Economic and Workforce Impact Analyses of Hecate Energy LLC's Proposed Battery Storage in OVRDC Region, Ohio

Prepared for
Hecate Energy LLC

Prepared by
Voinovich School of Leadership and Public Service (GVS)
Ohio University

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EXECUTIVE SUMMARY

The US Department of Energy (DOE) former Portsmouth Gaseous Diffusion Plant (PORTS) facility near Piketon, Ohio employed over 20,000 people during the site's construction in the 1950s. Employment during operations of the facility was approximately 2,500 per annum. Following a cold shutdown in 2005, in 2010, DOE awarded a $2.1 billion contract to Fluor B&W to conduct site cleanup activities. As this process continues, remediated land is being deeded to a local nonprofit known as the Southern Ohio Diversification Initiative (SODI) for private-sector economic development use. Ohio University's PORTSfuture Program is partnering with SODI to facilitate reindustrializing the site into an Integrated Energy System-Closed Loop Manufacturing (IES-CLM) facility. The PORTS site's unique assets will be leveraged for the synergistic production and use of energy with added efficiency and reduced greenhouse gas (GHG) emissions.

The desired future use focuses on utilizing the site location and infrastructure assets to develop a regional energy transmission and distribution hub, engaging in power generation to include all-of- the-above energy strategies, and collocating sustainable manufacturing initiatives. This analysis seeks to quantify the workforce required to support construction and operational activities for battery storage facility and to quantify the economic impact of this project on the Ohio Valley Regional Development Commission (OVRDC) region which serves as the primary labor market for new development.

Tables below show the economic impact of construction and operations and maintenance phases of the proposed activity on the economy of the OVRDC region. The construction of facilities will support about 124 jobs during the construction period, and about 32 jobs per year during the operations and maintenance phase. Additionally, the construction of facilities will generate about $18 million in economic activity during the construction phase and generate an additional $32 million annually through operations and maintenance.

Total Economic Impact of the Construction Phase of the Activity

CONSTRUCTION				
Impact Type	**Employment**	**Labor Income**	**Value Added**	**Output**
Direct Effect	90.00	$5,182,533	$5,237,188	$12,042,696
Indirect Effect	15.47	$1,016,148	$1,785,048	$3,363,970
Induced Effect	18.87	$862,966	$1,771,813	$3,054,957
Total Effect	124.34	$7,061,648	$8,794,051	$18,461,624
Multiplier	1.38	1.36	1.67	1.53

Note: 2024 dollars.

Source: IMPLAN; GVS

Total Economic Impact of the Operation and Maintenance Phase of the Activity

OPERATIONS AND MAINTENANCE				
Impact Type	**Employment**	**Labor Income**	**Value Added**	**Output**
Direct Effect	15.26	$22,197,296	$3,591,489	$11,848,977
Indirect Effect	3.50	$1,714,246	$4,437,677	$9,100,893
Induced Effect	13.52	$3,102,390	$6,357,312	$10,965,063
Total Effect	32.29	$27,013,934	$14,386,479	$31,914,933
Multiplier	2.11	1.21	4.00	2.69

Note: 2024 dollars.

Source: IMPLAN; GVS

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DEFINITIONS

PROJECT DESCRIPTION:

This proposed project involves the deployment of a utility-scale Battery Energy Storage System (BESS) at the Piketon Gaseous Diffusion Facility in Ohio. The project's primary objectives are to enhance regional grid reliability, support renewable energy integration, and provide efficient and flexible energy solutions to bolster the area's electric infrastructure. The system will also contribute to Ohio's overall carbon reduction goals and support regional clean energy policies by reducing reliance on traditional peaker plants.

The BESS will have a capacity of up to 1 GW and a 4-hour discharge duration, depending on final project specifications and regional grid requirements. It employs advanced lithium-ion battery technology for rapid response to grid needs. The system's fast response capabilities will allow grid operators to respond dynamically to fluctuations in supply and demand. The BESS will be directly interconnected to the nearby AEP Don Marquis Substation, ensuring seamless energy flow to the transmission network, enhancing regional energy security, and reducing congestion on transmission lines, particularly during peak hours.

Once established, the BESS will stabilize the local grid by providing ancillary services, such as frequency regulation, load leveling, and voltage support, reducing the area's dependence on fossil fuel peaker plants. Furthermore, the BESS will enable increased integration of renewable energy resources, such as solar and wind, by storing excess energy during peak generation periods and dispatching it during high-demand periods or when renewable energy generation is low. Additionally, the BESS will benefit the Piketon area by generating economic activities and creating jobs during its construction phase and providing ongoing jobs during its operation phase.

The deployment of this utility-scale battery system at Piketon represents a significant step toward modernizing the electric grid in Ohio. Through its integration with the AEP Don Marquis Substation, this project will deliver critical support for grid resilience, economic development, and renewable energy adoption in the region.

PROJECT STUDY AREA: The project's goal was to define a study area around Piketon, Ohio, within a 50-mile radius. However, IMPLAN and workforce analysis require well-defined regions, so we use the 12-county Ohio Valley Regional Development Commission region. These counties form a regional partnership dedicated to the development of Southern Ohio and thus have close economic ties. The 12 counties consist of Adams, Brown, Clermont, Fayette, Gallia, Highland, Jackson, Lawrence, Pike, Ross, Scioto, and Vinton Counties.

IMPLAN OVERVIEW: IMPLAN is an acronym for IMpact analysis for PLANing and is a widely used tool for economic impact analyses. IMPLAN uses a general input-output model that uses secondary

data from the BEA, BLS, and Census. The main difference between a general equilibrium model, which the input-output model is derived from, and a partial equilibrium model is that, unlike a partial equilibrium model that focuses only on one industry, the general equilibrium model captures all monetary market transactions between industries. Among four main sources of commercial input-output-based tools, IMPLAN is best equipped to handle modeling multiple regions as well as smaller regions (Khalaf, Jolley, and Clouse, 2021).[1]

KEY DEFINITIONS: The economic impact is derived directly through a firm or industry operation called the direct effect. When a firm buys goods and services from another local firm, the latter firm pays its employees in wages and makes subsequent purchases to additional firms. In an input- output model, the impacts generated by these activities are referred to as indirect effects. These firms in turn make purchases of goods and services from other firms, and so on. In other words, the indirect effect is generated through the supply chain and supporting industries' operations. In addition to direct and indirect effects, employees of these simulated firms will spend their wages on other industries in the region, which also creates ripple effects on the region's economy. These additional ripple effects are referred to as induced effects. In other words, the induced effect is the economic impact through local re-spending of income by direct and indirect employees. The total effect is the summation of direct, indirect, and induced effects. As a result, each initial dollar spent on activities supporting the operations and construction of firms may be circulated several times within the region.

The concept of multipliers derived from input-output tables is the key to economic impact analyses. The Multiplier is the ratio of the "Total Effect" to the "Direct Effect". In other words, multipliers measure the ripple effect of a change (or contribution) of an industry (or firm) in a region. For instance, the employment multiplier equals 2.11 in the proposed battery storge facility, indicating that for every one job in a battery storge facility, the facility would support one additional job in related industries. When it comes to labor income, value added and output multipliers, instead of discussing the number, they need to be interpreted as the dollar value. For instance, an output multiplier of 2.69 implies that each dollar supporting the operations of the battery storage facility will generate an additional 1.69 dollars for the regional economy. IMPLAN reports an economic impact analysis of activities through several economic indicators. Employment is the total annual average number of jobs, including all full-time, part-time, and seasonal workers. Labor Income is composed of both the wages and benefits paid to employees and the profits earned by self-employed people. Value Added (or Gross Regional Product) is the combination of Labor Income plus corporate profits, interest income, rental payments, sales tax, excise tax, property tax, fees, fines, and licenses. Finally, the output is the combination of Value Added plus the materials and services (other than employment) required by an industry to create its products.

IMPLAN ASSUMPTIONS: IMPLAN is built based on the input-output model. Thus, its assumptions follow the input-output model assumptions, which include a constant return to scale, fixed input structure,

[1] For more information, see Khalaf, C., Jolley, G. J., & Clouse, C. (2021). The Economic Impact of Small Colleges on Local Economies: A Guide to Attainable Data and Best Practices. Economic Development Quarterly, 08912424211033655.

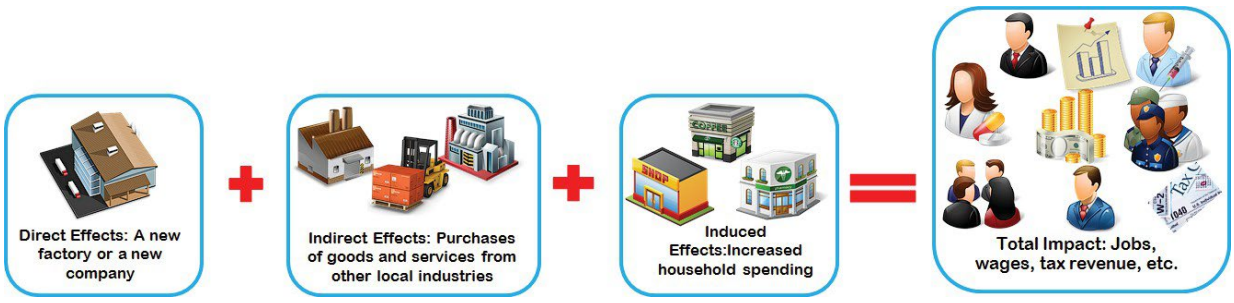
industry homogeneity, no supply constraints, fixed technology, constant byproduct coefficients, static model, measuring only backward linkages, and an unclear time dimension for the region to settle at its new equilibrium after the change.[2]

In this report, the researchers report two sets of economic impacts for each activity: 1) the economic impacts of the operations phase of the activity; 2) the economic impacts of the construction phase of the activity. While the economic impact of the operation phase is on an annual basis, the economic impact of the construction phase occurs only one time (during the construction period). Therefore, impacts will be reported in 2024 dollars but will be calculated using 2022 data, the most recent data year.

WORKFORCE OVERVIEW: Researchers include a workforce analysis for project's operations and maintenance, and construction phases. Workforce analysis is essential for identifying skill and occupational gaps between current and future employment needs. These analyses are organized by occupation title, retrieved from the nationally expected averages from the Bureau of Labor Statistics' May 2023 Occupational Employment Statistics (OES). The Workforce analysis report includes the top largest occupations by representation within an industry (when possible).

Each Workforce table displays total Ohio jobs for each occupation, which are reported from the Bureau of Labor Statistics' May 2023 State Occupational Employment and Wage Estimates data for Ohio. These numbers are then rounded, which may lead to percentages of project sums being less than 100, and sums of occupations being less than the total number of jobs.

IMPLAN LIMITIATIONS: Since economic structures change over time, the indirect effects that are quantified for one year may decrease or increase over the period of the analysis. It is also possible that as a new activity starts, another activity disappears, meaning jobs are not created but shift from one industry to another. The indirect and induced effects depend explicitly on the magnitude of the direct effect, so fluctuations or errors in the direct effect data are reflected in the total effects. This analysis uses the most conservative estimates to obtain a lower bound of effect.



[2] For more information see https://support.implan.com/hc/en-us/articles/115009505587-Detailed-Key-Assumptions-of-IMPLAN- Input-Output-Analysis

ECONOMIC IMPACT ANALYSIS FOR THE PROPOSED BATTERY STORAGE

500 MW / 2,000 MWH

PROJECT STUDY AREA: Ohio Valley Regional Development Commission region: Adams, Brown, Clermont, Fayette, Gallia, Highland, Jackson, Lawrence, Pike, Ross, Scioto, and Vinton Counties.

ECONOMIC IMPACT ANALYSIS OF THE CONSTRUCTION PHASE FOR THE PROPOSED BATTERY STORAGE

During the construction period, IMPLAN estimates a 500 MW / 2,000 MWH of battery storage project would create:

- 124 total jobs;
- $7,061,648 in total value paid to local workers;
- $8,794,051 in industry's contribution to regional GDP;
- $18,461,624 in industry sales.

Table 1: Total Economic Impact of the Construction Phase of the Activity

CONSTRUCTION				
Impact Type	**Employment**	**Labor Income**	**Value Added**	**Output**
Direct Effect	90.00	$5,182,533	$5,237,188	$12,042,696
Indirect Effect	15.47	$1,016,148	$1,785,048	$3,363,970
Induced Effect	18.87	$862,966	$1,771,813	$3,054,957
Total Effect	124.34	$7,061,648	$8,794,051	$18,461,624
Multiplier	1.38	1.36	1.67	1.53

Note: 2024 dollars.

Source: IMPLAN; GVS

ECONOMIC IMPACT ANALYSIS OF THE OPERATIONS AND MAINTENANCE PHASE FOR THE PROPOSED BATTERY STORAGE

During the Operations and Maintenance period (2024-2028), IMPLAN estimates a 500 MW / 2,000 MWH of battery storage project would create:

- 32 total jobs;
- $27,013,934 in total value paid to local workers;
- $14,386,479 in industry's contribution to regional GDP;
- $31,914,933 in industry sales.

Table 2: Total Economic Impact of the Operational and Maintenance Phase of the Activity

OPERATIONS AND MAINTENANCE				
Impact Type	**Average Annual Employment**	**Labor Income**	**Value Added**	**Output**
Direct Effect	15.26	$22,197,296	$3,591,489	$11,848,977
Indirect Effect	3.50	$1,714,246	$4,437,677	$9,100,893
Induced Effect	13.52	$3,102,390	$6,357,312	$10,965,063
Total Effect	32.29	$27,013,934	$14,386,479	$31,914,933
Multiplier	2.11	1.21	4.00	2.69

Note: 2024 dollars.

Source: IMPLAN; GVS

The cumulative effects of the project's proposed activities in the study region are shown in Table 3. The cumulative impacts include both the construction phase and the operations and maintenance phase spanning 5 years. In total, the project creates 156 jobs in the OVRDC region. These jobs would create $34 million in labor income, $23 million in value added, and $50 million in total additional output in the region. The 500 MW / 2,000 MWH battery storage facility would directly create 105 jobs, generating $27 million in labor income, $8.8 million in value added, and $23.8 million in direct total output.

Table 3: Total Cumulative Economic Impact of the Construction, Operational and Maintenance Phases of the Activity Over 5-year Period

CUMULATIVE				
Impact Type	**Employment**	**Labor Income**	**Value Added**	**Output**
Direct Effect	105.26	$27,379,829	$8,828,677	$23,891,673
Indirect Effect	18.97	$2,730,394	$6,222,725	$12,464,863
Induced Effect	32.39	$3,965,356	$8,129,125	$14,020,020
Total Effect	156.63	$34,075,582	$23,180,530	$50,376,557

Note: 2024 dollars.
Source: IMPLAN; GVS

Table 4 shows the tax revenue local, state, and federal governments receive from the construction phase of the battery storage facility. A total of $2,138,194 is the tax revenue generated by the battery storage facility. The local government receives a total of $205,943, the state receives $425,287, and the federal government receives $1,506,962.

Table 4. Tax Revenue of the Construction Phase of the Activity

TAX REVENUE DURING THE CONSTRUCTION PHASE						
Impact Type	**Sub-County General**	**Sub-County Special Districts**	**County**	**State**	**Federal**	**Total**
Direct Effect	$14,165	$15,966	$7,311	$136,241	$1,048,977	$1,222,662
Indirect Effect	$17,866	$48,654	$27,024	$160,231	$239,104	$492,881
Induced Effect	$14,356	$38,960	$21,637	$128,814	$218,880	$422,650
Total Effect	$46,389	$103,581	$55,973	$425,287	$1,506,962	$2,138,194

Note: 2024 dollars.
Source: IMPLAN; GVS

Table 5 shows the tax revenue local, state, and federal governments receive from the operations and maintenance phase of the battery storage facility. A total of $8,007,123 is the tax revenue generated by the battery storage facility. The local government receives a total of $974,964, the state receives $1,899,488, and the federal government receives $5,132,669.

Table 5. Tax Revenue of the Operations and Maintenance Phase of the Activity

TAX REVENUE DURING THE OPERATIONS AND MAINTENANCE PHASE						
Impact Type	Sub-County General	Sub-County Special Districts	County	State	Federal	Total
Direct Effect	$103,967	$219,157	$116,978	$998,610	$3,883,421	$5,322,136
Indirect Effect	$49,193	$138,884	$77,487	$438,051	$462,865	$1,166,482
Induced Effect	$51,582	$139,974	$77,738	$462,825	$786,382	$1,518,503
Total Effect	204,743	$498,017	$272,204	$1,899,488	$5,132,669	$8,007,123

Note: 2024 dollars.

Source: IMPLAN; GVS

Table 6. shows the total tax revenue local, state, and federal governments receive from the construction, operations, and maintenance phases of the battery storage facility. A total of $10,145,317 is the tax revenue generated by the battery storage facility. The local government receives a total of $1,180,907, the state receives $2,324,775, and the federal government receives $6,639,631. It is worth mentioning that the total amount of sales tax generated as a result of the construction, operations, and maintenance phases of the battery storage facility equals $1,776,805.

Table 6. Tax Revenue of the Construction, Operations and Maintenance Phases of the Activity

TOTAL TAX REVENUE DURING THE CONSTRUCTION, OPERATIONS AND MAINTENANCE PHASES						
Impact Type	Sub-County General	Sub-County Special Districts	County	State	Federal	Total
Direct Effect	$118,132	$235,123	$124,289	$1,134,851	$4,932,398	$6,544,798
Indirect Effect	$67,059	$187,538	$104,511	$598,282	$701,969	$1,659,363
Induced Effect	$65,938	$178,934	$99,375	$591,639	$1,005,262	$1,941,153
Total Effect	$251,132	$601,598	$328,177	$2,324,775	$6,639,631	$10,145,317

Note: 2024 dollars.

Source: IMPLAN; GVS

WORKFORCE ANALYSIS FOR THE PROPOSED BATTERY STORAGE

500 MW / 2,000 MWH

Table 7 shows the occupations that will be hired for the construction phase of the battery storage facility. As expected, the majority of the occupations will be in construction and extraction followed by management and business and financial operations.

Table 7: Workforce Analysis for the Construction Phase of the Activities

CONSTRUCTION			
Occupation	**Total Employment Ohio**	**Percentage of Project**	**Construction Jobs**
Construction and Extraction Occupations	185,300	52.35	47
Management Occupations	364,650	15.16	14
Business and Financial Operations Occupations	340,550	12.7	11
Office and Administrative Support Occupations	650,520	7.65	7
Architecture and Engineering Occupations	99,620	3.73	3
Installation, Maintenance, and Repair Occupations	217,230	2.26	2
Production Occupations	465,360	1.84	2
Transportation and Material Moving Occupations	546,420	1.57	1
Sales and Related Occupations	458,210	0.81	1
Life, Physical, and Social Science Occupations	36,780	0.72	1

Source: Bureau of Labor Statistics; GVS

Table 8 shows the occupations that will be hired for the operations and maintenance phase of the battery storage facility. As expected, the majority of the occupations will be in installation, maintenance, and repair followed by management and production operations.

Table 8: Workforce Analysis for Operations and Maintenance Phase of the Activities

OPERATIONS AND MAINTENANCE			
Occupation	**Total Employment Ohio**	**Percentage of Project**	**Construction Jobs**
Installation, Maintenance, and Repair Occupations	217,230	26.02	4
Management Occupations	364,650	21.82	3
Production Occupations	465,360	17.09	3
Business and Financial Operations Occupations	340,550	11.63	2
Office and Administrative Support Occupations	650,520	10.09	2
Architecture and Engineering Occupations	99,620	6.09	1
Sales and Related Occupations	458,210	2.07	0.5
Construction and Extraction Occupations	185,300	1.05	0.5

Source: Bureau of Labor Statistics; GVS