

PORTSFUTURE

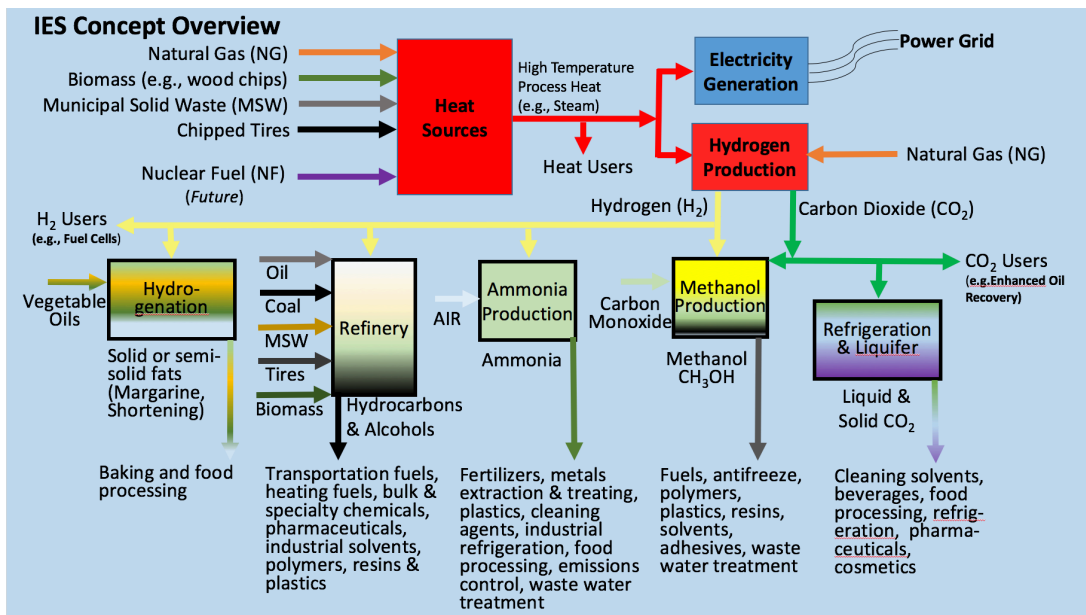
IMAGINING THE OPPORTUNITIES, GATHERING YOUR IDEAS
THE FACILITY AT PIKETON, OHIO



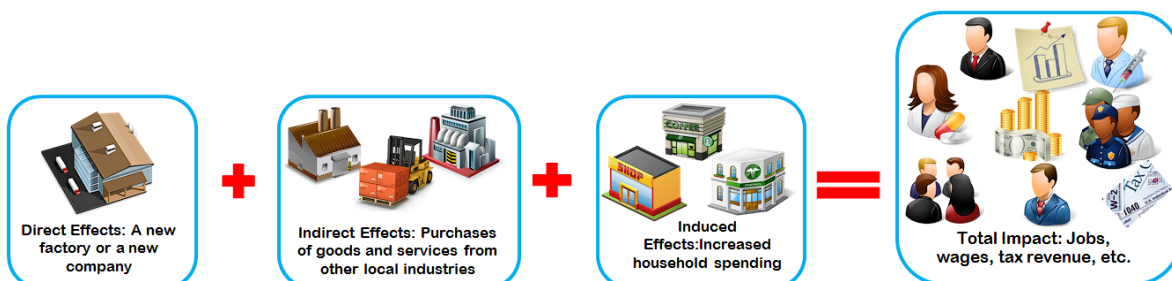
ECONOMIC IMPACT ANALYSIS FOR PROPOSED INTEGRATED ENERGY SYSTEM (IES) COMPLEX AT PORTS

Ohio University's Voinovich School of Leadership and Public Affairs PORTSfuture project is supporting the Southern Ohio Diversification Initiative's (SODI) efforts to pursue the development of an Integrated Energy System (IES) complex at the US Department of Energy PORTS reservation in Ohio. An IES closed-loop, advanced manufacturing complex will strive to fully leverage the unique infrastructure and other assets of the site for regional economic growth by attracting and expanding industries in the region, leveraging coal and shale resources in additive manufacturing applications, creating jobs, and growing the southern Ohio economy.

Key aspects of an IES are collocating, combining, interconnecting and/or networking of energy producers and energy users and utilizing waste outputs from one industrial process as an input or feedstock into a different industrial process. In an IES, value is the driver, and desired value propositions such as high efficiency, high reliability, low emissions, low/acceptable production costs, and creation of more permanent, non-exportable higher-quality jobs can be achieved. An IES embodies a synergistic integration of an "all-of-the-above" energy strategy.



Activities to advance the IES complex will further SODI's mission to diversify the regional economy by imagining possibilities beyond the immediate and existing economic realities in southern Ohio and will identify how to best prepare the PORTS site to attract 21st century industries with enduring missions. Site reindustrialization will spur regional cluster and supply chain-related growth throughout the impacted counties and multi-state region, further advancing economic healing by growing both large and small business opportunities in southern Ohio and beyond.



The PORTSfuture project is funded by a grant from the US Department of Energy Office of Environmental Management Portsmouth/Paducah Project Office.

1 GW COMBINED CYCLE GAS TURBINE (CCGT)

PROJECT SIMULACRUM: Lordstown Energy Center, Lordstown, Ohio.

PROJECT STUDY AREA: Ohio Valley Regional Development Commission region: Adams, Brown, Clermont, 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.

KEY DEFINITIONS: The Multiplier is the ratio of the Total Effect to the Direct Effect. Employment is annual average jobs of full and part-time employees and self-employed people. 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, Output is the combination of Value Added plus the materials and services (other than employment) required by an industry to create its products.

IMPLAN LIMITATIONS: Since economic structures change over time, the indirect effects that are quantified during one year may decrease or increase over the period of the analysis. It is also possible that as 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.

Core 1: Combined Cycle Gas Turbine

| CONSTRUCTION | | | | |
|-----------------|------------|--------------|--------------|--------------|
| Impact Type | Employment | Labor Income | Value Added | Output |
| Direct Effect | 500 | \$18,664,044 | \$25,087,317 | \$51,200,864 |
| Indirect Effect | 68 | \$3,296,336 | \$5,231,736 | \$9,539,269 |
| Induced Effect | 106 | \$3,501,141 | \$6,995,434 | \$12,584,317 |
| Total Effect | 673 | \$25,461,521 | \$37,314,487 | \$73,324,451 |
| Multiplier | 1.347 | 1.364 | 1.487 | 1.432 |

| OPERATION | | | | |
|-----------------|------------|--------------|--------------|--------------|
| Impact Type | Employment | Labor Income | Value Added | Output |
| Direct Effect | 25 | \$3,783,185 | \$23,830,452 | \$47,343,516 |
| Indirect Effect | 23 | \$952,600 | \$1,588,962 | \$3,107,429 |
| Induced Effect | 23 | \$754,761 | \$1,504,025 | \$2,708,916 |
| Total Effect | 71 | \$5,490,546 | \$26,923,439 | \$53,159,861 |
| Multiplier | 2.820 | 1.451 | 1.130 | 1.123 |

FINDINGS:

- During the construction period, IMPLAN estimates a 1 GW CCGT project would create:
 - 673 total annual average jobs
 - \$25,461,521 in total value paid to local workers
 - \$37,314,487 in Gross Regional Product
 - \$73,324,451 in direct industry sales
- During its operational period, IMPLAN estimates a 1 GW CCGT project would create:
 - 71 total annual average jobs
 - \$5,490,546 in total value paid to local workers
 - \$26,923,439 in Gross Regional Product
 - \$53,159,861 in direct industry sales

FOOTNOTE: The regional impacts of IMPLAN Sector 20 (Extraction of Natural Gas and Crude Petroleum) were expunged from this analysis to better reflect local use patterns.

1 MILLION TONNE PER YEAR CAPACITY AMMONIA FERTILIZER PLANT

PROJECT SIMULACRUM: PotashCorp, Lima, Ohio.

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

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Core 3: Fertilizer Plant***

| CONSTRUCTION | | | | |
|-----------------|------------|--------------|--------------|---------------|
| Impact Type | Employment | Labor Income | Value Added | Output |
| Direct Effect | 1,200 | \$46,330,484 | \$58,028,569 | \$141,588,960 |
| Indirect Effect | 215 | \$9,784,402 | \$15,620,631 | \$29,319,327 |
| Induced Effect | 269 | \$8,928,649 | \$17,826,368 | \$32,079,411 |
| Total Effect | 1,685 | \$65,043,536 | \$91,475,567 | \$202,987,698 |
| Multiplier | 1.404 | 1.404 | 1.576 | 1.434 |

| OPERATION | | | | |
|-----------------|------------|--------------|---------------|---------------|
| Impact Type | Employment | Labor Income | Value Added | Output |
| Direct Effect | 150 | \$23,212,930 | \$58,382,709 | \$244,370,048 |
| Indirect Effect | 248 | \$18,487,311 | \$39,392,472 | \$86,101,408 |
| Induced Effect | 214 | \$9,206,421 | \$16,879,727 | \$29,413,166 |
| Total Effect | 611 | \$50,906,662 | \$114,654,908 | \$359,884,622 |
| Multiplier | 4.076 | 2.193 | 1.964 | 1.473 |

FINDINGS:

- During the construction period, IMPLAN estimates the Fertilizer project will create:
 - 1,685 total annual average jobs.
 - \$65,043,536 in total value paid to local workers.
 - \$91,475,567 in Gross Regional Product.
 - \$202,987,698 in direct industry sales.
- During its operational period, IMPLAN estimates the Fertilizer project will create:
 - 611 total annual average jobs.
 - \$50,906,662 in total value paid to local workers.
 - \$114,654,908 in Gross Regional Product.
 - \$359,884,622 in direct industry sales.

FOOTNOTE: The regional impacts of IMPLAN Sector 20 (Extraction of Natural Gas and Crude Petroleum) were expunged from this analysis to better reflect local use patterns.

***Initial input effects (industry sales, employee compensation, and proprietor income) for the operations phase were imputed from statewide averages and their multiplier effects (indirect and induced) were attenuated by 50% to better reflect local use patterns.

NATURAL GAS: 500,000 BARREL PER DAY CAPACITY REFINERY

PROJECT SIMULACRUM: Hickory Bend Project, Mahoning County, Ohio.

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

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Core 2: Natural Gas Refinery***

| CONSTRUCTION | | | | |
|-----------------|------------|--------------|--------------|--------------|
| Impact Type | Employment | Labor Income | Value Added | Output |
| Direct Effect | 500 | \$19,304,368 | \$24,178,570 | \$58,995,400 |
| Indirect Effect | 90 | \$4,076,834 | \$6,508,596 | \$12,216,386 |
| Induced Effect | 112 | \$3,720,271 | \$7,427,653 | \$13,366,421 |
| Total Effect | 702 | \$27,101,473 | \$38,114,820 | \$84,578,208 |
| Multiplier | 1.404 | 1.404 | 1.576 | 1.434 |

| OPERATION | | | | |
|-----------------|------------|--------------|--------------|---------------|
| Impact Type | Employment | Labor Income | Value Added | Output |
| Direct Effect | 30 | \$4,792,839 | \$30,535,963 | \$263,295,344 |
| Indirect Effect | 96 | \$6,439,153 | \$12,202,580 | \$24,873,375 |
| Induced Effect | 64 | \$2,766,197 | \$5,072,183 | \$8,837,670 |
| Total Effect | 190 | \$13,998,189 | \$47,810,726 | \$297,006,389 |
| Multiplier | 6.335 | 2.921 | 1.566 | 1.128 |

FINDINGS:

- During the construction period, IMPLAN estimates the Natural Gas project will create:
 - 702 total annual average jobs.
 - \$27,101,473 in total value paid to local workers.
 - \$38,114,820 in Gross Regional Product.
 - \$84,578,208 in direct industry sales.
- During its operational period, IMPLAN estimates the Natural Gas project will create:
 - 190 total annual average jobs.
 - \$13,998,189 in total value paid to local workers.
 - \$47,810,726 in Gross Regional Product.
 - \$297,006,389 in direct industry sales.

FOOTNOTE: The regional impacts of IMPLAN Sector 20 (Extraction of Natural Gas and Crude Petroleum) were expunged from this analysis to better reflect local use patterns.

***Initial input effects (industry sales, employee compensation, and proprietor income) for the operations phase were imputed from statewide averages and their multiplier effects (indirect and induced) were attenuated by 50% to better reflect local use patterns.

OIL: 500,000 BARREL PER DAY CAPACITY REFINERY

PROJECT SIMULACRUM: Marathon Catlettsburg Refinery, Catlettsburg, Kentucky.

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

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Core 2: Oil Refinery**

| CONSTRUCTION | | | | |
|-----------------|------------|---------------|---------------|-----------------|
| Impact Type | Employment | Labor Income | Value Added | Output |
| Direct Effect | 10,000 | \$373,280,881 | \$501,746,334 | \$1,024,017,280 |
| Indirect Effect | 1,355 | \$65,926,718 | \$104,634,723 | \$190,785,390 |
| Induced Effect | 2,114 | \$70,022,814 | \$139,908,689 | \$251,686,350 |
| Total Effect | 13,469 | \$509,230,412 | \$746,289,747 | \$1,466,489,020 |
| Multiplier | 1.347 | 1.364 | 1.487 | 1.432 |

| OPERATION | | | | |
|-----------------|------------|---------------|-----------------|------------------|
| Impact Type | Employment | Labor Income | Value Added | Output |
| Direct Effect | 1,600 | \$322,442,610 | \$501,085,398 | \$13,009,978,368 |
| Indirect Effect | 5,500 | \$266,701,678 | \$412,464,278 | \$856,417,445 |
| Induced Effect | 2,978 | \$98,822,047 | \$197,103,525 | \$354,858,907 |
| Total Effect | 10,078 | \$687,966,335 | \$1,110,653,201 | \$14,221,254,720 |
| Multiplier | 6.299 | 2.134 | 2.216 | 1.093 |

FINDINGS:

- During the construction period, IMPLAN estimates the Oil project will create:
 - 13,469 total annual average jobs.
 - \$509,230,412 in total value paid to local workers.
 - \$746,289,747 in Gross Regional Product.
 - \$1,466,489,020 in direct industry sales.
- During its operational period, IMPLAN estimates the Oil project will create:
 - 10,078 total annual average jobs.
 - \$687,966,335 in total value paid to local workers.
 - \$1,110,653,201 in Gross Regional Product.
 - \$14,221,254,720 in direct industry sales.

FOOTNOTE: The regional impacts of IMPLAN Sector 20 (Extraction of Natural Gas and Crude Petroleum) were expunged from this analysis to better reflect local use patterns.

**Initial input effects (industry sales, employee compensation, and proprietor income) for the operations phase were imputed from statewide averages and analyzed in the regional level model.

BIOMASS: 500,000 BARREL PER DAY CAPACITY REFINERY

PROJECT SIMULACRUM: Chemtex International, Wilmington, North Carolina.

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

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Core 2: Biomass Refinery

| CONSTRUCTION | | | | |
|-----------------|------------|--------------|--------------|---------------|
| Impact Type | Employment | Labor Income | Value Added | Output |
| Direct Effect | 1,000 | \$38,608,737 | \$48,357,141 | \$117,990,800 |
| Indirect Effect | 179 | \$8,153,668 | \$13,017,192 | \$24,432,772 |
| Induced Effect | 225 | \$7,440,541 | \$14,855,307 | \$26,732,843 |
| Total Effect | 1,404 | \$54,202,946 | \$76,229,639 | \$169,156,415 |
| Multiplier | 1.404 | 1.404 | 1.576 | 1.434 |

| OPERATION | | | | |
|-----------------|------------|--------------|--------------|---------------|
| Impact Type | Employment | Labor Income | Value Added | Output |
| Direct Effect | 76 | \$6,639,024 | \$12,482,665 | \$143,043,824 |
| Indirect Effect | 188 | \$7,468,746 | \$12,934,619 | \$25,650,419 |
| Induced Effect | 67 | \$2,235,425 | \$4,456,015 | \$8,024,594 |
| Total Effect | 331 | \$16,343,194 | \$29,873,300 | \$176,718,837 |
| Multiplier | 4.361 | 2.462 | 2.393 | 1.235 |

FINDINGS:

- During the construction period, IMPLAN estimates the Biomass project will create:
 - 1,404 total annual average jobs.
 - \$54,202,946 in total value paid to local workers.
 - \$76,229,639 in Gross Regional Product.
 - \$169,156,415 in direct industry sales.
- During its operational period, IMPLAN estimates the Biomass project will create:
 - 331 total annual average jobs.
 - \$16,343,194 in total value paid to local workers.
 - \$29,873,300 in Gross Regional Product.
 - \$176,718,837 in direct industry sales.

FOOTNOTE: The regional impacts of IMPLAN Sector 20 (Extraction of Natural Gas and Crude Petroleum) were expunged from this analysis to better reflect local use patterns.

COAL: 500,000 BARREL PER DAY CAPACITY REFINERY

PROJECT SIMULACRUM: Lima Energy Project, Lima, Ohio.

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

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Core 2: Coal Refinery

| CONSTRUCTION | | | | |
|-----------------|------------|--------------|--------------|---------------|
| Impact Type | Employment | Labor Income | Value Added | Output |
| Direct Effect | 1,000 | \$38,608,737 | \$48,357,141 | \$117,990,800 |
| Indirect Effect | 179 | \$8,153,668 | \$13,017,192 | \$24,432,772 |
| Induced Effect | 225 | \$7,440,541 | \$14,855,307 | \$26,732,843 |
| Total Effect | 1,404 | \$54,202,946 | \$76,229,639 | \$169,156,415 |
| Multiplier | 1.404 | 1.404 | 1.576 | 1.434 |

| OPERATION | | | | |
|-----------------|------------|--------------|---------------|---------------|
| Impact Type | Employment | Labor Income | Value Added | Output |
| Direct Effect | 125 | \$23,692,640 | \$243,153,865 | \$311,502,656 |
| Indirect Effect | 64 | \$3,092,483 | \$5,395,712 | \$10,534,432 |
| Induced Effect | 129 | \$4,275,219 | \$8,535,882 | \$15,360,526 |
| Total Effect | 318 | \$31,060,342 | \$257,085,459 | \$337,397,614 |
| Multiplier | 2.541 | 1.311 | 1.057 | 1.083 |

FINDINGS:

- During the construction period, IMPLAN estimates the Coal project will create:
 - 1,404 total annual average jobs.
 - \$54,202,946 in total value paid to local workers.
 - \$76,229,639 in Gross Regional Product.
 - \$169,156,415 in direct industry sales.
- During its operational period, IMPLAN estimates the Coal project will create:
 - 318 total annual average jobs.
 - \$31,060,342 in total value paid to local workers.
 - \$257,085,459 in Gross Regional Product.
 - \$337,397,614 in direct industry sales.

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