



The Economic and Tax Revenue Impact of the Pierce County Energy Center

Economic Impact Memo
Prepared for Pierce County Energy Center

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July 06, 2024
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Executive Summary

A 420 megawatt ("MW") solar energy facility with 170 MW battery storage capacity is to be built in Pierce County, Nebraska. This memo provides an estimate of the potential economic impact of the facility on Pierce County and the surrounding region, both during the construction period and annual operations. There would be an economic impact of \$316.4 million on the regional economy during the construction period, including 542 jobs. The annual economic impact during the multi-decade operation period would be \$5.7 million in business activity each year, including \$360,000 in labor income earned in 9 jobs. The annual average local tax revenue impact would be \$2,057,000.

A. Introduction

This study from the University of Nebraska-Lincoln Bureau of Business Research estimates the economic and tax revenue impact of a potential 420 megawatts ("MW") (AC) solar facility with 170 MW battery storage capacity located in Pierce County, Nebraska, with 2,230 acres of land leased or purchased to house the facility. Estimates of the economic and tax revenue impact of the potential facility are provided for: 1) the development period when the solar and battery storage facility is built, and 2) during annual operations. Impacts are provided for the Pierce County region that includes Pierce, Antelope, Boone, Cedar, Colfax, Cuming, Dakota, Dixon, Holt, Madison, Platte, Stanton, and Wayne Counties in Nebraska. Economic impacts are presented in terms of output (sales), labor income, and employment. Output provides the broadest measure of economic activity, while employment and labor income are key measures of the impact on the labor market. Note that labor income is a component of output, implying that the output and labor income impacts should not be summed up. Tax revenue impacts examine major local tax revenue sources, including revenue from the Nameplate Capacity Tax and Personal Property Tax collected on battery storage components.

The economic impact of developing a solar and battery storage facility occurs in two separate phases. First, there is a temporary impact in the development phase, during the years when the solar facility is built, and battery storage is installed. Second, there are annual impacts from the operations of the facility. The annual operations impact typically occurs for several decades. Note that there is some loss of economic activity during both the development phase and the annual operations phase when agricultural land is taken out of production at the facility site.

The Pierce County Energy Center Solar and Battery Storage Facility would have estimated construction, materials, and development costs of approximately \$814.5 million. There would be an estimated 275 job years of labor when the facility is being assembled. A significant portion of development costs would be paid for battery storage components, solar panels, and other electronic equipment that are manufactured outside of the region.

The annual operating costs are \$6.4 million for the 420MW (AC) solar facility with battery storage. Economic impact analysis also considers lost economic activity on land taken out of agricultural production. Crop production is typically corn and soybeans in Pierce County. While not all land used for a solar project is in production agriculture, and some agricultural operations may remain within the project footprint, this memo assumes current crop production and pastureland activity will discontinue on 2,230 acres once facility development begins.

Development costs and annual operating costs reflect the direct economic impact of the solar and battery storage facility in the development phase and operations phase, respectively. Beyond these direct impacts, there are “multiplier” impacts on other local businesses that assist with facility construction during the development phase, or with annual facility operations. There are additional multiplier impacts on local businesses due to spending by the owners of leased or purchased land, by construction workers during the development phase, and by solar facility employees during annual operations. The multiplier impact therefore reflects opportunities for other businesses and workers in the Pierce County region. Economic multiplier impacts are estimated utilizing the IMPLAN software, which can be used to estimate multipliers for specific geographies such as states, counties, or combinations of counties. The total economic impact of the solar and battery storage facility is the sum of the direct economic impact of the facility plus the multiplier impact on other regional businesses. Lost crop production and pastureland activity reduce the direct, multiplier, and total economic impact of the solar and battery storage facility.

Local tax revenue impacts flow primarily from the annual Nameplate Capacity Tax of \$3,518 per MW of solar facility capacity and Personal Property Tax on battery storage components. Local property tax revenue, however, also increases due to real property installed at the facility site. In addition, there are property and sales taxes related to rising local income.

B. The Development Period Impact

Table 1 below summarizes the economic impact during the development period. The development period impact is based on an estimate that 34 percent of the total solar and battery storage investment would be construction activity that directly benefits the region. This figure excludes solar panels, battery storage components, and other electronic equipment but includes construction costs and the value of other infrastructure put in place at the facility. The facility will be under construction from September 2024 through May 2027. There would be 275 job-years of employment during this period with estimated earnings of \$19.3 million.

Analysis in Table 1 also subtracts the lost value of crop production and pastureland activity during 2 growing seasons, in 2025 and 2026. There would have been an estimated \$2.7 million in crop production or pastureland activity in two seasons on the 2,230 acres. The analysis assumes land currently allocated to crops would have been utilized for growing corn and soybeans if it had remained in agricultural production, as USDA data suggests that Pierce County cropland is largely devoted to corn and soybeans. It is further assumed that the approximately 720 acres which is currently pasture would continue in that land use. The analysis assumes growing yields through 2026 and USDA forecast prices for corn and soybeans during the 2025 to 2026 period and that recent annual values for pastureland will continue in the future.¹

Table 1 further shows the net direct economic impact of the development period, which is the impact of building the solar facility less the lost impact due to agricultural production. The net direct impact during the development period is \$276.3 million in output, including \$18.8 million in labor income spread over 272 job-years.

¹ Corn yields are estimated to grow by 1.9 bushels per acre from the mean value in the 2011 to 2020 period through 2026, based on Purdue University (available at <http://www.kingcorn.org/news/timeless/YieldTrends.html>), while soybean yields are estimated to grow by 0.68 bushels per acre according to the University of Nebraska-Lincoln (<https://cropwatch.unl.edu/soybeans/yields>). Crop price projections for 2025 through 2026 of \$4.30/bushel for corn and \$10.63/bushel for soybeans were taken from *USDA Long-Term Agricultural Projections* (February 2024). The potential annual value of an acre of pastureland for cattle grazing was estimated using 10-year price averages and following the approach in "Estimating a Fair Value for Standing Forage," *Cornhusker Economics* (July 2020) by Jay Parsons, Daren Redfean, Mary Drewnoski, and Robert Tigner

i. Multiplier Impact on Other Businesses

Also important is the multiplier impact during the development period, which is a measure of the impact on other businesses (besides the solar and battery storage facility) and workers in the Pierce County region. The multiplier impact for the construction of the facility is much less than the direct impact, given that only a modest portion of the materials and construction services are purchased from businesses in the Pierce County region. It is estimated that there will be \$23.7 million in purchases from regional businesses. Payments to leaseholders who live in the region and wages to regional construction workers further support regional businesses as these households spend some of their income locally. In addition, out-of-state construction workers also pay rent or for lodging and have restaurant and miscellaneous spending. The Pierce County Energy Center reports that the leaseholders (and sellers of land for the project) live in Pierce County and 40 percent of construction workers would come from the Pierce County region. It is expected that 50 percent of construction workers would come from adjacent regions in Nebraska or Iowa while 10 percent would come from elsewhere in the nation.

The multiplier impact from solar and battery storage development is estimated to be \$41.0 million in output during the development period, as seen in Table 1. As noted earlier, the multiplier impact is estimated using the IMPLAN model. Further, there is a lost multiplier impact of \$1.0 million in output during the development period from lost crop production.

The net multiplier impact on Pierce County region businesses is \$40.0 million during the development period. This impact includes job and income opportunities for regional workers. Other Pierce County region businesses would add 270 jobs during the development period with a labor income of \$13.7 million. These jobs would be created in construction businesses and throughout the economy as businesses purchase services and workers spend their paychecks.

Table 1 further reports the total economic impact during the solar project development period. The total economic impact is the sum of the direct economic impact and the multiplier impact.

Table 1. Estimated Economic and Tax Revenue Impacts from Solar and Battery Storage Facility Construction			
	Solar Facility Construction	Lost Agricultural Production	Net Impact
Direct Impact			
Output (\$)	\$279,000,000	-\$2,653,000	\$276,347,000
Labor Income (\$)	\$19,274,000	-478,000	\$18,797,000
Job-Years	275.0	-3.4	271.6
Multiplier Impact			
Output (\$)	\$41,046,000	-1,043,000	\$40,003,000
Labor Income (\$)	\$13,994,000	-\$248,000	\$13,747,000
Job-Years	275.6	-5.3	270.3
Total Impact			
Output (\$)	\$320,046,000	-\$3,696,000	\$316,350,000
Labor Income (\$)	\$33,269,000	-\$726,000	\$32,543,000
Job-Years	550.6	-8.7	541.9
Source: UNL-BBR calculations utilizing the IMPLAN model.			
Note: The direct impact and multiplier impact may not sum precisely to the total impact due to rounding. Likewise, the solar construction impact less the impact of lost agricultural production may not precisely sum to the net impact due to rounding.			

C. The Impact of Annual Operations

The annual economic impact is driven by the yearly operating costs of a business, and the size and wages of its workforce and purchases from local businesses. The net impact from converting 2,230 acres of cropland and pasture into a solar facility site therefore depends in part on the operating costs of each land use. Table 2 below shows the operating costs per acre for a solar and battery storage facility, along with the value generated by an acre of crop and pastureland.

Estimates in Table 2 are derived by dividing the \$6.4 million in annual operating costs for the solar facility, and \$1.3 million generated through agricultural activity, by 2,230 acres of land. The solar facility would have estimated operating costs of \$2,870 per acre each year. The annual value of agricultural production is estimated at \$601 per acre. Therefore, there would be a net increase of \$2,269 in operating cost per acre each year as agricultural land is used for a solar and battery storage facility. This suggests a net increase in economic impact although the impact also depends on the level of employment and purchases associated with each land use.

Table 2. Estimated Annual Cost Per Acre from Solar and Battery Facility Operations			
	Solar Facility Operations	Lost Agricultural Production	Net Impact
Per Acre	\$2,870	\$601	\$2,269
Source: UNL-BBR estimates based on USDA and Department of Energy data			

Table 3 shows the direct, multiplier, and the total economic impact of the annual operations of a 420(ac) MW solar facility with battery storage on 2,230 acres of land. Further, annual labor market impacts are provided in terms of labor income, along with associated employment. Finally, Table 3 shows the annual average local tax revenue impact. The 420(ac) MW facility would directly employ 5 full-time equivalent workers from within the Pierce County region with an estimated labor income of \$405,000, as seen in Table 3.

Table 3 also shows multiplier impacts. In the case of solar farm and battery storage operations, the multiplier impact reflects economic activity in the Pierce County region generated due to 1) spending of landowner lease payments, 2) the household spending of 5 workers who live within the Pierce County region, and 3) the impact from annual purchases from Pierce County region contractors for landscaping. The multiplier impact of annual operations is \$1.2 million in output, \$0.3 million in labor income, and 8.1 jobs. Table 3 also reports the lost multiplier impact of agricultural production.

The net multiplier impact from annual operations is the multiplier impact from solar and battery storage facility operations less the lost multiplier impact from agricultural production as land use changes. The net multiplier impact is \$0.7 million in output each year, \$0.2 million in labor income, and 5.4 jobs. This represents the annual net increase in opportunities for other businesses in the Pierce County region due to the operation of the Pierce County Energy Center.

Stated another way, the annual spillover of sales opportunities, employment, and labor income at other Pierce County region businesses is greater when the 2,230 acres are utilized for a solar and battery storage facility than when the acres are used for agricultural production.

The net total economic impact is \$5.7 million per year during operations, including \$360,000 in labor income spread over 8.9 jobs.

Table 3 further shows the Nameplate Capacity Tax paid to local governments from the 420(ac) MW solar farm each year and the annual average Personal Property Taxes paid on battery storage components. The annual Nameplate Capacity Tax is \$3,518 per MW in Nebraska. At that rate, the 420(ac) MW solar facility would generate \$1,477,560 each year in local tax revenue. Personal Property Tax paid on battery components would generate an annual average

of \$390,000 per year under a 30-year operating life for the facility. Table 3 further shows local tax revenue from property and sales taxes. The development of the solar and battery storage facility would not change the assessed value of the 2,230 acres of agricultural land but would increase the assessed value of real property located on that land given the present value of lease payments and the construction of concrete pads, the operations and maintenance building and a road on the 2,230-acre property. We conservatively estimate that the combined value of the increase in real property tax plus the Nameplate Capacity Tax would be \$4,000 per MW.

Table 3. Estimated Economic and Tax Revenue Impacts from Annual Operations of 420(ac) MW Solar Facility with Battery Storage Located on 2,230 Acres of Agricultural Land			
	Solar Facility Operations	Lost Agricultural Production	Net Impact
Direct Impact			
Output (\$)	\$6,400,000	-\$1,339,000	\$5,061,000
Labor Income (\$)	\$405,000	-\$241,000	\$164,000
Jobs	5.2	-1.7	3.5
Multiplier Impact			
Output (\$)	\$1,180,000	-\$527,000	\$653,000
Labor Income (\$)	\$321,000	-\$125,000	\$196,000
Jobs	8.1	-2.7	5.4
Total Impact			
Output (\$)	\$7,580,000	-\$1,866,000	\$5,714,000
Labor Income (\$)	\$726,000	-\$366,000	\$360,000
Jobs	13.3	-4.4	8.9
Local Tax Revenue			
Nameplate Capacity Tax	\$1,477,600	\$0	\$1,477,600
Personal Property Tax on Battery Storage (annual average)	\$390,000	\$0	\$390,000
Other Property and Sales Taxes	\$547,700	-\$358,000	\$189,700
Total	\$2,415,300	-\$358,000	\$2,057,300
Source: UNL-BBR calculations utilizing the IMPLAN model. Personal Property Tax revenue estimates from Baird Holm LLP			
Note: The direct impact and multiplier impact may not sum precisely to the total impact due to rounding. Likewise, the solar facility operations impact less the impact of lost agricultural production may not precisely sum to the net impact due to rounding.			

The sales tax impact reflects sales in the Pierce County region generated by additional income. There is approximately \$0.35 in taxable purchases for each \$1 of income in Nebraska, and the typical local sales tax rate in the Pierce County region is approximately 1.25. In addition, there is \$1.47 in taxable property value for each \$1 of income in the Pierce County region. The net tax

revenue impact for other local taxes is estimated at \$0.19 million. Most of this increase is due to the increase in real taxable property at the solar facility site.

The total annual net increase in local tax revenue from the Nameplate Capacity Tax, annual average Personal Property Tax, and these other local taxes is estimated at \$2.1 million.

The annual Personal Property Tax revenue estimate in Table 3 is based on the average revenue from that source over the life of the project. An annual average value was utilized because the taxable value of personal property such as battery storage components varies widely from year to year. In particular, the taxable value of a new battery storage facility depreciates over the ensuing 5 years. Table 4 below shows the average net local tax revenue from the project in the first six years and then the revenue in the remaining years after the taxable value of the battery storage components depreciates. The solar generation and battery storage facility will yield an average \$3.6 million net increase in local tax revenue in the first 6 years. Annual local revenue will be \$1.7 million in the years after that.

Table 4. Net Local Property Tax Revenue by Year			
	Personal Property Tax Revenue from Battery Storage	Other Local Tax Revenue (Net)	Total Local Tax Revenue (Net)
Average First 6 Years	\$1,950,000	\$1,667,000	\$3,617,000
Year 6 and Beyond	\$0	\$1,667,000	\$1,667,000
Source: UNL-BBR estimate. Personal Property Tax revenue estimates from Baird Holm LLP			

Appendix A. About the Bureau of Business Research and Key Personnel

A. The Bureau of Business Research

The Bureau of Business Research is a leading source for analysis and information on the Nebraska, the Midwest, and the national economy. The Bureau conducts both contract and sponsored research on the economy of states and communities including: 1) economic and fiscal impact analysis; 2) models of the structure and comparative advantage of the economy; 3) economic, fiscal, and demographic outlooks, and 4) assessments of how economic policy affects industry, labor markets, infrastructure, and the standard of living. The Bureau also competes for research funding from federal government agencies and private foundations from around the nation and contributes to the academic mission of the University of Nebraska-Lincoln through scholarly publication and the education of students. The Bureau website address is www.bbr.unl.edu.

B. Key Personnel

Dr. Eric Thompson (Principal Investigator)

Dr. Eric Thompson is the department chair and K. H. Nelson Professor of Economics and the director of the Bureau of Business Research at the University of Nebraska-Lincoln. He received his Ph.D. in Agricultural Economics from the University of Wisconsin-Madison with an emphasis on community economic development. He has served as Director of the Bureau of Business Research in the College of Business at the University of Nebraska-Lincoln since August 2004. Professor Thompson has published peer-reviewed articles in journals such as *the Journal of Regional Science*, *American Journal of Agricultural Economics*, and *Regional Science and Urban Economics*. Thompson has twice served as President of the Association for University Business and Economic Research (AUBER). Thompson has received over one hundred national and local grants from organizations such as the U.S. Departments of Transportation, Labor, and Agriculture, as well as the National Science Foundation, the Robert Wood Johnson Foundation, and numerous Nebraska business organizations, non-profit organizations, state agencies, and local governments.