOMIC IMPACT

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

The results of the economic impact analysis conducted by Paul A. Combs, PhD Consulting Economist from the University of Louisville, suggest that the construction and operation of the Project Site will have a positive economic impact statewide and on Martin County through job creation and resulting induced impacts, supply chain impacts, lease payments to private landowners, and 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. The results of this analysis are documented in the Estimated Economic Impact of Lynn Bark Energy Center, which is included as Attachment G

Attachments:

- Attachment G: Estimated Economic Impact of Lynn Bark Energy Center (14 pages)

Attachment G

Estimated Economic Impact

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RE: Estimated economic impact of Lynn Bark Energy Center

Executive Summary

Lynn Bark Energy Center, LLC (Lynn Bark or Applicant) is developing an up to 200 Megawatt (MW) alternating current photovoltaic solar power plant, known as Lynn Bark Energy Center (Project), on 1,514 acres of rugged land south of Inez, in Martin County, Kentucky¹. This letter provides estimates of the new local economic and fiscal activity expected from the development.

There are two primary impacts expected from the Project. First, there will be a spike in construction and linked jobs as the site is built out over approximately eighteen months. Using estimates of the construction payroll, I estimate that there will be a total (direct and spinoff) of 573 new jobs in Martin County in year one, with new labor compensation of \$32.3 million.

The Martin County Fiscal Court levies an occupational tax of two percent on employees' wages, salaries and other compensation. If all the estimated construction-related compensation were taxed, this would yield a one-time increase of \$647,000 in new tax revenue. And, if the compensation in the operations phase is fully captured, Martin County would receive an additional \$25,000 *annually*.

¹ See www.lynnbarkenergycenter.com/ and <https://mountaincitizen.com/2024/01/10/second-utility-scale-solar-project-proposed-for-martin-county/>

Demographic and Economic Characteristics of Martin County

Martin County is located in far eastern Kentucky, on the border of West Virginia. The Project is south of Inez, the county seat. One can see the basic geography in Figure 1. The red star indicates the approximate location of the Project. The company also provided me with a general site map, shown in Figure 2 with the Project outlined in yellow. One can see that the site is mountainous, not agricultural.

Figure 1

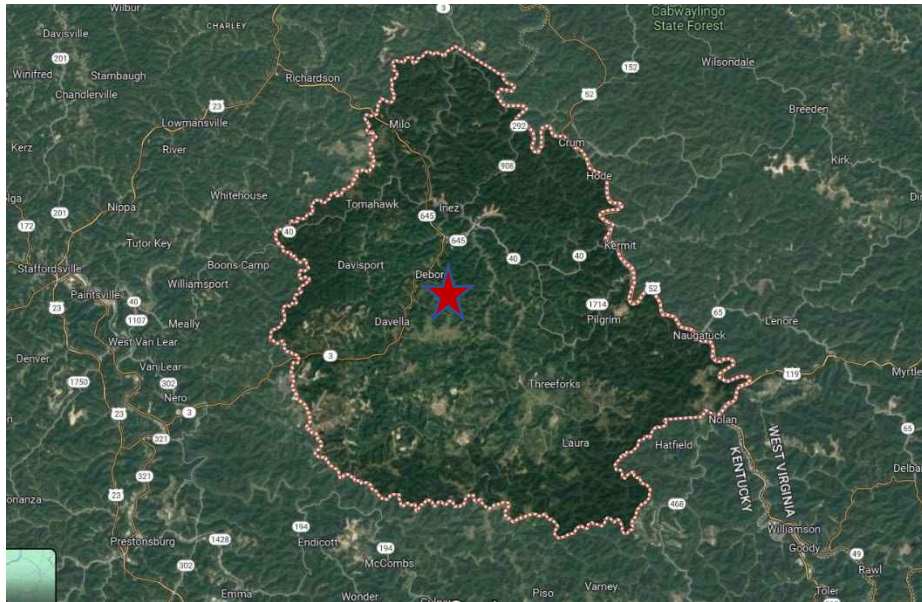


Figure 2



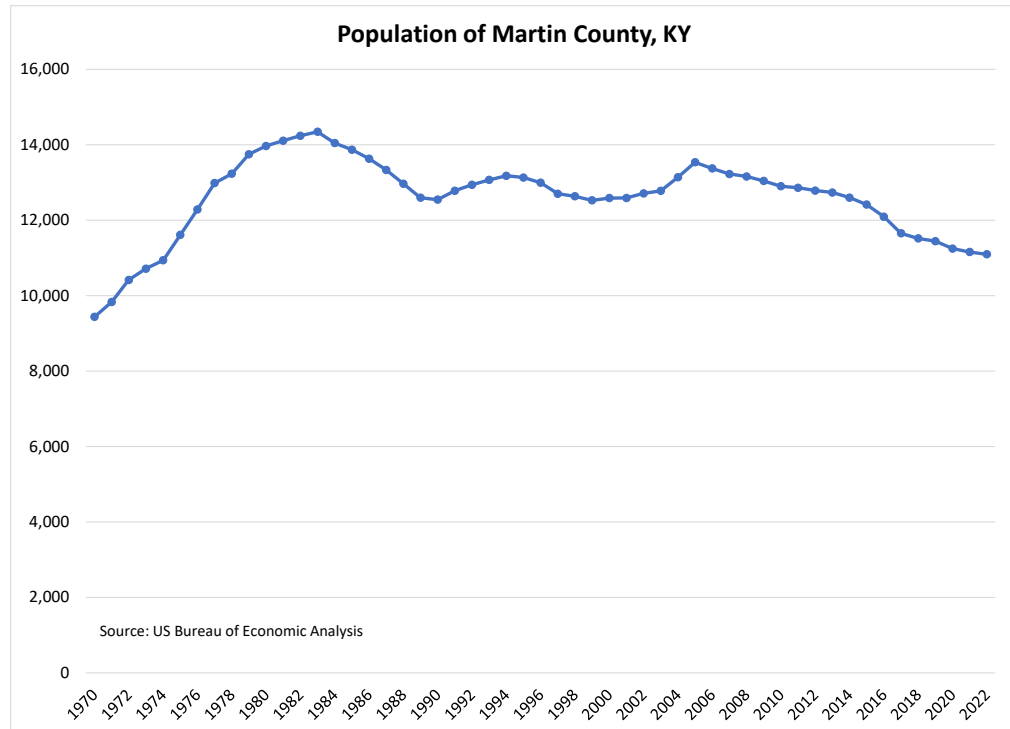
Results from the latest 2022 American Community Survey, released in December 2023, provide a nice summary of demographic and economic characteristics of Martin County.

Some details are provided in an appendix to this report. For many of the measures, the county is similar to the state of Kentucky, for example median age and persons per household. However, the county differs from the state average in a few areas:

- Compared to the Kentucky state average, the county population is more likely to be classified as white/Caucasian, more likely to have a disability, less likely to be foreign-born, less likely to be a veteran, and to have long commutes to work.
- Few adults have a four-year college degree, and a larger percentage of adults are not in the labor force.
- Residents tend to work disproportionately in natural resource industries. And, compared to Kentucky as a whole, they tend to work in public administration, construction and production and transportation occupations.
- Median household income was \$44,300, compared to a state average of \$60,200.

Martin County’s population has been declining over the past several decades, and there are now around 11,100 residents (Figure 3). It has lost about 3,000 residents (22 percent) since 1982.

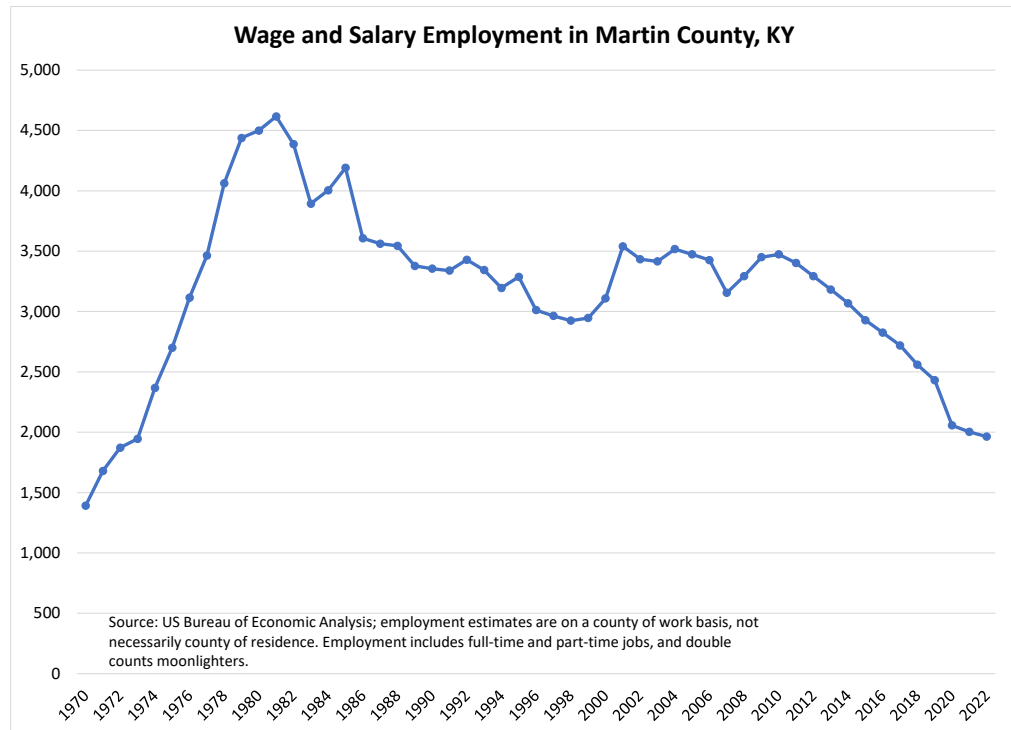
Figure 3



This demographic pattern is very correlated with the number of jobs in the county, as is evident in Figure 4. The county has less than one-half the jobs it had four decades ago. It

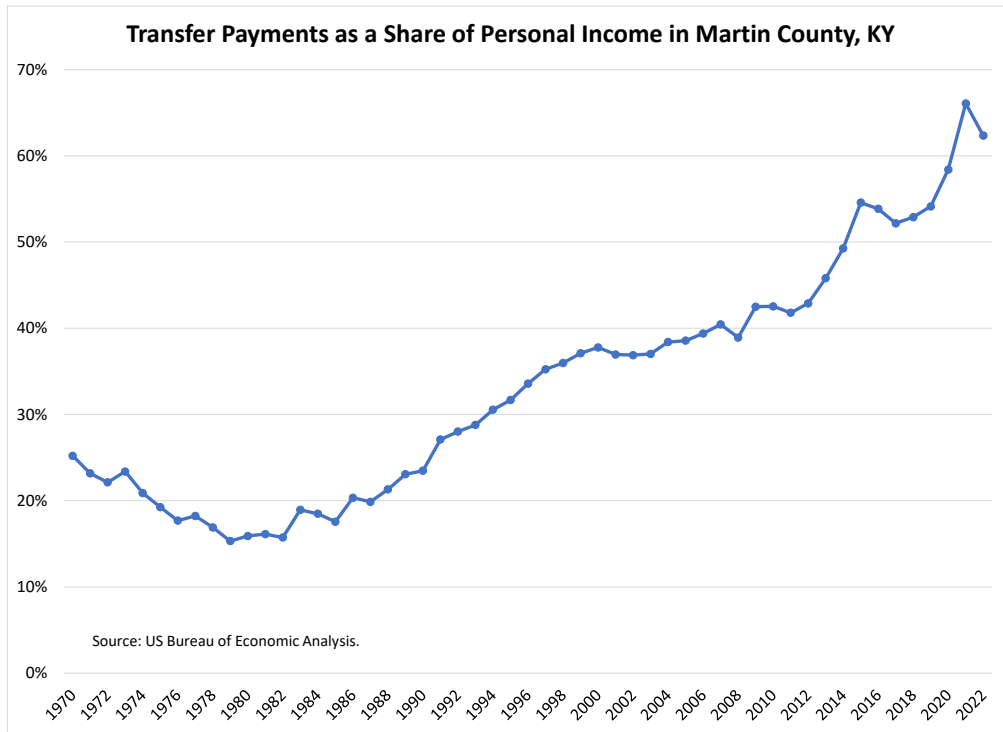
is no mystery that this reflects the loss of coal mining jobs in the county. At its peak in 1981, Martin County supported 3,100 mining jobs; by 2022 the number was less than 300. These jobs paid well, and at its peak coal mining accounted for 86 percent of earnings of workers and proprietors in the county. Unfortunately, there has not been growth in other industries to offset the loss of coal mining jobs.

Figure 4



The loss of mining jobs in Martin County had a major impact on commuting patterns. Martin County drew workers from surrounding counties and took their paychecks home. Personal income data reveal that, in 1982, nonresidents earned \$32 million more working in Martin County than Martin County residents earned working in other counties. This caused a 40 percent negative residence adjustment' in annual personal income of Martin County residents. By 2022, the adjustment was only a negative 7 percent, reflecting the loss of commuters into the county.

Figure 5



It is clear from historical data on personal income that county residents are very dependent on income from government transfer payments (Figure 5). It is the fastest growing component of personal income in Martin County. The share of residents' personal income from government transfer payments rose from 22 to 62 percent over the last five decades. The value of those transfer payments to residents, such as Social Security, Medicare, and Medicaid was \$221 million in 2022. By contrast, wages and salaries paid to workers in the county were only \$97 million.

The Census Bureau just released updated estimates of county to county commuting patterns. These reveal the historical interchange of workers to and from Martin County. We see in Table 1 that there is a balanced net flow of workers commuting in versus commuting out to surrounding counties. Local residents fill 68 percent of the 3,200 jobs in Martin County, with a significant flow of nonresidents commuting into work from Floyd, Johnson and Lawrence counties.

Consider now in Table 2 the opposite flow, where Martin County residents work. In this survey, there were 3,100 working Martin County residents, of which 70 percent worked in their home county. One can see that Johnson, Mingo, and Logan counties are the primary external destinations.

Table 1

County of Residence of Workers in Martin County, KY		
Martin	2,191	68.0%
Floyd	263	8.2%
Johnson	235	7.3%
Lawrence	160	5.0%
Mingo, WV	97	3.0%
Pike	64	2.0%
Mason, WV	46	1.4%
Wayne	36	1.1%
all other	128	4.0%
Total	3,220	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 Work for Residents of Martin County		
Martin	2,191	69.9%
Johnson	145	4.6%
Mingo, WV	118	3.8%
Logan	110	3.5%
Cabell, WV	98	3.1%
Floyd	97	3.1%
Muskingum, OH	94	3.0%
Pike	93	3.0%
All other	187	6.0%
Total	3,133	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 take a conventional approach to modeling the regional economic impacts, using a customized input-output model of Martin County². I have purchased annual economic data for all 120 Kentucky counties and use these as needed to construct regional models – of a county, a group of counties, or the whole state. The model has detailed information about the linkages among 520 potential industries in each regional economy, as well as the relationship between household spending and demand for local retail goods and services due to the employee compensation or other forms of income. When there is new industrial activity in a region, the model can predict how much of the supply chain can be met by local businesses and how much the new payroll will result in additional sales (and jobs) by local businesses.

The ratio of the total regional economic activity to a change in activity by a local 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 related spinoff activity, 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-added³.

The relevant sector for the construction phase is number 52, “Construction of new power and communication structures”, and I use this to model the initial investment. The employment multiplier for that sector in Martin County is 1.194. This is a very modest multiplier, due to the fact that almost all the materials used to assemble a solar farm are made outside Martin County; thus, there are few inter-industry impacts locally. Moreover, the county is not developed enough to supply all the goods and services demanded by households, and thus the predicted impact of the new construction wages is also relatively small as would be the impact of new wages from any development until Martin County is developed enough to supply all goods and services demanded by households.

There will also be some spin-off impacts from ongoing operations. Unfortunately, for the operations phase, the relevant IMPLAN sector, number 42, “Electric Power

² For documentation of IMPLAN modeling, see www.implan.com/history/. For this project I use economic data for 2022, the latest available.

³ Value-added is a measure of how much economic activity actually sticks to a region. For example, if one purchases a new vehicle for \$40,000 from a local dealership, only a few thousand dollars actually is captured in the county. Business revenues rise by \$40,000, but most of it flows right 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 as a result of the sale.

Generation – Solar”, is empty of data and results for Martin County. This is because there is no history of solar electricity generation and therefore no basic economic data to construct industry relationships. However, with the recent IMPLAN data for 2022, for the first time I find the sector has activity in the state level model. The employment multiplier for the state of Kentucky is 2.991. I will use that below to estimate the annual spinoff impact of operations.

Construction Payroll and Local Economic Impacts

From an economic perspective, the solar project has two phases, construction and operations. The construction phase is expected to last about one and a half years, while the operations phase will last 30 to 35 years. Almost all the employment occurs in the construction phase. The regional economic impacts consist of the direct effects of spending by the developer, and any spinoff impacts due to local purchases of supplies and new spending by households as a result of the increased incomes.

Direct effects

The company’s investment involves land acquisition, site preparation, solar panel and electrical equipment installation, plus landscaping and security fencing. Lynn Bark Energy Center, LLC plans to enter into an Engineering, Procurement, and Construction (EPC) contract for this project, so it is not possible to know precisely how many workers will be employed nor their total compensation. For modeling purposes, I am using an estimate of average employment over a one and a half years construction phase. The results of a recent California study of six large photovoltaic projects suggests that there will be an estimated average of 480 direct jobs over a twelve to eighteen-month construction period for this project⁴.

Table 3

Construction wages and benefits from 2014 Berkeley study			
	Average annual wage	Average annual benefits	Total compensation
CA Valley & Topaz Combined, Low Wage	\$52,736	\$24,104	\$76,840
Average Across Six Solar Projects	\$78,002	\$36,880	\$114,882

Source: <https://laborcenter.berkeley.edu/pdf/2014/building-solar-ca14.pdf>

⁴ A University of California-Berkeley study looked at six large PV projects in California, and summarized the economics. The author finds a ratio of 2.4 FTE construction jobs per MW. Applied to the Lynn Bark Energy Center’s up to 200 MW one gets 480 direct construction jobs. He shows the permanent operations jobs per MW, and applied to this project one gets 6.4 FTEs. See page 28 of *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>

The California study also provides a range of results for construction wages and benefits (Table 3). The lowest average annual construction wage reported was \$52,736, and the average wage across the six projects was \$78,002, as shown in the table above. California is, of course, a high-wage state, with a much higher cost of living than Kentucky. On the other hand, the wage results are from projects developed a decade ago, and there have been large increases in average wages across the US since then.⁵

Occupations include construction managers, earth grader operators, panel installers, electricians, and fencers. I searched the federal database on hundreds of occupations to learn how much these workers are likely to earn on the Project. There is no listing in the Kentucky data for “Solar Photovoltaic Installer”, but the national average annual wage in 2022 was \$50,710⁶.

Table 4

Kentucky Wages for Related Occupations, 2022			
Occupation (SOC code)	Employment	Hourly mean wage	Annual mean wage
Construction Managers(119021)	-	\$45.07	\$93,740
Operating Engineers and Other Construction Equipment Operators(472073)	6,230	\$26.20	\$54,490
Electricians(472111)	9,210	\$26.85	\$55,840
Fence Erectors(474031)	280	\$18.91	\$39,320
Industrial Engineers(172112)	5,500	\$42.29	\$87,960
Materials Engineers(172131)	330	\$47.57	\$98,940
Mechanical Engineers(172141)	2,730	\$40.87	\$85,010
Heating, Air Conditioning, and Refrigeration Mechanics and Installers(499021)	5,240	\$24.43	\$50,810
Electrical Power-Line Installers and Repairers(499051)	2,590	\$34.63	\$72,020
Telecommunications Line Installers and Repairers(499052)	1,090	\$26.10	\$54,290

Source: US Bureau of Labor Statistics, Occupational Employment Survey, <https://data.bls.gov/oes/#/geoOcc/Multiple%20occupations%20for%20one%20geographical%20area>

Good inferences about other relevant occupations can be gleaned from Table 4. The construction managers are likely to earn over \$90,000, heavy equipment operators and installers over \$50,000, electricians around \$56,000 and fencers \$39,000. The average

⁵ By contrast, a recent union-oriented report on Ohio solar projects claims temp workers there are only making \$18 to \$20 per hour, implying average annual pay of around \$40,000; See <https://columbusfreepress.com/article/ohio-solar-panel-farms-are-booming-construction-workers-are-being-exploited-make-it-happen>

⁶ Source: US Bureau of Labor Statistics, Occupational Employment Survey. For national data on solar photovoltaic installer, see www.bls.gov/oes/current/oes_nat.htm#47-2231 . For Kentucky data, see www.bls.gov/oes/current/oes_ky.htm County-level data are not available.

annual wages and salaries for all such jobs in Martin County in 2022 was \$47,970⁷. Based on this information, I assume the average annual pay across the construction occupations will be \$50,000, excluding fringe benefits.

Multiplying the expected number of jobs times the assumed average pay per job yields a direct construction payroll of \$24.0 million. The average fringe benefits, such as employer payments for health insurance, in Kentucky for the construction industry is 21 percent⁸; so, total labor compensation assumed for these jobs is \$29.1 million, or \$60,700 per job.

Total impacts in Martin County from construction

The construction phase will have spin-off effects in Martin County, due to materials and labor purchased locally. The economic impact of local supplies purchased is called the indirect effect, and the impact of new local household spending is called the induced effect. Adding these two effects to the direct effect yields the total effect of a development, as shown in Table 5. Using the Martin County model for the relevant construction sector, and the direct construction budget. I project there will be an estimated total of 573 new jobs in the county, and new labor compensation of an estimated \$32.3 million.

Table 5

Sector 52, Construction of new power and communication structures				
Impact Type	Employment	Labor Income	Value Added	Output
Direct	480.0	\$29,130,009	\$37,814,691	\$63,577,949
Indirect	41.1	\$1,696,036	\$2,816,860	\$6,899,559
Induced	52.1	\$1,522,768	\$4,130,613	\$7,176,739
Total	573.2	\$32,348,814	\$44,762,164	\$77,654,246
<i>implied multiplier</i>	<i>1.194</i>	<i>1.110</i>	<i>1.184</i>	<i>1.221</i>

Source: IMPLAN model of Martin County, using 2022 economic data.

⁷ Source: US Bureau of Economic Analysis (BEA), <https://www.bea.gov/data/by-place-county-metro-local>, Table CAINC30, average annual wages and salaries in county.

⁸ BEA provides estimates of both total compensation and total wages by industry for the state. Dividing total construction industry compensation by wages in 2022 yields 1.21.

The results can be scaled up or down to fit any assumed number of construction jobs⁹. Note that both the indirect and induced effects are small. The indirect effect is small due to the lack of local suppliers of solar farm materials. The induced effect is somewhat bigger, though still small due to the lack of retail and service businesses in the county to absorb the new household income linked to the construction jobs. Both of these constraints may indicate opportunity for further economic growth in Martin County.

Wider regional impacts from construction

Some readers may wonder why I have focused on impacts in Martin County as opposed to more widespread regional impacts. Keep in mind that most federal-state statistical agencies and models measure employment on a place of work basis, as opposed to a place of residence basis. So, all construction workers at the site are counted as Martin County jobs. Nevertheless, clearly there will be some spinoff economic activity in surrounding counties, as supplies are purchased and workers spend their paychecks at retail establishments in the region.

To investigate possible broader regional impacts, I built another IMPLAN model, this time of Martin County plus Floyd, Johnson and Lawrence counties. The results are slightly larger than that of the Martin-only simulation.

The job multipliers for the Project construction phase are 1.194 for Martin County alone, and 1.322 for the four-county region, for a net change of 61 total predicted jobs. (Other economic multipliers, such as labor income and business output, are also consistently in that range). I also performed a comparable simulation using a model covering the whole state of Kentucky. That job multiplier for the solar farm is 1.539, slightly higher than that for the four-county region. Based on our impact analysis tools, there are not significant differences in the predicted regional impacts when zooming out to adjacent counties or statewide¹⁰. In this case, the economic multipliers are relatively small whether one models one county, four, or 120. This is due primarily to the lack of industrial linkages in the region to the solar industry. Expanded solar and energy storage manufacturing in Kentucky, such as the Enervenue battery manufacturing facility in

⁹ This linear scaling is a feature of IMPLAN and other regional input-output modeling systems. It is reasonable in the case of a solar farm construction project. The feature becomes a problem in cases where an industrial development dramatically changes a local economy, for example, in the case of a large manufacturing plant in rural county. In that case, one could expect complicated and nonlinear effects, such as growth in the local population, much higher wage rates, and growth in support industries.

¹⁰ For other industrial developments around Kentucky it is common for our models to predict job multipliers of 3, 4, or 5, particularly for complicated manufacturing operations such as motor vehicles and parts.

Shelbyville, would potentially enable the state to capitalize on a larger multiplier for renewable energy projects such as this one¹¹.

Impact of Ongoing Operations

The California PV study cited above found that a ratio of 31.3 MW per permanent operations job. Applied to the Project, this results in an estimate of 6.4 permanent operational jobs at the site. As mentioned in the above discussion of modeling methods, the IMPLAN sector for solar farm operations is empty of data for Martin County, but economic activity is shown in the statewide model. The results of a simulation of 10 operations jobs is shown in Table 6. Applied to the Project, this yields a total of an estimated 19 jobs. I assume, based on the California study, employee compensation per operations job to be an estimated \$102,000. Applying the labor income multiplier, this yields total labor income in the county of an estimated \$1.2 million. These impacts occur annually for the life of the Project, expected to last 30 to 35 years.

Table 6

10 Jobs in Sector 42, Electricity Generation - Solar				
Impact Type	Employment	Labor Income	Value Added	Output
Direct	10.0	\$1,510,669	\$4,363,792	\$7,894,802
Indirect	10.2	\$785,712	\$1,905,999	\$4,110,995
Induced	9.8	\$529,264	\$958,516	\$1,707,422
Total	29.9	\$2,825,646	\$7,228,307	\$13,713,219
<i>implied multiplier</i>	<i>2.991</i>	<i>1.870</i>	<i>1.656</i>	<i>1.737</i>

Source: IMPLAN model of State of Kentucky, using 2022 economic data.

¹¹ See <https://enervenue.com/enervenue-opening-gigafactory-in-shelby-county-kentucky-to-scale-production-of-its-differentiated-energy-storage-solutions/>

Local Tax Revenues

Martin County and the Commonwealth of Kentucky levy property taxes on real estate and tangible property, and the Commonwealth taxes the value of manufacturing machinery. The latest published tax rates that are applied Countywide are provided in Table 7. They total less than one percent of the assessed value of real estate, and about one and one-half percent on the value of tangible property. The County public school system is biggest recipient of property tax revenues.

Table 7

Martin County Property Tax Rates, 2023			
in cents per \$100 valuation			
Jurisdiction	Real Estate	Tangible Personal	Manufacturers' Machinery
Extension Service	13.10	24.50	
General Fiscal Court	11.50	14.50	
Health	4.00	4.00	
Library	10.70	10.70	
County Public Schools	39.30	53.70	
State of Kentucky	11.40	45.00	
Total, County-wide	90.00	152.40	15.00
Source: Kentucky Department of Revenue			
https://revenue.ky.gov/News/Publications/Pages/Property-Tax-Rate-Books.aspx			

Martin County levies a county-wide occupational tax of two percent on wages, salaries and other compensation, as well as on the net profits of businesses¹². If construction worker compensation is fully captured by the tax, the County would receive a one-time estimated increase of \$647,000 in occupational tax revenues. And, if the compensation in the operations phase is fully captured, the county would receive an estimated additional \$25,000 *annually*.

¹² See www.martincountyky.com/occupational-tax and www.martincountyky.com/files/ugd/768605_d848824848a54385a865bfedc5cbe98b.pdf

Appendix

Demographic and Economic Characteristics of Martin County		
	Martin County	State of Kentucky
<i>Number of residents</i>	11,298	4,502,935
Median age	39.8	39.1
Percent white	89.1%	84.8%
Percent of noninstitutionalized population w disability	32.5%	17.6%
Percent foreign-born	0.90%	4.10%
Percent 18 and older veteran	2.5%	7.0%
Percent living in same house as a year ago	88.9%	86.6%
High school attainment rate, population aged 25+	75.3%	88.2%
College attainment rate, population aged 25+	10.8%	26.5%
<i>Number of Households</i>	3,756	1,769,102
Median household income	\$45,265	\$60,183
Persons per household	3.01	2.55
With broadband internet subscription	79.9%	85.6%
<i>Population 16+</i>	9,438	3,607,440
In the labor force	34.7%	59.5%
Employed civilian	32.1%	56.1%
Unemployed	2.2%	3.0%
Armed forces	0.3%	0.4%
Not in labor force	65.3%	40.5%
Median travel time to work (minutes)	30.3	23.9
<i>Civilian employed population 16 years and over</i>	3,032	2,025,396
Management, business, science, and arts occupations	31.1%	36.4%
Service occupations	17.9%	15.7%
Sales and office occupations	23.0%	20.6%
Natural resources, construction, and maintenance occupations	14.3%	8.8%
Production, transportation, and material moving occupations	13.7%	18.6%
<i>Industry</i>		
Agriculture, forestry, fishing and hunting, and mining	8.9%	1.8%
Construction	4.2%	6.2%
Manufacturing	5.1%	14.2%
Wholesale trade	2.1%	2.3%
Retail trade	16.4%	11.8%
Transportation and warehousing, and utilities	4.1%	6.8%
Information	1.0%	1.4%
Finance and insurance, and real estate and rental and leasing	10.8%	5.6%
Professional, scientific, and mgmt, and admin and waste mgmt services	4.1%	9.0%
Educational services, and health care and social assistance	24.9%	24.0%
Arts, entertainment, and recreation, and accommodation and food services	1.8%	8.1%
Other services, except public administration	2.3%	4.5%
Public administration	14.3%	4.3%

Source: US Census Bureau, American Community Survey, 5-year profiles, 2018-22,
www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/