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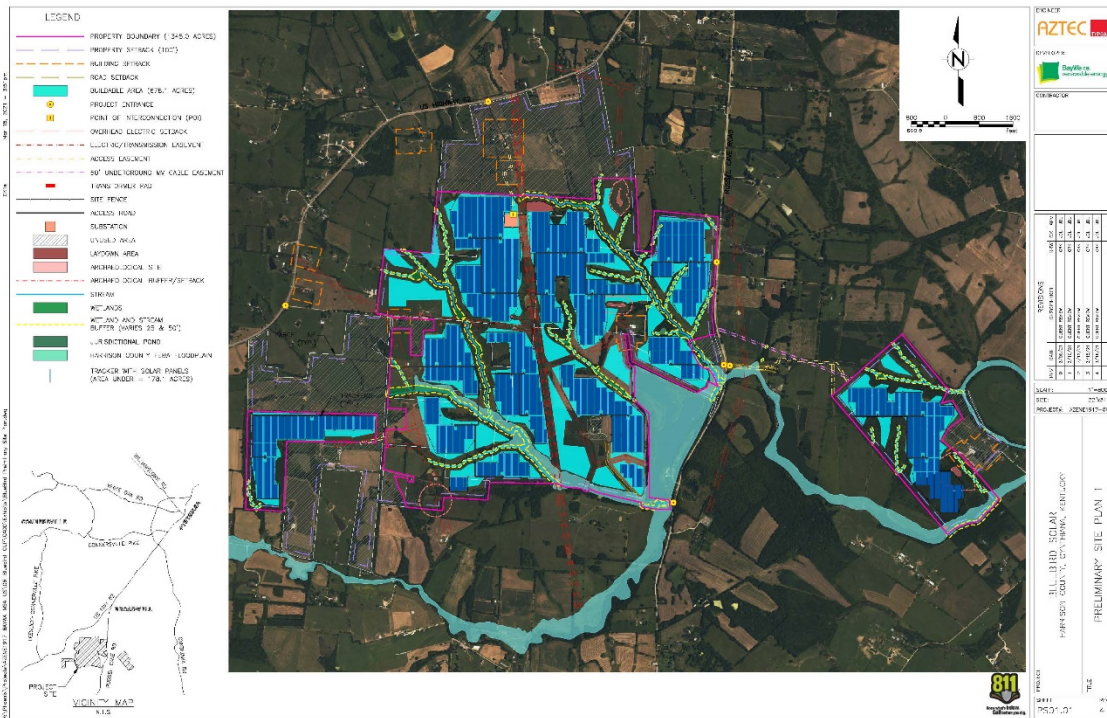
RE: Economic and fiscal impacts of the Bluebird solar energy project

This note provides estimates of the new economic and fiscal activity expected from the proposed Bluebird solar energy, just south of Cynthiana, in Harrison County, Kentucky. BayWa r.e. is developing the 1,343 acre site, which will have an electricity generation capacity of 90-100 megawatts. The company anticipates an investment of approximately \$110 million. The company and the County government have negotiated a financial agreement in support of an industrial revenue bond in which the company will make annual payments in lieu of taxes (PILOT) to local government jurisdictions, in addition to other property and income-related taxes due.

There are two primary impacts expected from the project. First, there will be a one-time spike in construction and linked jobs as the site is built out over approximately one year, with a commensurate increase in County occupational tax receipts. Using company estimates of the construction payroll, I estimate that there will be a total of 282 new jobs in the County in year one, with new payroll of \$18.22 million. That payroll would yield \$273,000 in one-time occupational tax receipts for Harrison County. Second, there will be three decades of new property tax and PILOT payments to state and local jurisdictions in Harrison County due to the increased value of real estate, machinery and tangible property installed at the site. New property taxes plus the PILOT agreement will result in over \$1.5 million in payments to jurisdictions over the subsequent thirty years.

The site

The site is about ten miles south of the Harrison County seat in Cynthiana, between US Highway 62 and Kentucky Highway 353 (Russell Cave Road). The land is currently in agricultural use. One can see in the site map below the farmland, with Highway 62 on the left and Highway 353 on the right. The two highways meet just north of the site, at Broadwell.



Construction phase

The company expects to invest over \$110 million in the solar project. The investment involves land acquisition, site preparation, solar panel and electrical equipment installation, plus landscaping and security fencing. BayWa r.e. will hire construction companies for this project, and has detailed estimates of material and labor costs by type. Using their detailed data on hours required by occupation, I estimate that on-site labor costs will amount to \$15.10 million. The estimated average wage per hour, excluding fringe benefits and other indirect labor costs, is \$35.46. So, this implies about 213 jobs over a twelve-month construction period. Assuming 2,000 work hours per year, this implies an average annual wage of \$70,920. The average annual pay for all jobs in Harrison County in 2019 was \$41,573¹.

¹ Source: US Bureau of Economic Analysis, average annual wages and salaries in county.

Spin-off impacts in Harrison County

The construction phase will have some spin-off effects in Harrison County. I model this using a custom IMPLAN model of the County². The relevant sector for the construction phase is number 52, “Construction of new power and communication structures”, and this can be used to model the initial investment. The direct effect in the County is 213 jobs over one year, with a payroll of \$15.10 million.

The model has detailed information about the inter-industry linkages in each regional economy, as well as the expected household spending on retail goods and services due to the enhanced employee compensation. 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 by local businesses. Adding these two effects to the direct effect yields the total effect of a development, and dividing the total effect by the direct effect yields a multiplier. Using the Harrison County multipliers for the relevant construction sector, and the direct construction budget, I project there will be a total of 282 new jobs in the County, and new payroll of \$18.22 million.

There will also be some modest spin-off impacts from ongoing operations. The company expects operations to support only two or three jobs. Unfortunately, for the operations phase, the relevant IMPLAN sector, number 42, “Electric Power Generation – Solar”, is empty of data and results for Harrison County. This is because there is no history of solar electricity generation and therefore no basic economic data to construct industry relationships. A reasonable recourse is to tap the literature on solar project impacts, find comparable places, and use other studies to estimate the likely operational impacts on local economies in Kentucky. A California PV study of six large solar farms found that a ratio of 31.3 MW per permanent operations job. Applied to the Bluebird project, this results in an estimate of only three permanent operational jobs at the site³. Another example, the Shugart solar farm in Maryland was studied extensively, and analysts projected that annual operations will support a total of only four jobs in the County

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

³ 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 Bluebird’s 90 MW you get 216 direct construction jobs. He shows the permanent operations jobs per MW, and applied to Bluebird you get about 3 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>

(including modest spinoff activity)⁴. Thus, ongoing annual economic impacts are expected to be very small relative to the one-time impacts of construction.

Possible multi-county impacts

The economic impact discussion above focuses only on Harrison County. How would the estimates change if the impact area was widened to include nearby counties? The direct jobs and payroll from construction take place in Harrison County, but the spin-off impacts could take place more widely, as vendors in surrounding counties support the project, and regional retailers absorb some of the new spending from payrolls. For example, construction workers might stay in motels in nearby Georgetown or Lexington, eat meals at restaurants there, purchase gas for their vehicles, etc.

County of Residence of Workers in Harrison County		
Harrison	3,644	74.1%
Fayette	259	5.3%
Nicholas	222	4.5%
Bourbon	208	4.2%
Pendleton	141	2.9%
Robertson	133	2.7%
Scott	93	1.9%
Bracken	72	1.5%
all other	146	3.0%
Total	4,918	100.0%

Source: US Census Bureau, American Community Survey, Residence County to Workplace County Commuting Flows, 5-Year ACS, 2011-2015

County of Work for Residents of Harrison County		
Harrison	3,644	50.7%
Scott	1,531	21.3%
Fayette	660	9.2%
Bourbon	558	7.8%
Pendleton	230	3.2%
Grant	139	1.9%
Boone	98	1.4%
Franklin	75	1.0%
all other	250	3.5%
Total	7,185	100.0%

Source: US Census Bureau, American Community Survey, Residence County to Workplace County Commuting Flows, 5-Year ACS, 2011-2015

⁴ See pages 13-14 of the July 31, 2019 study of the Shugart, Maryland project: <https://mde.maryland.gov/programs/Water/WetlandsandWaterways/Documents/Solar/Shugart-Solar-Socio-Economic-Justification-Report-FINAL.pdf>

It is clear from data on county-to-county commuting patterns that Harrison County residents to a large degree tend to work in surrounding counties. About one-half of its 7,185 working residents commute to work in a nearby county. Harrison County residents drive to Scott, Fayette, Bourbon, and other counties to take advantage of more job opportunities and higher pay. By contrast, only about one-quarter of people working in Harrison County are nonresidents. A few hundred workers commute from Fayette, Nicholas, Bourbon and other nearby counties into Harrison.

The commuting patterns suggest that the regional impacts of a major construction project in Harrison County would be primarily confined to a few counties within a short drive from the site. Zooming out geographically will always increase the estimated economic impact of a development, since more suppliers and outlets for household purchases are brought into the analysis. To learn about the sensitivity of the regional scope, I built another IMPLAN model using the latest economic data for seven counties – Harrison, plus Bourbon, Fayette, Nicholas, Pendleton, Robertson, and Scott. I then simulated the impact of the 213 direct construction jobs in the new power sector as before. The results are summarized below. One can see the modest increase in estimated economic impacts from widening the geographic scope of the analysis. Using a seven county model results in an additional 55 regional jobs, and \$3.2 million in new labor income, from the construction phase⁵.

Estimated Total Economic Impacts		
Model	Employment	Labor Income
Harrison County only	281.9	\$18,217,330
Seven regional counties	336.4	\$21,408,862

Local tax revenues, IRB, PILOT agreement

Harrison County and the Commonwealth of Kentucky levy property taxes on real estate and tangible property, with the state also taxing manufacturing machinery. The table below provides the latest tax rates that are applied County-wide. They total about one percent of the assessed value of property. The only other taxing jurisdiction in the County are the cities of Berry and Cynthiana, but the Bluebird project is outside their city boundaries and thus would not be subject to those property taxes. Harrison County

⁵ I also simulated the construction impact on a statewide Kentucky model. The results were almost identical to those from the seven-county model. This is presumably because there are few suppliers in the state for the materials used in a solar farm.

also levies an occupational license fee (payroll) and a net profits tax, both with a rate of 1.5 percent. Applied to the construction-related payroll, this implies a one-time annual boost in County occupational tax revenues of \$273,000. The project’s annual operations would also be subject to the County net profits tax, assuming it earns a profit.⁶ I cannot predict the likely net profits taxes to be paid, but they could be significant over the next three decades.

Harrison County Property Tax Rates, 2020		
in cents per \$100 valuation		
Jurisdiction	Real Estate	Tangible Personal
Extension Services	5.5490	12.3512
Fiscal Court - General	10.6000	12.9000
Health Department	4.5000	4.5000
Soil Conservation	1.1000	0.0000
Library	7.0000	12.9100
Fire District	6.2000	6.2000
County Public Schools	51.7000	51.7000
Total, County-wide	86.6490	100.5612
Source: Kentucky Department of Revenue		
https://revenue.ky.gov/News/Publications/Pages/Property-Tax-Rate-Books.aspx		

The County and the company have negotiated an Industrial Revenue Bond (IRB) and a Payment in Lieu of Taxes (PILOT) agreement, whereby the company makes annual payments to the County jurisdictions. The company and its consultants made projections of the increased land value and the annual value of machinery and tangible property, under standard depreciation schedules, over the subsequent thirty years. Current property tax rates were applied, and annual tax estimates were calculated. The projected new property taxes plus the PILOT amount to over \$1.5 million over the next thirty years. These payments, averaging around \$50,000 per year, can be compared to the \$16,000 per year currently paid by landowners of the site (almost all of which is assessed at its agricultural use value). It should be pointed out that solar projects like this require almost no public services from local government; and because they require

⁶ The project has agreed to pay County occupational taxes on its net profits apportioned to the County as part of its PILOT agreement.

so few people to operate do not add students and expenses to the local public school system.