

# PORTSFUTURE PROGRAM

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



## PORTSFUTURE PROGRAM

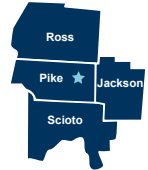
**U.S Department of Energy PORTS Site Reindustrialization  
Targeted Industries-Economic Impact and Workforce Analysis**





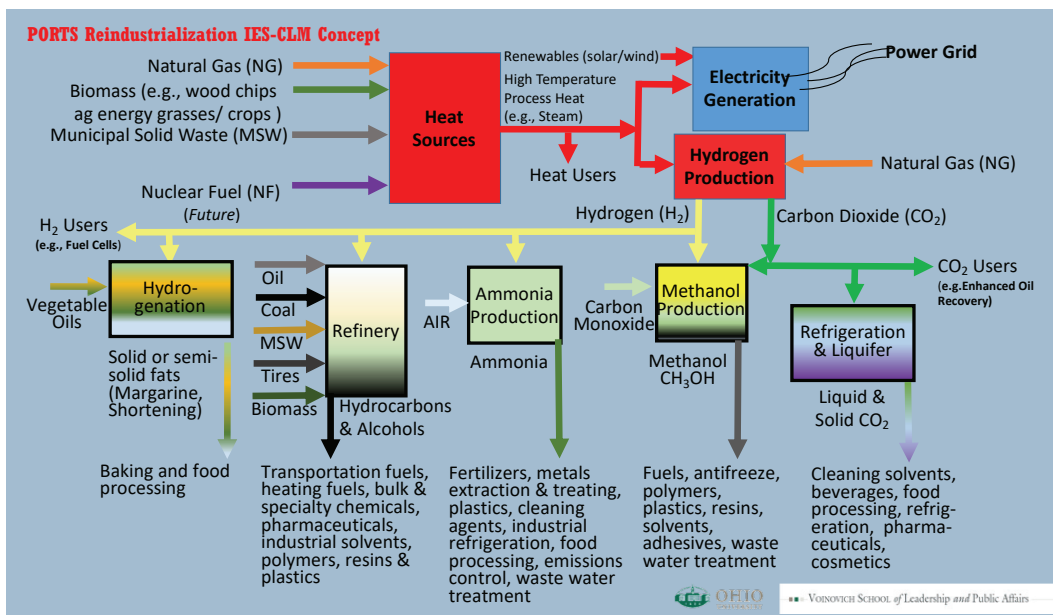
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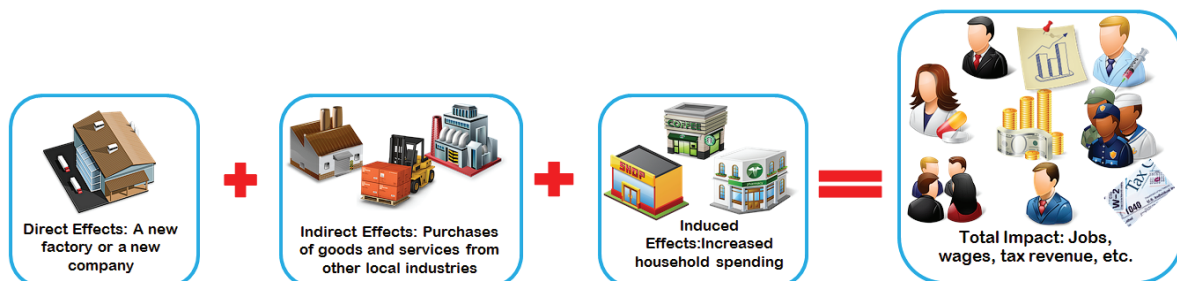


Ohio University's Voinovich School of Leadership and Public Affairs PORTSfuture project is supporting the Southern Ohio Diversification Initiative's (SODI) efforts to pursue the development of an Integrated Energy System (IES) complex at the US Department of Energy PORTS reservation in Ohio. An IES closed-loop, 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.

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

## 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.

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.

# WORKFORCE ANALYSIS FOR PROPOSED INTEGRATED ENERGY SYSTEMS (IES) COMPLEX AT PORTS

## CCGT FACILITY WORKFORCE IMPACT

CONSTRUCTION			
Occupation	Total Ohio Workforce	Percentage of Project	CCGT Construction Jobs
Construction and Extraction Occupations	176,140	36.6	183
Installation, Maintenance, and Repair Occupations	208,220	35.8	31
Office and Administrative Support Occupations	813,080	7.2	36
Management Occupations	243,270	6.1	10
Architecture and Engineering Occupations	93,140	2.2	11
Transportation and Material Moving Occupations	393,320	2.1	179
Business And Financial Operations Occupations	253,180	2	11
Production Occupations	501,570	1	5
OPERATION			
Occupation	Total Ohio Workforce	Percentage of Project	CCGT Operation Jobs
Installation, Maintenance, and Repair Occupations	208,220	28.8	7
Office and Administrative Support Occupations	813,080	16	4
Production Occupations	501,570	14.5	4
Architecture and Engineering Occupations	93,140	10.7	3
Business and Financial Operations Occupations	253,180	6.9	2
Management Occupations	243,270	6.5	2

## FERTILIZER PLANT WORKFORCE IMPACT

CONSTRUCTION			
Occupation	Total Ohio Workforce	Percentage of Project	Fertilizer Construction Jobs
Construction and Extraction Occupations	176,140	58.9	707
Management Occupations	243,270	12.5	150
Office and Administrative Support Occupations	813,080	9.8	118
Business and Financial Operations Occupations	253,180	5.4	65
Architecture and Engineering Occupations	93,140	3.4	41
Installation, Maintenance, and Repair Occupations	208,220	2.9	35
Transportation and Material Moving Occupations	393,320	2	24
Production Occupations	501,570	1.6	19
OPERATION			
Occupation	Total Ohio Workforce	Percentage of Project	Fertilizer Operation Jobs
Production Occupations	501,570	40.2	60
Transportation and Material Moving Occupations	393,320	11.4	17
Office and Administrative Support Occupations	813,080	9.2	14
Installation, Maintenance, and Repair Occupations	208,220	8.8	13
Management Occupations	243,270	7.1	11
Life, Physical, and Social Science Occupations	35,450	5.4	8
Sales and Related Occupations	514,300	3.9	6
Architecture and Engineering Occupations	93,140	3.7	6
Business and Financial Operations Occupations	253,180	2.8	4

FOOTNOTE: Underlying industry, occupation, and employment data are derived using national expected averages from the Bureau of Labor Statistics' May 2015 Occupational Employment Statistics (OES) survey and 2014-24 Industry-occupation matrix data, by industry tables. Occupations that constitute less than 0.1 percent of the industry, have fewer than 50 jobs, are confidential, or include poor quality data are not displayed. Post analysis occupations that constitutes less than 1 percent of any particular project and account for less than 1 job are omitted. Jobs numbers are then rounded. These compounding suppression effects cause the percentages to add to less than 100 and the sum of occupations to be less than the total number of jobs.

## NATURAL GAS REFINERY WORKFORCE IMPACT

### CONSTRUCTION

Occupation	Total Ohio Workforce	Percentage of Project	Gas Construction Jobs
Construction and Extraction Occupations	176,140	54.2	271
Installation, Maintenance, and Repair Occupations	208,220	15.9	80
Office and Administrative Support Occupations	813,080	6.9	35
Management Occupations	243,270	5.5	28
Transportation and Material Moving Occupations	393,320	4.4	22
Production Occupations	501,570	3.8	19
Business and Financial Operations Occupations	253,180	2.1	11
Architecture and Engineering Occupations	93,140	1.2	6

### OPERATION

Occupation	Total Ohio Workforce	Percentage of Project	Gas Operation Jobs
Production Occupations	501,570	41.5	12
Installation, Maintenance, and Repair Occupations	208,220	10.2	3
Architecture and Engineering Occupations	93,140	8	2
Life, Physical, and Social Science Occupations	35,450	8	2
Office and Administrative Support Occupations	813,080	7.4	2
Transportation and Material Moving Occupations	393,320	7.2	2
Management Occupations	243,270	6.9	2
Business and Financial Operations Occupations	253,180	4.3	1

*FOOTNOTE: Underlying industry, occupation, and employment data are derived using national expected averages from the Bureau of Labor Statistics' May 2015 Occupational Employment Statistics (OES) survey and 2014-24 Industry-occupation matrix data, by industry tables. Occupations that constitute less than 0.1 percent of the industry, have fewer than 50 jobs, are confidential, or include poor quality data are not displayed. Post analysis occupations that constitutes less than 1 percent of any particular project and account for less than 1 job are omitted. Jobs numbers are then rounded. These compounding suppression effects cause the percentages to add to less than 100 and the sum of occupations to be less than the total number of jobs.*

## OIL REFINERY WORKFORCE IMPACT

### CONSTRUCTION

Occupation	Total Ohio Workforce	Percentage of Project	Oil Construction Jobs
Construction and Extraction Occupations	176,140	54.2	5420
Installation, Maintenance, and Repair Occupations	208,220	15.9	1590
Office and Administrative Support Occupations	813,080	6.9	690
Management Occupations	243,270	5.5	550
Transportation and Material Moving Occupations	393,320	4.4	440
Production Occupations	501,570	3.8	380
Business and Financial Operations Occupations	253,180	2.1	210
Architecture and Engineering Occupations	93,140	1.2	120

### OPERATION

Occupation	Total Ohio Workforce	Percentage of Project	Oil Operation Jobs
Production Occupations	501,570	42.2	675
Architecture and Engineering Occupations	93,140	10.1	162
Installation, Maintenance, and Repair Occupations	208,220	8.2	131
Office and Administrative Support Occupations	813,080	6.9	110
Transportation and Material Moving Occupations	393,320	6.5	104
Construction and Extraction Occupations	176,140	6.3	101
Management Occupations	243,270	5.6	90
Business and Financial Operations Occupations	253,180	4.6	74
Life, Physical, and Social Science Occupations	35,450	3.7	59
Sales and Related Occupations	514,300	1.7	27
Computer and Mathematical Occupations	136,170	1.2	19
Healthcare Practitioners and Technical Occupations	353,160	0.5	8
Protective Service Occupations	113,800	0.2	3

*FOOTNOTE: Underlying industry, occupation, and employment data are derived using national expected averages from the Bureau of Labor Statistics' May 2015 Occupational Employment Statistics (OES) survey and 2014-24 Industry-occupation matrix data, by industry tables. Occupations that constitute less than 0.1 percent of the industry, have fewer than 50 jobs, are confidential, or include poor quality data are not displayed. Post analysis occupations that constitutes less than 1 percent of any particular project and account for less than 1 job are omitted. Jobs numbers are then rounded. These compounding suppression effects cause the percentages to add to less than 100 and the sum of occupations to be less than the total number of jobs.*

## BIOMASS REFINERY WORKFORCE IMPACT

### CONSTRUCTION

Occupation	Total Ohio Workforce	Percentage of Project	Biomass Construction Jobs
Construction and Extraction Occupations	176,140	54.2	542
Installation, Maintenance, and Repair Occupations	208,220	15.9	159
Office and Administrative Support Occupations	813,080	6.9	69
Management Occupations	243,270	5.5	55
Transportation and Material Moving Occupations	393,320	4.4	44
Production Occupations	501,570	3.8	38
Business and Financial Operations Occupations	253,180	2.1	21
Architecture and Engineering Occupations	93,140	1.2	12

### OPERATION

Occupation	Total Ohio Workforce	Percentage of Project	Biomass Operation Jobs
Production Occupations	501,570	41.5	32
Installation, Maintenance, and Repair Occupations	208,220	10.2	8
Architecture and Engineering Occupations	93,140	8	6
Life, Physical, and Social Science Occupations	35,450	8	6
Office and Administrative Support Occupations	813,080	7.4	6
Transportation and Material Moving Occupations	393,320	7.2	5
Management Occupations	243,270	6.9	5
Business and Financial Operations Occupations	253,180	4.3	3
Sales and Related Occupations	514,300	1.7	1

## COAL REFINERY WORKFORCE IMPACT

### CONSTRUCTION

Occupation	Total Ohio Workforce	Percentage of Project	Coal Construction Jobs
Construction and Extraction Occupations	176,140	54.2	542
Installation, Maintenance, and Repair Occupations	208,220	15.9	159
Office and Administrative Support Occupations	813,080	6.9	69
Management Occupations	243,270	5.5	55
Transportation and Material Moving Occupations	393,320	4.4	44
Production Occupations	501,570	3.8	38
Business and Financial Operations Occupations	253,180	2.1	21
Architecture and Engineering Occupations	93,140	1.2	12

### OPERATION

Occupation	Total Ohio Workforce	Percentage of Project	Coal Operation Jobs
Production Occupations	501,570	42.2	53
Architecture and Engineering Occupations	93,140	10.1	13
Installation, Maintenance, and Repair Occupations	208,220	8.2	10
Office and Administrative Support Occupations	813,080	6.9	9
Transportation and Material Moving Occupations	393,320	6.5	8
Construction and Extraction Occupations	176,140	6.3	8
Management Occupations	243,270	5.6	7
Business and Financial Operations Occupations	253,180	4.6	6
Life, Physical, and Social Science Occupations	35,450	3.7	5
Sales and Related Occupations	514,300	1.7	2

FOOTNOTE: Underlying industry, occupation, and employment data are derived using national expected averages from the Bureau of Labor Statistics' May 2015 Occupational Employment Statistics (OES) survey and 2014-24 Industry-occupation matrix data, by industry tables. Occupations that constitute less than 0.1 percent of the industry, have fewer than 50 jobs, are confidential, or include poor quality data are not displayed. Post analysis occupations that constitutes less than 1 percent of any particular project and account for less than 1 job are omitted. Jobs numbers are then rounded. These compounding suppression effects cause the percentages to add to less than 100 and the sum of occupations to be less than the total number of jobs.

# ECONOMIC AND WORKFORCE IMPACT ANALYSIS FOR PROPOSED TIER 2 INTEGRATED ENERGY SYSTEM (IES) INDUSTRIES AT PORTS

## LIQUID AND SOLID CO<sub>2</sub>: 500 TONS/DAY CAPACITY

**PROJECT SIMULACRUM:** Continental Carbonic, Clearfield, PA

**PROJECT STUDY AREA:** OVRDC region (i.e., Adams, Brown, Clermont, Gallia, Highland, Jackson, Lawrence, Pike, Ross, Scioto, and Vinton Counties, Ohio)

**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.

### LIQUID AND SOLID CO<sub>2</sub> ECONOMIC IMPACT

CONSTRUCTION				
Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	400	\$18,197,021	\$22,366,995	\$44,231,556
Indirect Effect	38	\$2,076,606	\$3,298,538	\$6,426,038
Induced Effect	92	\$3,171,520	\$6,357,641	\$11,138,906
Total Effect	530	\$23,445,147	\$32,023,173	\$61,796,500
Multiplier	1.324	1.288	1.432	1.397

OPERATION				
Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	80	\$6,890,822	\$23,080,797	\$68,643,304
Indirect Effect	94	\$4,703,661	\$11,032,045	\$23,360,632
Induced Effect	53	\$1,814,209	\$3,633,127	\$6,367,597
Total Effect	227	\$13,408,693	\$37,745,969	\$98,371,532
Multiplier	2.838	1.946	1.635	1.433

### LIQUID AND SOLID CO<sub>2</sub> WORKFORCE IMPACT

CONSTRUCTION			
Occupation	Total Ohio Workforce	Percentage of Project	CO2 Construction Jobs
Construction And Extraction Occupations	180,550	57.7	231
Management Occupations	239,640	13.0	52
Office And Administrative Support Occupations	815,240	9.9	40
Business And Financial Operations Occupations	261,220	6.2	25
Architecture And Engineering Occupations	94,370	4.0	16
Installation, Maintenance, And Repair Occupations	210,310	2.6	10
Production Occupations	494,570	2.0	8
Transportation And Material Moving Occupations	397,650	2.0	8
Sales And Related Occupations	509,470	1.0	4

OPERATION			
Occupation	Total Ohio Workforce	Percentage of Project	CO2 Operation Jobs
Production Occupations	494,570	41.8	33
Installation, Maintenance, And Repair Occupations	210,310	9.9	8
Architecture And Engineering Occupations	94,370	8.3	7
Life, Physical, And Social Science Occupations	35,490	7.9	6
Transportation And Material Moving Occupations	397,650	7.7	6
Office And Administrative Support Occupations	815,240	7.5	6
Management Occupations	239,640	6.9	6
Business And Financial Operations Occupations	261,220	4.7	4
Sales And Related Occupations	509,470	2.0	2

**FOOTNOTE:**

1. Economic impact analysis done with IMPLAN software, version 3.1. 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 U.S. Census Bureau.
2. Underlying industry, occupation, and employment data are derived using national expected averages from the Bureau of Labor Statistics' May 2016 Occupational Employment Statistics (OES) survey and 2014-24 Industry-occupation matrix data, by industry tables. Occupations that constitute less than 0.1 percent of the industry, have fewer than 50 jobs, are confidential, or include poor quality data are not displayed. Post analysis occupations that constitutes less than 1 percent of any particular project and account for less than 1 job are omitted. Jobs numbers are then rounded. These compounding suppression effects cause the percentages to add to less than 100 and the sum of occupations to be less than the total number of jobs.

# METHANOL: 1,000,000 TONS/YEAR CAPACITY

**PROJECT SIMULACRUM:** Methanex, Geismar, LA

**PROJECT STUDY AREA:** OVRDC region (Adams, Brown, Clermont, Gallia, Highland, Jackson, Lawrence, Pike, Ross, Scioto, and Vinton Counties, Ohio)

**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.

## METHANOL ECONOMIC IMPACT

CONSTRUCTION				
Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	1,250	\$56,865,685	\$69,896,853	\$138,233,600
Indirect Effect	117	\$6,489,392	\$10,307,929	\$20,081,368
Induced Effect	288	\$9,911,000	\$19,867,625	\$34,809,077
Total Effect	1,655	\$73,266,077	\$100,072,407	\$193,114,045
Multiplier	1.324	1.288	1.432	1.397

OPERATION				
Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	130	\$10,620,772	\$20,022,287	\$198,534,448
Indirect Effect	247	\$11,094,795	\$18,619,683	\$36,316,999
Induced Effect	99	\$3,397,811	\$6,804,991	\$11,926,433
Total Effect	476	\$25,113,377	\$45,446,961	\$246,777,879
Multiplier	3.658	2.365	2.270	1.243

## METHANOL WORKFORCE IMPACT

CONSTRUCTION			
Occupation	Total Ohio Workforce	Percentage of Project	Methanol Construction Jobs
Construction And Extraction Occupations	180,550	57.7	721
Management Occupations	239,640	13.0	163
Office And Administrative Support Occupations	815,240	9.9	124
Business And Financial Operations Occupations	261,220	6.2	78
Architecture And Engineering Occupations	94,370	4.0	50
Installation, Maintenance, And Repair Occupations	210,310	2.6	33
Production Occupations	494,570	2.0	25
Transportation And Material Moving Occupations	397,650	2.0	25
Sales And Related Occupations	509,470	1.0	13

OPERATION			
Occupation	Total Ohio Workforce	Percentage of Project	Methanol Operation Jobs
Production Occupations	494,570	41.8	54
Installation, Maintenance, And Repair Occupations	210,310	9.9	13
Architecture And Engineering Occupations	94,370	8.3	11
Life, Physical, And Social Science Occupations	35,490	7.9	10
Transportation And Material Moving Occupations	397,650	7.7	10
Office And Administrative Support Occupations	815,240	7.5	10
Management Occupations	239,640	6.9	9
Business And Financial Operations Occupations	261,220	4.7	6
Sales And Related Occupations	509,470	2.0	3

**FOOTNOTE:**

1. Economic impact analysis done with IMPLAN software, version 3.1. 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 U.S. Census Bureau.

2. Underlying industry, occupation, and employment data are derived using national expected averages from the Bureau of Labor Statistics' May 2016 Occupational Employment Statistics (OES) survey and 2014-24 Industry-occupation matrix data, by industry tables. Occupations that constitute less than 0.1 percent of the industry, have fewer than 50 jobs, are confidential, or include poor quality data are not displayed. Post analysis occupations that constitutes less than 1 percent of any particular project and account for less than 1 job are omitted. Jobs numbers are then rounded. These compounding suppression effects cause the percentages to add to less than 100 and the sum of occupations to be less than the total number of jobs.

# POLYMERS: 1,100 KMT/YEAR CAPACITY

**PROJECT SIMULACRUM:** Solvay, Marietta, OH

**PROJECT STUDY AREA:** OVRDC region (Adams, Brown, Clermont, Gallia, Highland, Jackson, Lawrence, Pike, Ross, Scioto, and Vinton Counties, Ohio)

**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.

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## POLYMERS ECONOMIC IMPACT

CONSTRUCTION				
Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	1000	\$45,492,551	\$55,917,486	\$110,578,888
Indirect Effect	94	\$5,191,514	\$8,246,344	\$16,065,095
Induced Effect	230	\$7,928,801	\$15,894,101	\$27,847,264
Total Effect	1.324	\$58,612,866	\$80,057,932	\$154,491,247
Multiplier	1.324	1.288	1.432	1.397

OPERATION				
Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	300	\$42,378,827	\$91,548,018	\$411,322,592
Indirect Effect	271	\$15,566,528	\$27,796,554	\$54,267,299
Induced Effect	263	\$9,067,389	\$18,153,222	\$31,819,270
Total Effect	834	\$67,012,744	\$137,497,794	\$497,409,162
Multiplier	2.780	1.581	1.502	1.209

## POLYMERS WORKFORCE IMPACT

CONSTRUCTION			
Occupation	Total Ohio Workforce	Percentage of Project	Polymer Construction Jobs
Construction And Extraction Occupations	180,550	57.7	577
Management Occupations	239,640	13.0	130
Office And Administrative Support Occupations	815,240	9.9	99
Business And Financial Operations Occupations	261,220	6.2	62
Architecture And Engineering Occupations	94,370	4.0	40
Installation, Maintenance, And Repair Occupations	210,310	2.6	26
Production Occupations	494,570	2.0	20
Transportation And Material Moving Occupations	397,650	2.0	20
Sales And Related Occupations	509,470	1.0	10

OPERATION			
Occupation	Total Ohio Workforce	Percentage of Project	Polymer Operation Jobs
Production Occupations	494,570	48.3	145
Architecture And Engineering Occupations	94,370	9.4	28
Installation, Maintenance, And Repair Occupations	210,310	9.1	27
Office And Administrative Support Occupations	815,240	6.9	21
Management Occupations	239,640	6.2	19
Business And Financial Operations Occupations	261,220	5.2	16
Life, Physical, And Social Science Occupations	35,490	5.2	16
Transportation And Material Moving Occupations	397,650	3.4	10
Sales And Related Occupations	509,470	2.3	7
Computer And Mathematical Occupations	140,110	1.6	5
Construction And Extraction Occupations	180,550	1.0	3

**FOOTNOTE:**

- Economic impact analysis done with IMPLAN software, version 3.1. 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 U.S. Census Bureau.
- Underlying industry, occupation, and employment data are derived using national expected averages from the Bureau of Labor Statistics' May 2016 Occupational Employment Statistics (OES) survey and 2014-24 Industry-occupation matrix data, by industry tables. Occupations that constitute less than 0.1 percent of the industry, have fewer than 50 jobs, are confidential, or include poor quality data are not displayed. Post analysis occupations that constitutes less than 1 percent of any particular project and account for less than 1 job are omitted. Jobs numbers are then rounded. These compounding suppression effects cause the percentages to add to less than 100 and the sum of occupations to be less than the total number of jobs.



# Cracker Plant

**PROJECT SIMULACRUM:** Shell Cracker in Potter Township, PA (100,000 bpd of ethane)

**PROJECT STUDY AREA:** OVRDC region (i.e., Adams, Brown, Clermont, Gallia, Highland, Jackson, Lawrence, Pike, Ross, Scioto, and Vinton Counties, Ohio)

**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.

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## CRACKER PLANT ECONOMIC IMPACT

CONSTRUCTION				
Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	6,000	\$224,900,005	\$269,739,156	\$300,331,601
Indirect Effect	432	\$21,114,139	\$35,150,058	\$65,353,644
Induced Effect	1,096	\$38,508,120	\$77,063,090	\$134,751,460
Total Effect	7,528	\$284,522,264	\$381,952,303	\$500,436,705
Multiplier	1.25	1.27	1.42	1.67

OPERATION & MAINTAINANCE				
Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	600	\$34,636,001	\$519,454,056	\$3,345,659,039
Indirect Effect	1,740	\$95,948,153	\$211,294,665	\$393,739,345
Induced Effect	652	\$22,870,446	\$44,744,692	\$79,563,397
Total Effect	2,992	\$153,454,599	\$775,493,414	\$3,818,961,781
Multiplier	4.99	4.43	1.49	1.14

## CRACKER PLANT WORKFORCE IMPACT

CONSTRUCTION		
Occupation	Percent of Industry	Employment
Construction And Extraction Occupations	54.1	3,246
Installation, Maintenance, and Repair Occupations	17.6	1,056
Office And Administrative Support Occupations	7.3	438
Management Occupations	5.9	354
Transportation and Material Moving Occupations	5.4	324
Production Occupations	3.8	228
Business and Financial Operations Occupations	2.4	144
Architecture and Engineering Occupations	1.5	90
Sales And Related Occupations	0.8	48

OPERATION & MAINTAINANCE		
Occupation	Percent of Industry	Employment
Production Occupations	41.8	251
Installation, Maintenance, And Repair Occupations	9.9	59
Architecture And Engineering Occupations	8.3	50
Life, Physical, And Social Science Occupations	7.9	47
Transportation And Material Moving Occupations	7.7	46
Office And Administrative Support Occupations	7.5	45
Management Occupations	6.9	41
Business And Financial Operations Occupations	4.7	28
Sales And Related Occupations	2.0	12

**FOOTNOTE:**

1. Economic impact analysis conducted with IMPLAN software, version 3.1. 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 U.S. Census Bureau.
2. Underlying industry, occupation, and employment data are derived using national expected averages from the Bureau of Labor Statistics' Occupational Employment Statistics (OES) survey and 2016–2026 industry-occupation matrix data, by industry tables. Source: <https://www.bls.gov/emp/tables/industry-occupation-matrix-industry.htm>.

## DATA CENTER

**PROJECT SIMULACRUM:** Facebook Data Center in New Albany, OH (970,000 sq. ft.)

**PROJECT STUDY AREA:** OVRDC region (Adams, Brown, Clermont, Gallia, Highland, Jackson, Lawrence, Pike, Ross, Scioto, and Vinton Counties, Ohio)

**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.

### DATA CENTER ECONOMIC IMPACT

CONSTRUCTION				
Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	1,600	\$59,840,001	\$68,413,430	\$80,089,356
Indirect Effect	83	\$4,312,350	\$7,238,291	\$14,756,137
Induced Effect	322	\$11,404,902	\$22,102,275	\$39,125,862
Total Effect	2,005	\$75,557,253	\$97,753,997	\$133,971,355
Multiplier	1.25	1.26	1.43	1.67

OPERATION & MAINTAINANCE				
Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	100	\$7,733,000	\$8,002,334	\$8,358,095
Indirect Effect	29	\$1,135,934	\$1,885,406	\$3,470,933
Induced Effect	45	\$1,576,646	\$3,055,606	\$5,409,008
Total Effect	174	\$10,445,580	\$12,943,346	\$17,238,036
Multiplier	1.74	1.35	1.62	2.06

### DATA CENTER WORKFORCE IMPACT

CONSTRUCTION		
Occupation	Percent of Industry	Employment
Construction And Extraction Occupations	54.1	866
Installation, Maintenance, and Repair Occupations	17.6	282
Office And Administrative Support Occupations	7.3	117
Management occupations	5.9	94
Transportation and material moving occupations	5.4	86
Production Occupations	3.8	61
Business and Financial Operations Occupations	2.4	38
Architecture and Engineering Occupations	1.5	24
Sales And Related Occupations	0.8	13

OPERATION & MAINTAINANCE		
Occupation	Percent of Industry	Employment
Computer and Mathematical Occupations	41.2	41
Office and Administrative Support Occupations	26.5	27
Business and Financial Operations Occupations	10.3	10
Management Occupations	9.5	10
Sales and Related Occupations	7.7	8
Mathematical Science Occupations	0.8	1
Architecture and Engineering Occupations	0.8	1
Installation, Maintenance, and Repair Occupations	0.7	1
Production Occupations	0.5	1

**FOOTNOTE:**

1. Economic impact analysis conducted with IMPLAN software, version 3.1. 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 U.S. Census Bureau.
2. Underlying industry, occupation, and employment data are derived using national expected averages from the Bureau of Labor Statistics' Occupational Employment Statistics (OES) survey and 2016–2026 industry-occupation matrix data, by industry tables. Source: <https://www.bls.gov/emp/tables/industry-occupation-matrix-industry.htm>.

For more information about the PORTSfuture Program,  
visit [www.portsfuture.com](http://www.portsfuture.com) or contact Stephanie Howe: [howe@ohio.edu](mailto:howe@ohio.edu)

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