Attachment G
Economic Impact Report

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RE: Estimated economic and fiscal impacts of Logan County solar project

Silicon Ranch is developing a solar farm with 173 MW generating capacity on about 1,600 acres of farmland near Russellville, in Logan County KY. According to news reports, the company will invest approximately $150 million to provide electricity for the TVA Green Invest program[1]. Prospective customers include Facebook's data center in Gallatin TN and the GM Corvette plant in Bowling Green. This note provides estimates of the new economic and fiscal activity expected from the development.

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 estimates of the construction payroll, I estimate that there will be a total of 529 new jobs in the County in year one, with new payroll of $25.1 million. That payroll would yield $189,000 in one-time occupational tax receipts for Logan County.

Second, there will be three to four decades of new property-related tax payments to state and local jurisdictions in Logan County due to the increased value of real estate, machinery and tangible property installed at the site. The County is assessing the potential issuance of an Industrial Revenue Bond in support of the project. The company proposes making Payments in Lieu of Taxes (PILOT) to Logan County jurisdictions, including the public schools, of $6 million over thirty years. The proposed PILOT

[1] See www.bgdailynews.com/news/logan-county-to-get-1-600-acre-solar-farm/article_55232e0b-9019-5ab3-a401-83f4d5fb096d.html

payments average $200,000 per year, but only covers tangible personal property. The taxable value of the land is expected to jump from around $1,400 to $9,500 per acre due to the development. Combined with the proposed PILOT payments, this means the project would result in an average of $484,000 per year in property taxes to local jurisdictions, including the school system, for the first thirty years. This is approximately twenty times larger than current property tax payments from the farmland. Additionally, the expected project life is forty years, so increased real and tangible property taxes would continue for another decade after the proposed PILOT expires.

Construction phase

The company expects to invest approximately $150 million in the solar project. The investment involves land acquisition, site preparation, solar panel and electrical equipment installation, plus landscaping and security fencing. Silicon Ranch will hire construction companies for this project, and has announced that at its peak there will be 450 workers on site. For modeling purposes, I am using an estimate of average employment over a one-year construction phase. Using the results of a recent California study of six large photovoltaic projects suggests that there will be an average of 415 direct jobs over a twelve-month construction period for this project[2].

[2] 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 Silicon Ranch's 173 MW you get 415 direct construction jobs. He shows the permanent operations jobs per MW, and applied to this project you get about 6 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

Kentucky Wages for Related Occupations, 2020			
Occupation (SOC code)	Employment	Hourly mean wage	Annual mean wage
Construction Managers(119021)	1,270	$41.64	$86,610
Operating Engineers and Other Construction Equipment Operators(472073)	4,350	$24.21	$50,360
Electricians(472111)	9,610	$25.39	$52,810
Fence Erectors(474031)	190	$14.55	$30,270
Industrial Engineers(172112)	4,830	$39.02	$81,170
Materials Engineers(172131)	400	$45.63	$94,910
Mechanical Engineers(172141)	3,170	$39.86	$82,910
Heating, Air Conditioning, and Refrigeration Mechanics and Installers(499021)	4,870	$21.44	$44,600
Electrical Power-Line Installers and Repairers(499051)	2,660	$28.60	$59,490
Telecommunications Line Installers and Repairers(499052)	940	$21.58	$44,890

Source: US Bureau of Labor Statistics, Occupational Employment Survey, www.bls.gov/oes/current/oes_ky.htm

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 2020 was $48,020[3]. Good inferences about other relevant occupations can be gleaned from the accompanying table. The construction managers are likely to earn over $80,000, heavy equipment operators around $50,000, installers around $45,000, electricians around $53,000, and fencers $30,000. These data suggest that a $50,000 average pay assumed for construction jobs is reasonable. The average annual pay for all jobs in Logan County in 2020 was $47,849[4]. Multiplying the 415 jobs times the average pay per job yields a direct construction payroll of $20.75 million.

Spin-off impacts in Logan County

The construction phase will have some spin-off effects in Logan County. I model this using a custom IMPLAN model of the County[5]. The relevant sector for the construction phase is number 52, "Construction of new power and communication structures", and

[3] 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#47-0000 . For Kentucky data, see www.bls.gov/oes/current/oes_ky.htm .

[4] Source: US Bureau of Economic Analysis, https://www.bea.gov/data/by-place-county-metro-local , Table CAINC30, average annual wages and salaries in county..

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

this can be used to model the initial investment. The direct effect in the County is 415 jobs over one year, with a payroll of $20.75 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 (and jobs) 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 Logan County multipliers for the relevant construction sector, and the direct construction budget, I project there will be a total of 529 new jobs in the County, and new payroll of $25.1 million.

Regional impacts from construction

Some readers may wonder why I have focused on impacts in Logan 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 Logan 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. One can see from the latest data on commuting patterns that 78 percent of workers in Logan County are also residents of Logan County. Warren County also supplies a significant share of workers, as do contiguous counties Todd, Muhlenberg, and Butler.

County of Residence of Workers in Logan County

	Number	Share of Total
Logan County	7,044	77.9%
Warren County	692	7.7%
Todd County	393	4.3%
Muhlenberg County	317	3.5%
Butler County	181	2.0%
other counties	412	0.8%
Total workers	9,039	100.0%

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

To investigate possible broader regional impacts, I built another IMPLAN model, this time of Logan and the four counties supplying the most workers. The results are somewhat larger than that of the Logan-only simulation, primarily because of the inclusion of the much more populous Warren

County. It is only 26 miles between Russellville and Bowling Green, and Warren County supports a much more developed industrial and retail economy than Logan.

The job multipliers for the solar farm construction phase are 1.275 for Logan alone, and 1.500 for the five-county region, for a net change of 93 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. The job multiplier for the solar farm is 1.564, almost identical to that for the five-county region. Based on the best impact analysis tools available, there are not significant differences in the predicted regional impacts when zooming out to adjacent counties or statewide[6]. In this case, the economic multipliers are relatively small whether one models one county or five or 120. This is due to the lack of industrial linkages in the region to the solar farm industry, and to the thinness of retail and service industries to absorb new household spending. Logan County is sparsely populated, and simply does not support businesses that supply much of what its residents demand. Residents will travel to nearby larger cities to make major purchases of commodities, and to spend money on entertainment, travel, health care, and other services not available at home.

Ongoing operations

There will also be some modest spin-off impacts from ongoing operations. The company expects operations to support a few jobs. Unfortunately, for the operations phase, the relevant IMPLAN sector, number 42, "Electric Power Generation – Solar", is empty of data and results for Logan County. This is because there is no history of solar electricity generation and therefore no basic economic data to construct industry relationships. (The sector is also empty of data for the statewide model, for the same reason). 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. The California PV study cited above found that a ratio of 31.3 MW per permanent operations job. Applied to the Logan County project, this results in an estimate of six permanent operational jobs at the site. Thus, ongoing annual economic impacts are expected to be very small relative to the one-time impacts of construction.

[6] For many other industrial developments around Kentucky it is not unusual for our models to predict job multipliers of 3, 4, or 5, particularly for complicated manufacturing operations such as motor vehicles and parts.

It is beyond the scope of this analysis to try to net out all the other economic impacts from the change in land use. Relevant negative factors include the loss of expected income from crop farming and that farming's linkages to local suppliers of seed, feed, and other supplies. On the positive side are the relatively large lease payments going to the farm owners, the income to the several new operations jobs at the solar farm, the new income from sheep ranching at the site, plus the linkages of those income streams to the local economy. To measure all these would require some basic information about current farm activity, the amount of lease payments to farm owners, the likely number of sheep to be grazed, as well as any contractual arrangements between the solar farm owner and the sheep operation.

Local tax revenues

Logan 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 table below provides the latest published tax rates that are applied County-wide[7]. They total less than one percent of the assessed value of property. There are four other municipal taxing jurisdictions in Logan County, but the project is outside their city boundaries and thus would not be subject to those property taxes. Logan County levies a county-wide occupational license fee (payroll) and a net profits tax, both at a rate of 0.75 percent[8]. Thus, assuming the above construction payroll is met, the County will receive about $189,000 in occupational tax payments.

[7] Tax rates for 2021 have been set and applied, but have yet to be published by the Kentucky Department of Revenue.

[8] See https://logancounty.ky.gov/Documents/ordinance0422059.pdf

Logan County is assessing the potential issuance of an Industrial Revenue Bond (IRB) in support of the project. The company proposes making Payments in Lieu of Taxes (PILOT) to Logan County jurisdictions, including the public schools, of $6 million over thirty years[9]. This can be compared to the $1.9 million the County and schools would have received from tangible personal property taxes without the IRB and PILOT. Thus, overall, the proposed PILOT payments would average $200,000 per year for three decades.

Logan County Property Tax Rates, 2020

in cents per $100 valuation

Jurisdiction	Real Estate	Tangible Personal
Extension Services	4.7920	5.6983
Fiscal Court - General	13.0000	18.5000
Health Department	2.5000	2.5000
Library	9.2000	12.1200
Soil Conservation	1.5000	0.0000
County Public Schools	47.3000	47.3000
Two Watershed Special Districts	11.3500	0.0000
Total, County-wide	89.6420	86.1183

Source: Kentucky Department of Revenue

https://revenue.ky.gov/News/Publications/Pages/Property-Tax-Rate-Books.aspx

In order to obtain an IRB, the County Judge Executive and Fiscal Court must provide a bond inducement resolution and there would be a corresponding PILOT that indicates the school property taxes will remain 100 percent whole as if there was no IRB in place. But the PILOT only covers tangible personal property. The taxable value of the land is expected to jump from around $1,400 to $9,500 per acre due to the development. Combined with the proposed PILOT payments, this means the project will result in an average of $484,000 per year in property taxes to local jurisdictions, including the school system, for the first thirty years. This is approximately twenty times larger than current property tax payments from the farmland, as discussed in the next paragraph. Additionally, the expected project life is forty years, meaning increased real and tangible property tax payments will continue for another decade after the proposed PILOT expires.

The company provided me with the parcel numbers of the land for the site, and I looked up their ownership, taxable value, and current property tax payments through the website of the Logan County PVA. The nine parcels have a combined taxable value of $1.826 million, and generated $14,100 in property taxes in 2020, almost all going to local jurisdictions. It should be pointed out that solar projects like this require almost no

[9] The cost values, depreciation rates, taxable values, PILOT calculations, and other assumptions were performed by Altus, and the relevant spreadsheet was provided to me as a reference for these statements.

public services from local government; and because they require so few people to operate do not add students and expenses to the County public school system.