UTILITY SCALE SOLAR IN OHIO: ECONOMIC DEVELOPMENT AND COMMUNITY CONSIDERATIONS

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Background

- Ohio is undergoing an energy transition
 - In Ohio, ~10 coal-fired power plants have closed since 2010; ~10 GW of capacity
 - 8 large, <u>utility scale</u> solar PV projects (>50 MW) have been approved by OPSB; 1.4 GW of capacity
 - 23 additional projects pending or pre-application; 4.2 GW of capacity
- Various drivers for these projects (e.g., cost declines, public policy, business demand, etc.)
- What are the economic, workforce, and tax-related impacts of utility scale solar projects? What does this mean for your community?



Utility Scale Solar in OH

•31 "late-stage" solar projects (as of 1/8/2021)

•Hillcrest and Hardin I & II under construction

•Many more projects in the pipeline for 2021 and beyond...



OPSB. (2021, January 8). https://opsb.ohio.gov/wps/portal/gov/opsb/about-us/resources/solar-farm-map-and-statistics



Economic Impacts of Solar – An Overview

• IO methods to quantify economic impacts in terms of jobs supported, wages, etc.



Figure developed by author.

Utility-Scale Solar Project Development Process



IRENA. (2017). Renewable energy benefits: Leveraging local capacity for solar PV. https://www.irena.org/-

/media/Files/IRENA/Agency/Publication/2017/Jun/IRENA_Leveraging_for_S olar_PV_2017.pdf



One-Time Construction Phase Employment Impacts



Figures developed by author.

Employment expressed as full-time equivalents (FTE).



One-Time Construction Phase Economic Impacts



Figures developed by author.



Annual O&M Phase Employment Impacts



Figures developed by author.

Employment expressed as full-time equivalents (FTE).



Annual O&M Phase Economic Impacts





Figures developed by author.



At the Project Level (Fox Squirrel, Madison Co.)

One-Time Construction Phase Economic Impacts

	(I) 100% Ohio labor & materials	(2) 100% Ohio labor, market-based materials	(3) 80% Ohio labor, market-based materials	(4) 80% Ohio labor, 0% Ohio materials	
Employment					
Direct Effect	2,840	I,833	I,748	1,613	
Indirect Effect	١,979	626	587	513	
Induced Effect	2,155	954	907	818	
Total Effect	6,975	3,413	3,243	2,944	
Multiplier	2.46	1.86	1.85	1.82	
Output					
Direct Effect	\$750,250,020	\$265,584,756	\$251,182,836	\$213,028,400	
Indirect Effect	\$357,128,804	\$106,576,054	\$100,036,737	\$84,214,271	
Induced Effect	\$327,201,283	\$144,825,178	\$137,723,989	\$124,207,615	
Total Effect	\$1,434,580,107	\$516,985,988	\$488,943,562	\$421,450,286	
Multiplier	1.91	1.95	1.95	1.98	

Annual O&M Phase Economic Impacts

	(1) 100% Ohio labor & materials	(2) 100% Ohio labor, market-based materials	(3) 80% Ohio labor, market-based materials	(4) 80% Ohio labor, 0% Ohio materials	
Employment					
Direct Effect	38	23	19	18	
Indirect Effect	17	10	8	8	
Induced Effect	22	13	П		
Total Effect	77	47	38	37	
Multiplier	2.02	2.01	2.02	2.02	
Output					
Direct Effect	\$10,501,400	\$6,341,165	\$5,080,997	\$5,040,672	
Indirect Effect	\$6,215,605	\$3,753,231	\$3,007 <mark>,358</mark>	\$2,983,491	
Induced Effect	\$3,282,319	\$1,981,995	\$1,588,117	\$1,575,513	
Total Effect	\$19,999,325	\$12,076,391	\$9,676,472	\$9,599,676	
Multiplier	1.90	1.90	1.90	1.90	

Michaud, G., Khalaf, C., Zimmer, M. (2020). Assessing the economic, workforce, and pollution impacts of the Fox Squirrel solar project. Prepared for Geenex Solar. http://dis.puc.state.oh.us/TiffToPDf/A1001001A20J14B52440E02154.pdf



Workforce Impacts

	Estimated Ohio
	Workforce in 2020
A: Needed Across all Phases	
Electrical Engineers	6,422
Engineering Technicians	3,224
B: Manufacturing	
Advanced Manufacturing Technicians	3,382
Computer Control Operators	I,288
Industrial Engineers	15,248
Mechanical Engineers	15,709
Environmental Engineers	I,242
Materials Scientists	669
C: Onsite Labor (Const. + O&M)	
Electricians (Solar PV Installers)	25,316
IT Specialists	19,017
Software Engineers	5,875
Structural Engineers	8,293



Figure developed by author, with data from CareerOneStop, United States Department of Labor, Employment and Training Administration. (2020). *Find local training*. Retrieved from https://www.careeronestop.org/FindTraining/find-training.aspx

Estimated Ohio workforce in 2020 and projected annual increase in employment is based on the Ohio Occupational Employment projections Report 2016–2026.

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Workforce Impacts – Wages



Figure developed by author, with data from O*NET (see: https://www.onetonline.org/).



Transferring to Solar Occupations

SOLA	AR	Solar PV Installers	Electricians	Electronics Engineering Technicians	Electrical Engineers	Solar Energy Systems Engineers	Civil Engineers	Software Developers
COAL		\$20.52	\$25.08	\$29.59	\$40.28	\$42.97	\$37.68	\$47.51
Production Workers	\$14.41	\$6.11	\$10.67	\$15.18	\$25.87	\$28.56	\$23.27	\$33.10
Inspectors, Testers, & Weighers	\$18.51	\$2.01	\$6.57	\$11.08	\$21.77	\$24.46	\$19.17	\$29.00
Control and Valve Installers/Repairers	\$32.21	-\$11.69	-\$7.13	-\$2.62	\$8.07	\$10.76	\$5.47	\$15.30
Power Plant Operators	\$35.22	-\$14.70	-\$10.14	-\$5.63	\$5.06	\$7.75	\$2.46	\$12.29
Electrical and Electronics Repairers	\$35.65	-\$15.13	-\$10.57	-\$6.06	\$4.63	\$7.32	\$2.03	\$11.86
Electro-Mechanical Technicians	\$27.03	-\$6.51	-\$1.95	\$2.56	\$13.25	\$15.94	\$10.65	\$20.48
Industrial Production Managers	\$47.96	-\$27.44	-\$22.88	-\$18.37	-\$7.68	-\$4.99	-\$10.28	-\$0.45

Figure developed by author. Dollar values in the matrix display hourly wage differences, with positive numbers showing occupations that have higher wages than their transitioning-from occupation; colors note how easy (green) or difficult (red) the transition would be, based on the gap in skills. The non-shaded wages on the periphery represent the median hourly wage rate for each of the respective coal-fired power plant and construction-related solar occupations. Based on Ohio data. For more information, see: http://closup.umich.edu/sites/closup.umich.edu/repi/REPI-Michaud.pdf



Tax Revenues via PILOT Program (Ohio)

 Service payment of up to \$9,000/MW of nameplate capacity required in lieu of property taxes (SB 232, 2010). Benefit local schools, health systems, senior citizens, etc.





Wrap-Up

- Several large, utility scale solar projects emerging across Ohio
- Multitude of positive benefits that solar energy is bringing to communities
 - Economic growth, durable job creation, income generation, and new economic clusters



For the full report, as well as a one-page overview, please see: https://www.ohio.edu/voinovich-school/news-resources/reportspublications/utility-scale-solar

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