

**Ohio University (OU) Voinovich School of Leadership and
Public Service US Department of Energy Office of
Environmental Management
(DOE EM) Financial Assistance Grant**

**Collaborative Efforts to Inform DOE EM Cleanup, End State
Configuration, and Accelerated Property Transfer at the
PORTS facility in Piketon, Ohio**

**Site Repurposing Continuation and Ongoing Technical
Assistance, Public Outreach, Education, and Engagement
for Property Transfer and Future Use**

Grant Year 5 (GY5) April 1, 2020 – September 30, 2021

Combined Activities Report

**Stephanie Howe
Ohio University (OU) Voinovich School of Leadership and Public
Service**

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Department of Energy Office of Environmental Management
Portsmouth/Paducah Project Office*

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**Stephanie Howe-Program Director
740.593.9900
howe@ohio.edu**

Purpose and approach

The Site Repurposing Continuation and Ongoing Technical Assistance, Public Outreach, Education, and Engagement for Property Transfer and Future Use activities serve the DOE EM cleanup mission in several ways. These activities expand data utilization with site stakeholders at PORTS and in the region to enhance information-based decision making when determining viable future-use options for the site and site assets, so that cost savings/cost avoidance may be realized by DOE as cleanup efforts continue. These activities contribute to informing the end-state configuration for the site and may expedite property transfer for reindustrialization, thus supporting DOE's efforts to reduce the EM footprint at PORTS. Additionally, grant activities support the site reindustrialization efforts being led by the local community reuse organization, the Southern Ohio Diversification Initiative (SODI).

Ohio University's role in the site repurposing and ongoing outreach activities is to serve the public interest: by acting as an independent, credentialed broker of data and other information; by convening, facilitating, and assisting collaborative partners and interested parties-including government, business, and community entities-with information sharing and partnership building; by brokering relationships with private sector entities who are potential future tenants; and, along with collaborators, by employing data-driven decision processes to ensure efficacious planning for site future-use endeavors. These efforts are responsive to the stated future-use preferences of the public at large in the four-county region near the site as identified during various DOE and Ohio University public engagement efforts.

All site repurposing and ongoing outreach activities were carried out in the form of a collaborative effort among Ohio University (OU), DOE, the local community reuse organization known as the Southern Ohio Diversification Initiative (SODI), site contractors, and national experts. As the activities were carried out, progress updates and/or conversations were held with stakeholders such as the Site Specific Advisory Board (SSAB) (when requested), local, state, and federal elected officials; county, regional, and state-level economic development professionals; private sector interests; national experts; community leaders; and/or the public at large.

The work is part of the Ohio University PORTSfuture Program that focuses activities in the areas of public engagement, training, outreach, and STEM education; ecology, hydrology, site environment field work; site readiness, GIS, and data analysis; economic modeling/economic impact analysis; industry discovery; and partnership building. All grant activities create public value and serve the public interest in

one or more of the following ways: informing site cleanup and future use planning; providing cost savings/cost avoidance for cleanup; facilitating the transfer of property to reduce the DOE EM footprint; leveraging public assets of the PORTS site and the region to create regional economic stability; and providing regional youth with STEM education opportunities related to the site and/or emerging STEM-related occupations.

Background

The U.S. Department of Energy's former Portsmouth Gaseous Diffusion Plant (PORTS) near Piketon, Ohio has been an important economic player in the Pike, Scioto, Ross, and Jackson County region for many decades. This fact has impacted the region's socio-economic profile. As the decommissioning and decontamination process continues at the PORTS site, it is expected that this transition period will lead to further changes in the region's socio-economic profile including the creation of socio-economic stressors as well as growth opportunities. The extent to which decision-makers can minimize transitional stress and maximize the economic prospects for the region hinges greatly upon the cleanup and transfer of the PORTS site and site assets for other economic use.

Leveraging foundational public engagement activities

Site repurposing continuation and Ongoing Technical Assistance, Public Outreach, Education, and Engagement for Property Transfer and Future Use activities for grant year 5, build upon site repurposing and outreach activities conducted with 3161 funding (federal funds focused on benefits to workers) during 2013-2015 and previous work under grant years 1, 2, 3, and 4. These activities also build upon findings from Ohio University's original DOE grant work under the public outreach task completed in 2011. Under the outreach task, Ohio University conducted a 15 month, broad-based, grass roots, public participation process in Pike, Scioto, Ross, and Jackson Counties to identify the community's future-use preferences for PORTS. Community participants in outreach activities included residents, economic development entities, environmental groups, nonprofits, businesses, governmental interests, and many other stakeholders in the four counties near the PORTS reservation.

To inform the design of the outreach project, OU conducted qualitative research that included interviewing key site stakeholders, conducting four focus groups with the public at large, and administering a regional telephone survey to gain information about residents' opinions on major problems facing local communities, their awareness/knowledge of the site and cleanup efforts, and their preferences for possible site future uses. Results from this qualitative research were used to design Community Visioning Teams that further broadened opportunities for public involvement at a more in-depth and focused level. Future-use scenarios were developed by community participants in County Visioning Teams and voted on by the public at large at numerous public events and online. County Visioning Teams were provided summary findings from the qualitative research, data on the site and site assets, cleanup plans, and reports that detailed environmental conditions on the site. Throughout the visioning process, participants reviewed and discussed the data and used this input in creating their future use scenarios. The link to the full outreach report is at the bottom of the resulting screen at this webpage: <http://www.portsfuture.com/Default.aspx>

Public voting on future use preferences occurred online and in-person at public events throughout the region from July 15, 2011-September 30, 2011. A total of 1,141 people voted on the nine scenarios. Each person could select 1-3 scenarios as preferred options for future use consideration for PORTS. Results of the multiple-choice voting, with the top four scenarios highlighted in red font, are as follows:

Scenario Name	Total Votes
Nuclear power plant	495
Green energy production	475
Industrial park	421
National research and development	418
Warehousing, distribution, and transportation hub	179
Training and education facility	160
Metal recovery facility	152
Multi-use southern Ohio education center	143
Greenbelt	131

Scenario preferences obtained through the public voting activities were reported to site stakeholders and the final outreach task report was submitted to the U.S. Department of Energy, Office of Environmental Management, Portsmouth/Paducah Project Office, DOE PORTS site officials, and the PORTS-SSAB for their consideration in informing cleanup and risk reduction decisions. These results served to inform all site repurposing activities.

Site repurposing activities-history and evolution prior to current grant year

2013-2015

Staff from OU, SODI, DOE, and relevant site contractors met regularly and engaged in activities to achieve the collaborative goals of informing DOE EM cleanup, end-state configuration and accelerated property transfer at PORTS. Efforts focused on identifying viable options for best leveraging the site and site assets and identifying related industrial sectors that could be recruited as future tenants of a reindustrialized PORTS reservation. The Energy Sector was vetted in-depth and the potential to attract energy-related businesses to locate at the site appears to be favorable. Due to southern Ohio's long-standing ties to energy industries, the ability to develop/strengthen an energy cluster in the region will be enhanced with the site cleanup, transfer, and reuse. During 2014, the President and CEO of the International Economic Development Council (IEDC) met with the collaborative group to discuss strategies for site reindustrialization in the top three identified potential future use sectors that include energy, advanced manufacturing, and transportation/logistics. The IEDC President in his role as an OU Voinovich School Senior Fellow continues to provide expert input and guidance to grant activities throughout the year as requested and in-person usually twice per year.

To gather meaningful input from energy industry leaders and state and regional economic development professionals, a regional energy sector roundtable was held in May of 2014 to further inform site reuse planning in this area. The roundtable discussion focused on identifying opportunities to develop energy sector businesses at the PORTS site in the form of Public-Private Partnerships (P3s). Ohio University designed the roundtable concept in conjunction with IEDC and other national experts and in consultation with several energy industry leaders who were interviewed by telephone. This information resulted in a concept paper that guided the materials developed for the session, the participant recruitment, and the facilitation design for the roundtable.

The roundtable was well-attended and included representation from private industry, economic development, government, national level consultants, PORTS-SSAB, DOE, SODI, and site contractors. The Energy Sector Roundtable revealed key insights regarding the most feasible energy industries to pursue including: bio-chemicals (polymers, plastics, other); waste recycling/waste transformation (waste heat, municipal waste, anaerobic digestion, methane combustion, other); metals recycling; energy generation, energy storage and micro-grids; biofuels/bio-products; and coal alternatives (carbon capture and use, carbon capture and sequestration, clean coal, coal to liquids, RD&D, other) with an emphasis on

employing an ‘E3 approach’ of harmonizing utilization of environmental resources to develop energy and provide economic benefit to the region.

During the winter of 2014/2015, Mike Zimmer Esq., an attorney, international energy business development expert, and Ohio University Voinovich School and Russ College of Engineering and Technology Executive in Residence, authored an industry profile paper that discussed top energy sector industries viable for siting at PORTS. The paper can be viewed here:

<https://www.portsfuture.com/wp-content/uploads/2019/03/PORTSfuture-Energy-Sector-PORTS-Campus-White-Paper.pdf>

In February of 2016, Dr. Benjamin Cross P.E., Principal of NuSynergy Energy LLC, Ohio University Voinovich School Executive in Residence and formerly Senior Advisor for the Clean Energy Directorate at the Savannah River National Laboratory, authored a white paper on establishing an Appalachian Regional Energy Cluster. This white paper provides an overview of business (industry) clusters and discusses why the establishment of an Appalachian Regional Energy Cluster is considered a prerequisite for enhancing the viability of locating an Integrated Energy System-Closed Loop Manufacturing (IES-CLM) complex at the U.S. Department of Energy PORTS site. The white paper can be viewed here:

<https://www.ohio.edu/ce3/resources/upload/CE3-Appalachian-Regional-Energy-Cluster-White-Paper-Feb-2016-FINAL.pdf>

These papers served to guide grant activities in 2016.

2016-2021

Site repurposing activities were informed by and built upon the previous efforts cited above. At the request of the local community reuse organization, the Southern Ohio Diversification Initiative (SODI), OU site repurposing activities were directed to focus on supporting the development of an Integrated Energy System/Closed Loop, advanced Manufacturing (IES-CLM) complex at PORTS and align with insights garnered throughout previous site repurposing grant work. An IES-CLM complex will attract and expand industries in the region, leverage coal and shale resources in additive manufacturing applications, create jobs, and grow the southern Ohio economy.

This strategy includes employing a multi-disciplinary cluster approach for regional development utilizing the PORTS campus as one element of a regional economic diversification strategy. This approach is employed based on the notion that clusters develop across a geographic area and businesses provide synergy across/among each other, which will enhance cluster growth. This cluster approach was consistent with stated public preferences for site reuse cited above. Additionally, in the past 2-3 years, southern and eastern Ohio have been tagged as potential areas in which to site billion-dollar petrochemical industries that are related to the shale boom in Ohio and western Pennsylvania. The PORTS site has the infrastructure capacity to serve as a major petrochemical (petchem) industry hub.

Another burgeoning industry across the nation and especially in Ohio relates to data centers which consume vast amounts of electricity. Again, the PORTS infrastructure and interconnection to both the PJM and MISO national grids lends the PORTS site be an ideal location for a central hub for electricity generation, transmission, and distribution for decades to come. The DOE PORTS site is widely viewed as a major regional asset that can greatly enhance efforts to develop several regional clusters in the areas of energy, advanced manufacturing, transportation/logistics, and power generation, transmission, and distribution and thus the site could be reindustrialized in these areas to enhance the economic viability of the region for many future generations of Ohioans.

Beginning January 2021, under the Biden Administration, national energy and economic development strategies abruptly shifted to focus on clean energy production and clean manufacturing which aligns perfectly with the Integrated Energy System-Closed Loop Manufacturing (IES-CLM) strategy for PORTS. This dramatic shift in national focus was born out of necessity to employ an ‘all-hands-on-deck’ approach to combatting the rapidly worsening climate crises by developing ways to reduce CO₂ emissions in the areas of power generation, manufacturing, and transportation. Our site reindustrialization efforts expanded to include private sector developers to produce decarbonized energy inputs via development of clean hydrogen to power for electricity and blue hydrogen for manufacturing and transportation. We retain our partnership with a regional solar energy developer as well as with private companies who conducted a siting study to determine assets at the site that are aligned with attracting advanced nuclear small modular reactor projects in the futures. With these core energy producer partners, we are remaining steadfast to our articulated vision of engaging in an ‘all of the above’ energy strategy in our IES-CLM.

Site repurposing activities-Current Grant Year 5

OU site repurposing activities include collaborating with SODI and other stakeholders on: master planning, site readiness and property transfer activities; data analysis; GIS; industry discovery and networking; collaborations/partnership building; project resource acquisition for SODI; and developing linkages to applicable Ohio University researchers and tech commercialization entities. Ongoing Technical Assistance, Public Outreach, Education, and Engagement for Property Transfer and Future Use activities include: developing property request guidelines (if requested); a property transfer plan; a phased-implementation schedule; providing reindustrialization planning and progress updates, STEM educational activities for regional youth, and entrepreneurship outreach to community members in the four-county region.

These activities will support the diversification of the regional economy by imagining possibilities beyond the immediate and existing economic realities in southern Ohio to identify what is needed to best prepare the PORTS site to attract 21st century industries with enduring missions. This will provide residents in the region access to 21st century job prospects, enhanced wages, and an overall improved quality of life. Site reindustrialization will spur regional cluster and supply chain-related growth throughout the impacted counties, further advancing economic healing by growing both large and small business opportunities in southern Ohio and beyond. OU Grant Year 5 activities are depicted in Figure 1 below.

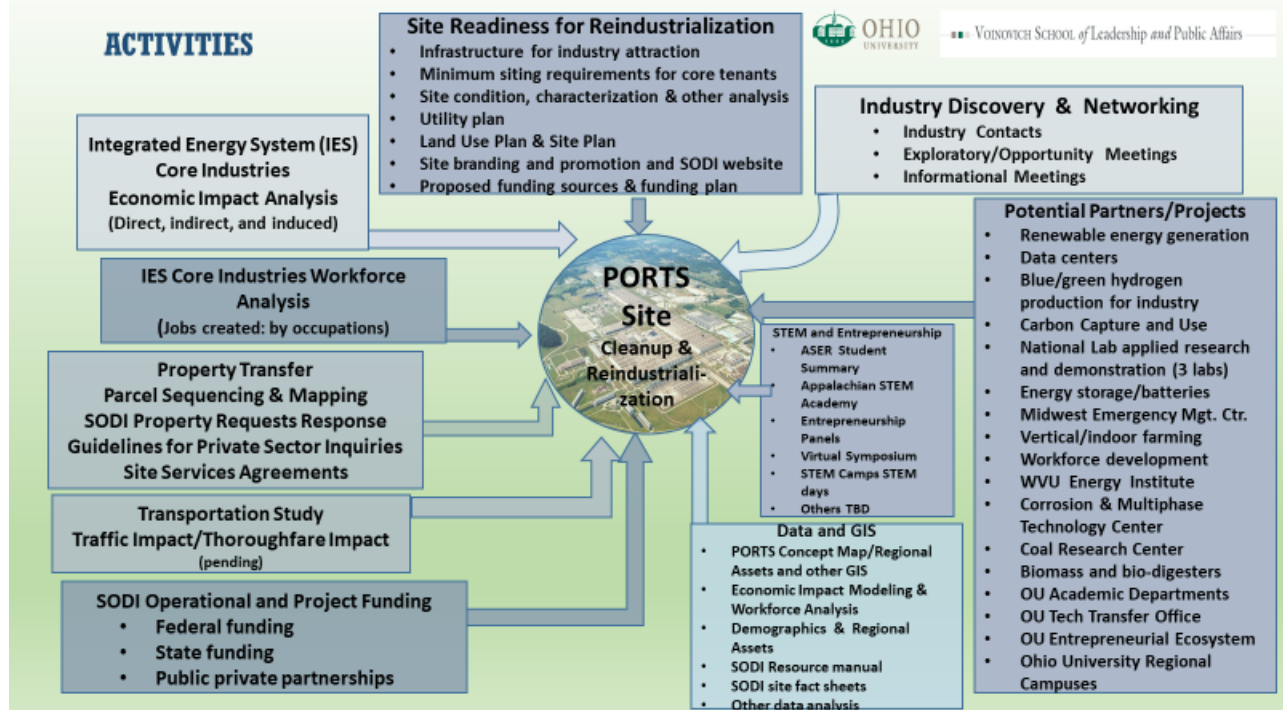


Figure 1-OU Grant Year 5 activities

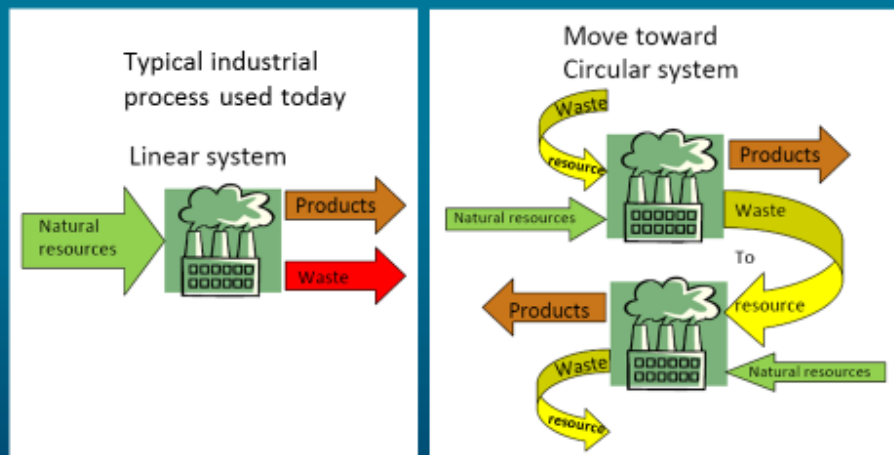
Integrated Energy System-Closed Loop Manufacturing (IES-CLM) complex

The Southern Ohio Diversification Initiative is pursuing the development of an Integrated Energy System-Closed Loop Manufacturing (IES-CLM) complex at PORTS to leverage the unique infrastructure and other assets of the site to their optimal value for new economic growth opportunities.

The technical definition of an IES is two or more energy resources utilized as inputs to two or more physically coupled subsystems to produce one or more energy commodities as outputs. A simpler definition is multiple energy resources combined to produce one or more energy related products. An IES embodies a synergistic integration of an “all-of-the-above” energy strategy.

The key aspects of an IES-CLM 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-CLM, the “whole” is worth more than the “sum of the parts”, 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, higher quality jobs are achieved. An IES-CLM results in industrial symbiosis as depicted in Figure 2 below.

Industrial Symbiosis (Closed Loop Manufacturing)



The facility at Piketon, Ohio

**PORTS
FUTURE**



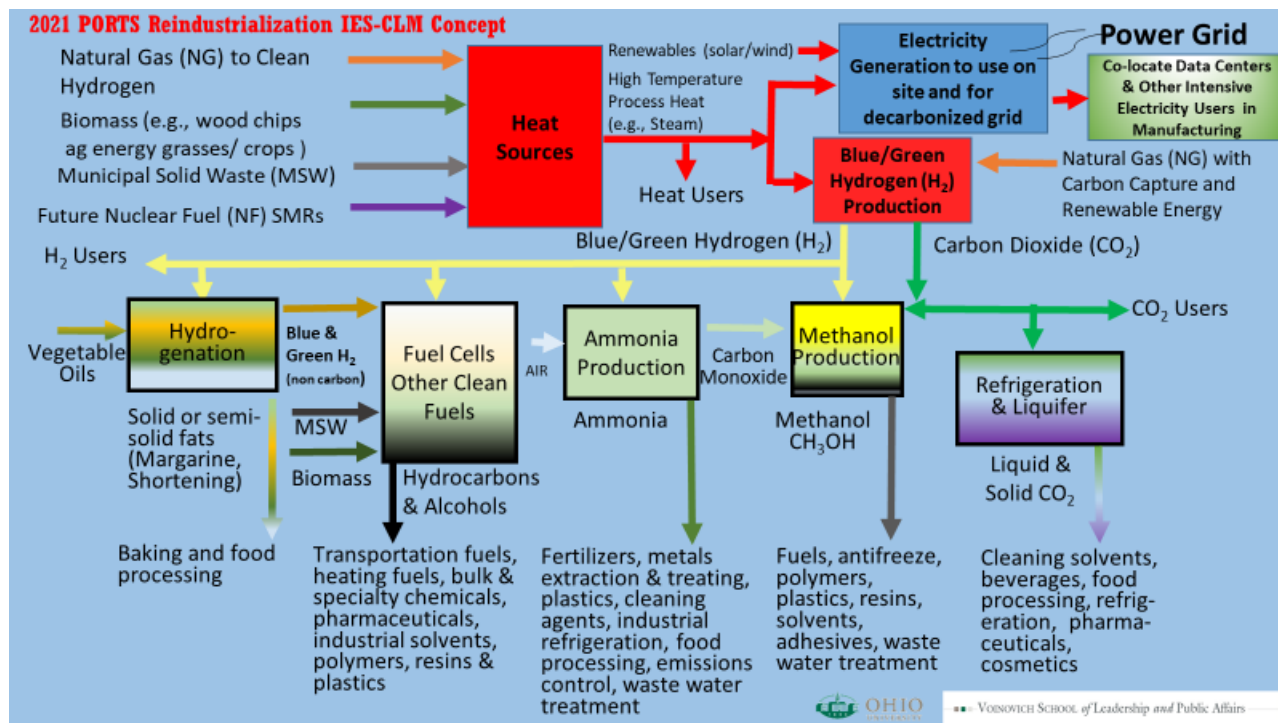
Figure 2-Industrial symbiosis depiction

IES-CLM complexes integrate high temperature heat with industrial technologies to: produce electricity for use by manufacturers, data centers, and residential consumers; supply predictable, low-cost energy; power industrial processes such as carbon conversion (e.g., coal to liquids) and chemical production; and produce decarbonized hydrogen for transportation fuels, polymers, plastics, fertilizer, and the hydrogen fuel cell market to name a few. Creating an IES-CLM at the PORTS facility will: serve and expand existing markets; create new markets; establish new applications for value-added manufacturing with the region's coal and natural gas assets; utilize hydrogen across components of the IES-CLM; develop flexible processes to accommodate market shifts; and utilize residual heat to drive low temperature processes such as water purification (e.g., distillation, osmosis) and enzymatic processes (e.g., fermentation, anaerobic digestion).

The Piketon IES-CLM Project is expected to develop in a series of phases:

- Pilot plant and demonstration activities
- Near-term (0 to 5 years): deployment of initial energy sources and process plant needed by industries to meet their market conditions and the regulatory environment
- Mid-term (5 to 15 years); transition and prepare for the potential addition of nuclear and other energy sources and process plants to accommodate changing economic and regulatory environments
- Long-term (15+ years): integration and optimization of energy sources and industrial process plant industries for changing economic and regulatory environments

A graphical depiction of the Integrated Energy System-Closed Loop Manufacturing concept follows in Figure 3 below. To view the IES-CLM complex technical concept diagrams, see Appendix 1.



Regional cluster development will occur with the growth of natural spin-offs from the core IES-CLM complex to be located at the former PORTS facility as various industries can realize more effective production costs when tied into an IES-CLM. Industries that are high hazard, high security, high investment, and/or require extremely high temperature process heat can be located within the secure area of the IES-CLM complex at the PORTS facility. Other industries can tie into the IES-CLM complex to access heat, electricity, hydrogen, and other production outputs via transportation networks (e.g., roads, rail, and pipelines). A depiction of the potential for regional cluster development with an IES-CLM complex follows in Figure 4 below.

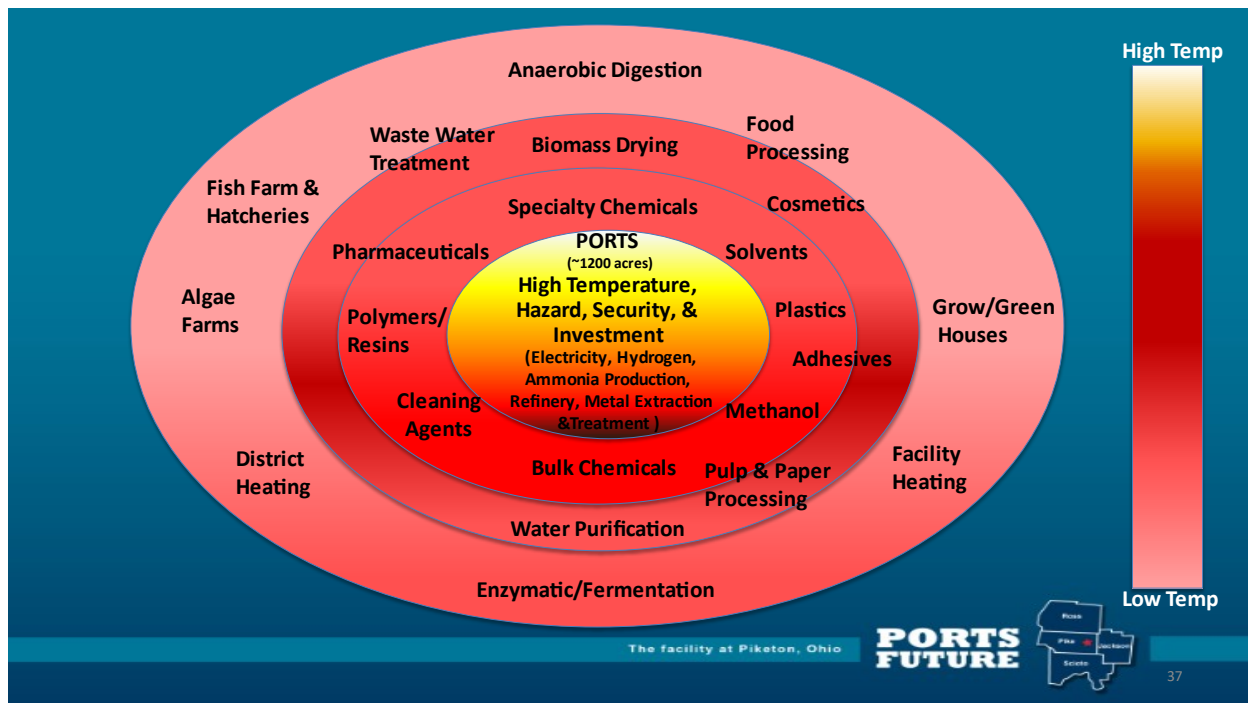


Figure 4- Potential for regional cluster development with an IES-CLM complex

Reindustrialization of the PORTS site into an IES-CLM complex would serve as an excellent example of converting a national liability to a national asset, resulting in much-needed regional economic development. This effort is an extraordinary opportunity to demonstrate what can and should be done with former DOE Defense Nuclear Sites or other brownfield sites. The IES-CLM complex will provide enduring and non-exportable jobs focused on optimizing efficiency of energy production and energy utilization in a sustainable and environmentally responsible manner. Sustainability, recycling and the efficient use of the region's natural attributes/resources and its man-made industrial infrastructure are key drivers. Repurposing of coal assets to make new and innovative products is an excellent opportunity for economic development. Using coal and shale assets in additive manufacturing and diversifying the regional economy will revitalize the region.

Citizens will have access to an increased number of high-quality, higher-than-average paying jobs. Economic impact analyses and workforce analyses of prospective future jobs have been and continue to be conducted by Dr. Gilbert Michaud formerly with OU and now faculty at Loyola University in Chicago, Illinois. The region's entire economy will benefit from the site reindustrialization in the form of direct economic impacts (i.e., worker wages), indirect economic impacts (i.e., commerce and business revenue), and induced economic impacts (i.e., purchasing of goods and services that will generate business and job expansion and state and local tax revenue). It is impossible to overstate the impact that site reindustrialization will have on the region's economy as there have been no large-scale industry start-ups or expansions to replace the DOE former plant operations. A multitude of IES-CLM complex benefits are shown below in Figure 5-IES-CLM Impact.



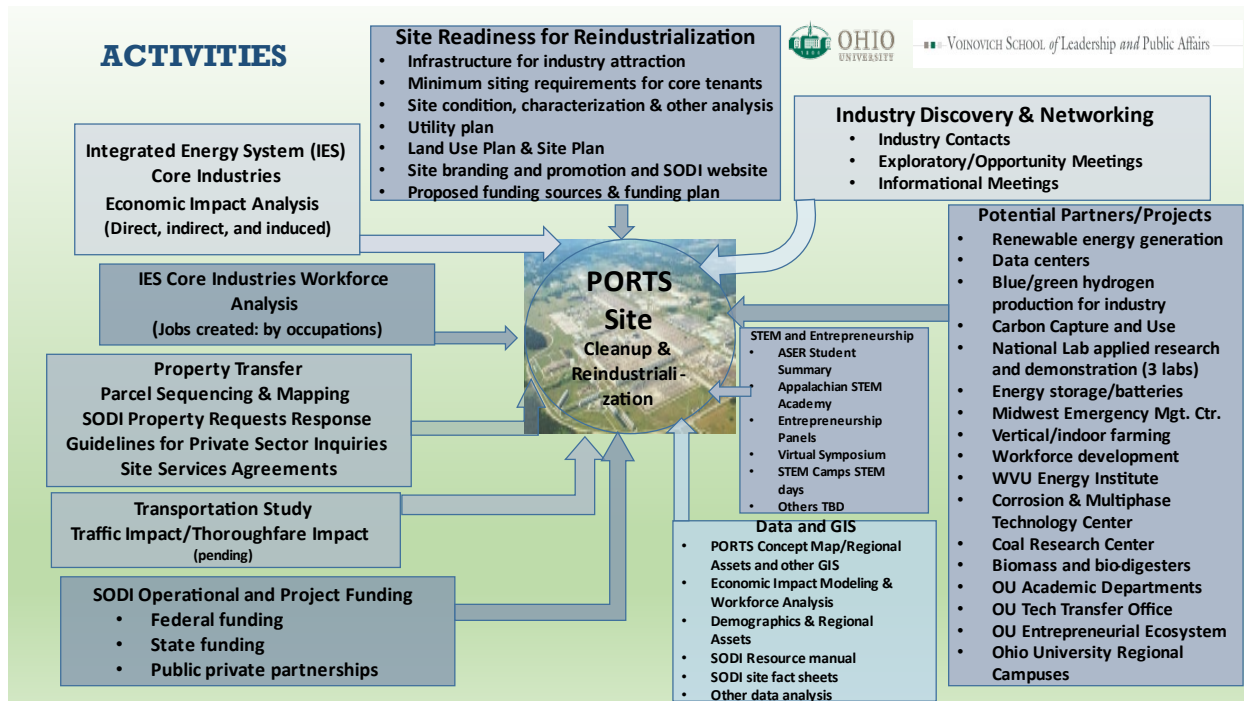
Figure 5-IES-CLM Impact

OU grant activities complement SODI's ongoing collaboration with an industry collaborative seeking to identify and pilot a versatile, next generation nuclear power technology at the PORTS site. The next generation nuclear reactor could serve as the long-term source of high temperature heat to power the IES-CLM complex at PORTS. This new technology would be attractive to energy-intensive heat and power-using industrial end-users who are seeking zero carbon, environmentally friendly energy sources in their production processes. Key concerns that must be addressed include mitigating the immense up-front cost to construct the reactors and resolving regulatory issues associated with the design and federal licensing of this new reactor technology so that it can be constructed and operated as a part of the IES-CLM complex at the PORTS site. SODI and the industry collaborative plan to continue to work closely with the government, the U.S. Department of Energy, and others with the goal of effectively fostering this partnership.

Summary of Grant Year 5 Activities for Site Repurposing Continuation and Ongoing Technical Assistance, Public Outreach, Education, and Engagement for Property Transfer and Future Use

Some activities began in Grant Year 5 and will carry forward into Budget Period 6 (BP6) as ongoing grant activities.

Brief narratives for each activity-area displayed follow the graphic below.



OU Grant Year 5 activities

Site Readiness for Reindustrialization

The Southern Ohio Diversification Initiative (SODI) continues their focus on asset recovery operations by dedicating staff resources to this effort. Asset recovery involves SODI working with DOE and site cleanup contractors to identify, retrieve, recycle and/or sell personal property assets that are located at the PORTS site. By expanding asset recovery efforts, SODI will reduce landfill waste and increase revenue streams for regional economic development. Asset recovery proceeds are used by SODI for economic diversification initiatives in Pike, Ross, Scioto, and Jackson counties. These four counties served as the primary labor market for the PORTS site when it operated as a US DOE gaseous diffusion facility. The asset recovery proceeds are also used to accelerate the PORTS site reindustrialization efforts including working with Ohio University who allocates part of their DOE grant to create a viable land use plan, site master plan, and related materials to further prepare SODI to comprehensively respond to prospective investment requests from industries. DOE EM funding appropriated to the site by Congress is dedicated to cleanup activities including funding for the DUF6 facility.

Site readiness for site reindustrialization activities focus on preparing parcels to be made available and undergo approval processes for reindustrialization. This includes: identifying industry types that would be a good fit for the available parcels; ensuring that the site can meet those industries' minimum siting criteria; analyzing the utility infrastructure in relation to industry attraction and determining minimum standards, identifying weaknesses and proposing funding sources to strengthen utility infrastructure; ensuring all basic geological, environmental, and other related site characterization studies are completed or identify gaps and studies that need to be completed to prepare the site for redevelopment; designing a framework to ensure the site will meet the minimum validation by an external site selection agent; improving the SODI website; and assembling this information so that SODI can respond to and alleviate concerns of prospect companies which will be crucial to attracting industries. SODI formally received the first land parcel transfer at a ceremony held in July of 2018. Future parcel transfers are expected, including an additional 200 acres in calendar year 2021, thus SODI needs to accelerate site

reindustrialization preparedness to quickly attract industries so that job creation can be realized for the region.

Data and GIS

As stated earlier, the purpose of the two activity areas summarized in this report is to serve the DOE EM cleanup mission. By expanding data utilization with site stakeholders at PORTS and in the region to enhance information-based decision making when determining viable future-use options for the site and site assets, the potential for cost savings/cost avoidance is enhanced as DOE cleanup efforts continue. Data and GIS created under previous grant activities will be maintained and new and/or updated data and GIS products are being developed under the current grant. Data activities are summarized in Figure 6 and described below.

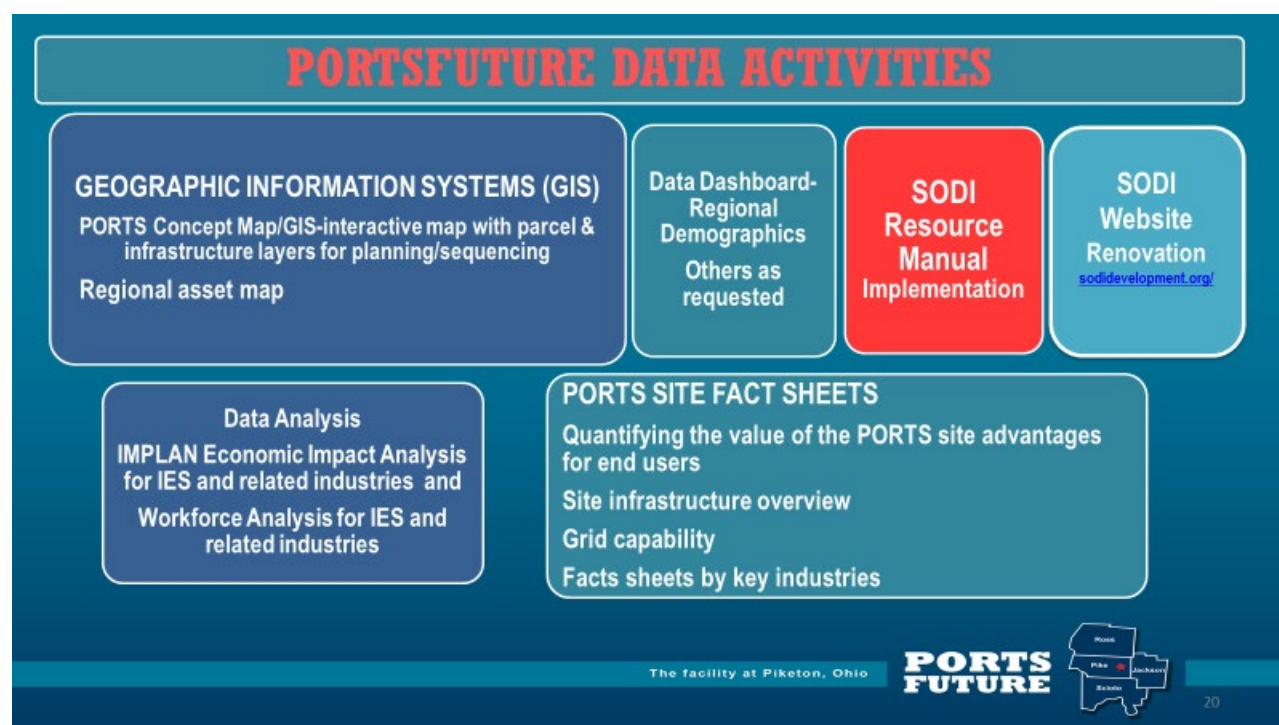


Figure 6-PORTSfuture Data Activities

Industries Economic Impact Analysis and Workforce Analysis

In previous grant years, Ohio University conducted analyses on the direct, indirect, and induced economic impact and related workforce analysis on the four-county labor market closest to the facility (Pike, Scioto, Jackson, and Ross counties) of potential additive manufacturing industries (tier 2 industries) related to an IES. Grant Year 5 included an analysis of decarbonized hydrogen to power and blue hydrogen production. Additional analyses on other potential site reindustrialization options will be added to findings of previous grant years as appropriate.

Regional Energy Initiatives Related to Integrated Energy System Closed Loop Manufacturing (IES-CLM) Industries Economic Impact Analysis

Ohio University conducted analysis of the direct, indirect, and induced economic impacts on the regional labor market for an existing initiative that was launched by our decarbonized hydrogen partner at the Escalante facility in New Mexico. The Escalante project will serve as a model for their expansion into Ohio at the PORTS facility.

The economic impact analysis report will inform site reindustrialization, local economic development planning efforts and workforce development strategies and will serve to inform the IES-CLM complex business case. This information can be used to seek support and/or resources from industry, investors, government, and the community in support of the development of an IES-CLM complex. Deliverables include a summary document that can stand alone or be compiled as part of a larger summary document. This analysis is available at: https://www.portsfuture.com/wp-content/uploads/2021/08/Newpoint-Gas-Hydrogent-to-Power_onepager_June-17.pdf

Draft electronic version of report in PDF format-April 2021

Final electronic version of report in PDF format-completed June 2021

Data on Ohio Geology

Secured comprehensive data from the Ohio Department of Natural Resources on geology and related information that will be needed by private developers. Created a password protected web page on the portsfuture.com website so that data can be reviewed as needed by external parties upon request.

Regional Transmission Organizations (RTOs) Summary

Created RTO summary at the request of a private energy developer so they could determine benefits/value of locating energy projects at PORTS due to the specific grid interconnections accessible at the site. Summary can be viewed at: <https://www.portsfuture.com/wp-content/uploads/2021/08/PORTSfuture-Comparison-on-RTOs-in-USA-and-Canada.pdf>

Draft electronic version of report in PDF format-July 2021

Final electronic version of report in PDF format-September 2021

PORTS Site Master Plan

Ohio University collaborated with SODI to produce a site master plan that fully explicates SODI's mission, vision, assumptions, guiding principles, goals, values, objectives, challenges, benefits, and strategy for launching the IES-CLM complex at PORTS.

Draft electronic version of report in PDF format-June 2021

Final electronic version of report in PDF format-to be determined by SODI after SODI Board approval

PORTS Land Use Plan

Ohio University collaborated with SODI to produce a site land use plan that describes SODI's site reindustrialization purpose, assumptions, current land use, leases, transfers and other land use actions, future land use plans, land use issues, planning and control for existing missions, and process for future land use changes.

Draft electronic version of report in PDF format-June 2021

Final electronic version of report in PDF format-to be determined by SODI after SODI Board approval

PORTS Concept Map

Maintaining, expanding, and modifying as requested the interactive site map that displays various layers including site infrastructure, easements, broadband points of presence, topography, limitations, parcel transfers, and other information to be used in site planning efforts. This is a GIS database creating a land use, site master planning tool that enables the user to display various layers such as site infrastructure assets, wetlands, landfills, and other features in relation to developable parcels. This GIS tool will assist in assessing suitability to industry siting criteria and with other activities related to planning for reindustrialization. This interactive GIS database can be viewed at:

<https://ohiou.maps.arcgis.com/apps/webappviewer/index.html?id=fe14a57f8ccb48d4875cbfb17e0271>

SODI recently requested updates to the concept map related to the advanced nuclear siting study. OU is in the process of gathering the necessary data from DOE to execute the requested updates.

Draft electronic version of report in PDF format-to be determined when data are received

Final electronic version of report in PDF format-to be determined by SODI

Utility Matrix and Permit Inventory

OU developed a utility matrix and permit inventory in Grant Year 4. The utility matrix provides an at-a-glance view of utilities' current capacity, current usage, excess capacity, and other notes of importance for industries looking to site operations at PORTS. OU created an index/matrix of infrastructure requirements for targeted industries (e.g., water, gas, electric, security, other) that could serve to identify assets to preserve rather than demolish resulting in potential for DOE cost avoidance in this effort. The utility matrix will provide useful data points on investments an industrial tenant might need to consider to make use of an asset that might otherwise be disposed.

The utility matrix will continue to be updated based on targeted industry needs and is available upon request and at the discretion of the community reuse organization known as SODI. This matrix is being maintained and updated as appropriate to support SODI's reindustrialization efforts.

SODI Resource Manual Implementation Follow Up

During calendar year 2017, Ohio University provided ~\$50,000 in non-DOE funds toward a collaboration among OU, private sector consultants, and SODI to create a comprehensive site reindustrialization resource manual. The manual is for use by SODI and other regional and state economic development entities working on the reindustrialization of the PORTS site consistent with the IES-CLM concept diagram shown in Figure 3 above and the IES-CLM technical concept diagrams that depict the mechanical and chemical engineering components of an IES complex shown in Appendix 1 below. In Grant Year 5, OU continued discussing with SODI the implementation of recommendations in the manual.

OU will continue to work with SODI as requested on carrying out recommendations in the manual. Requests to review the manual can be directed to SODI.

SODI Fact Sheets

Quantifying the value of PORTS site advantages for end users will be vital to attracting industries to the site. Facts sheets have already been developed for site infrastructure, grid capability, combined cycle gas turbine facility, and four types of refineries and can be viewed here <https://www.portsfuture.com/site-reuse/>

SODI Fact Sheets continue to be developed and will include relevant data and GIS on the specific areas when requested by SODI. These products will assist SODI in responding comprehensively and expeditiously to private sector and other inquiries about the site and site assets and will thus enhance site reindustrialization efforts.

Data Dashboards

Maintaining previously developed data dashboards. These dashboards are a collection of quantitative and qualitative data to be employed in SODI's site reindustrialization strategy. These data dashboard provide interactive data analysis and visually display relevant regional demographics of workforce-aged residents useful for future site use decision-making. It allows users to quickly access data on the four-county region for various datasets including:

- Population - Total population and percent change in population over time.
- Demographics - The breakdown of total population by age groups and educational attainment.
- Detailed Demographics - The distribution of educational attainment by specific age categories.
- Student Enrollment - Student enrollment by sector and admission area.
- Migration - In-migration, out-migration, and net migration flows for the four-county region.
- Employment by Industry - Total employment by industry sector in the four-county region.
- Employment by Occupation - Total employment by major occupational categories in the four-county region.

- This dashboard can be viewed at:
- The dashboard will be updated to reflect US Census 2020 data pending availability of funding.

Asset Map

Maintaining, expanding, and modifying as requested the existing regional asset map. This map visually displays relevant regional assets useful for future site use decision-making such as highways, hazmat routes, rail, airports, navigable waterways, accredited education institutions, metro centers, population that can be reached within various drive times from the site, and many other data points.

Updated this grant year to include new layers that became available and to update/reorganize some layers. This map can be viewed at:

<http://ohiou.maps.arcgis.com/apps/webappviewer/index.html?id=e5e8bf0c28464fa9b558cd6064afce98>

SODI Public Information and Website Redesign Launch

A public information and website launch for the redesigned SODI website is being planned for rollout in the coming year. The goal of these activities is to develop a positive and informative narrative about site reindustrialization activities. Ohio University has hired strategic consultants to assist in this effort. Funding for the consultants is primarily coming from non-DOE resources at Ohio University. OU finished the redesign of the SODI website in Grant Year 4 in collaboration with SODI and an outside vendor. The goal was to design and build a website for SODI that is easy to navigate and provides useful information to target audiences. This website will be finalized after the SODI board reviews and signs off or provides suggestions for changes to the website. Audiences for the website include industry prospects, businesses, nonprofits, economic development professionals, and general inquiries.

SODI and OU contributed to content creation for each relevant webpage on the new website and the vendor created new content as needed. The website can be viewed at: <http://www.sodidevelopment.org/> SODI Public Information Campaign and website launch dates to be determined by SODI.

SODI Operational and Project Funding

Ohio University prepared a proposal to submit to US Senator Sherrod Brown's community projects funding initiative. The proposal requested \$500K for SODI for use in their operations and site reindustrialization efforts. The proposal was submitted by our strategy consultants via Senator Brown's online proposal portal. The proposal has proceeded to the final stage and all indications appear that the funding will be granted to SODI. SODI federal community project funding award date will be determined by Senator Brown's office. Ohio University has offered to pursue other federal funding on behalf of SODI to support future infrastructure project on SODI's parcels at the PORTS facility. SODI federal funding submissions will be determined by SODI

DOE Energy Earthshot Hydrogen Hub

During the summer of 2021, DOE announced a Request for Information (RFI) for large-scale hydrogen hub projects. The goal of these hubs would be to produce at scale decarbonized hydrogen to expedite the CO₂ reduction goals that are at the heart of the Biden Administration's battle to mitigate the ever-worsening global climate crisis. This RFI exquisitely aligns with the new focus to launch the IES-CLM utilizing decarbonized hydrogen that can be produced by the private sector hydrogen partner mentioned previously in this report.

Ohio University has assembled and is leading a team to pursue a DOE Energy Earthshot Hydrogen Hub to be sited on SODI parcels at the PORTS reservation. Integrated energy systems producing zero emissions at source power along with blue/green hydrogen will serve a vital function in the decarbonization of electricity generation, industrial processes, and transportation. This initiative has a

public-private partnership assembled that is ready to execute pending availability of funding which will enable leveraging other sources of funding and private financing.

The goal is to site one of the soon-to-be named DOE Energy Earthshot Hydrogen Hubs at the former DOE facility in Pike County, Ohio. Ideally, co-location of a CO₂ Sequestration Hub in southern Ohio would further support this hydrogen hub due to the region's favorable geology for CO₂ sequestration. The Hydrogen Hub will launch an Integrated Energy System and Manufacturing complex to create an 'all of the above' energy strategy for decarbonizing power generation, industry, and transportation to combat the climate crises and create well-paying union and non-union jobs in the clean energy economy. Siting a hydrogen hub in Pike County would align with the Biden Administration's focus to serve economically disadvantaged and distressed communities impacted by the transition away from coal and other fossil fuel industries.

Our advantage is that we have a functioning partnership to launch an integrated energy hub--driven initially by hydrogen--that includes: three DOE National Labs (INL-the DOE Nuclear Lab, NREL-the DOE Renewable Energy Lab, and NETL-the DOE Fossil Energy Lab); private industry partners working in clean hydrogen to power, blue/green hydrogen, renewable energy and advanced nuclear; the building trades; Ohio University (coordinating this partnership); and the DOE-designated community re-use organization known as the Southern Ohio Diversification Initiative.

This effort has been named 'The Ohio Valley Green Energy and Manufacturing (GEM)' initiative. This strategy to launch the long-planned for Integrated Energy System-Closed Loop Manufacturing (IES-CLM) Complex utilizing decarbonized hydrogen initially which will play a significant role in addressing the issues associated with the emerging nexus between, energy, water, climate, food, and waste and is an extremely effective approach to combatting climate change. The IES-CLM complex consists of closely coupled energy producers and intensive energy end users sharing support services and systems and common processes to generate power and manufacturer products using advanced closed-loop manufacturing techniques. The concept is based on integrating a diversity of energy sources--specifically zero emissions at source hydrogen power, renewable energy, and advanced nuclear-- water and material resources and manufacturing processes to secure sustainable outcomes. It envisions clean energy producers generating high temperature process-heat to primarily produce electricity and hydrogen and drive a suite of energy and chemical conversion processes. The IES-CLM will improve private sector profits and create jobs in distressed communities while protecting the environment and conserving precious natural resources. Deactivated coal fired power plants in the region can be repurposed to generate clean hydrogen to power which will extend regional impacts.

The Ohio Valley GEM IES-CLM project will encompass an applied laboratory for accelerating the commercialization of green and blue hydrogen strategies to combat climate change utilizing various technologies and feedstocks including advanced nuclear. Hydrogen production assets can thrive from the comparatively low feedstock costs of the nearby Marcellus and Utica shale natural gas reserves. Favorable geological locations for Carbon Capture Sequestration Utilization and Storage (CCSUS) make this option attractive in southeast Ohio to site a hydrogen hub. This southern Ohio site has interconnection to extra high voltage power lines and two major grid operators serving many of the Midwest and Mid-Atlantic states which will enable the clean power that is generated on site and in the region to be utilized as baseload power, thus helping to decarbonize a significant portion of the national grid.

Green hydrogen is often advanced as the best approach for carbon abatement by using an electrolyzer with water and renewable energy or nuclear energy as a power input to produce hydrogen as a fuel. Blue hydrogen is produced from natural gas through methane reforming (MR) with carbon capture. Costs of the process are offset by use of market-based carbon offsets or technical abatement to make the process carbon neutral. Captured CO₂ can be recycled to enhance oil recovery; make liquid CO₂ and dry ice;

support indoor farming activities; and use as feedstock to make methanol, plastics, polymers, and resins. The geographic location of the site, which is within 600 miles of 60% of the US population and 800 miles of much of the Canadian population, provides excellent access to large markets for hydrogen use.

An IES-CLM complex is a sustainable, lower-carbon power generation, hydrogen production and manufacturing strategy built on efficiency, stewardship, circular economy principles and more resilient regional economic development. The project provides an ideal platform for collaborating with several US DOE National Laboratories to execute current federal energy research efforts in an applied fashion, leading to accelerated technology commercialization to enable more rapid CO₂ reduction for our nation. RFI responses were submitted by the team to DOE on July 7, 2021
Request for Proposals (RFP) release-to be determined by DOE during the fall of 2021

Coalition Building for Advancing Site Repurposing

Ohio University has engaged a nationally prominent firm, Remington Road Group, to assist with coalition building on regional, state, and national levels to advance site repurposing activities. The PORTSfuture grant covered start-up costs for this effort until other resources could be secured. Ohio University has approved the use of their State of Ohio Appalachian New Economy Partnership funds to cover ongoing costs. Coalition building efforts have focused on:

- Meetings with key stakeholders/funders/influencers
- Meetings with federal elected officials
- Meeting with Biden Administration officials including US DOE officials
- Ongoing contact with the Pike County Council of Governments
- Conducted a site reindustrialization/hydrogen hub roundtable with US Congressman Tim Ryan, labor leaders from USW, IBEW, Ohio Building Trades Council, plumbers and pipefitters, Ohio AFL-CIO, and private energy companies
- Developed a labor steering committee to assist with coalition building
- Developing public information and messaging materials
- Other efforts to be determined moving forward

Meetings that occurred between April 2021-August 17, 2021, include the following:

White House

- Steve Ricchetti-Counselor to the President
- Tina Flournoy- Chief of Staff to Vice President Harris, Former Chief of Staff to President Clinton
- Stef Feldman-Senior Advisor to Director of White House Domestic Policy Council-Policy Director on Biden 2020

White House (WH) Office on Domestic Climate Policy

- Maggie Thomas, Chief of Staff to Gina McCarthy
- David Hayes, Special Assistant to the President for Climate Policy

Department of Energy

- Tarak Shah, Chief of Staff to Secretary Granholm
- Jennifer Jean Kropke, Director of Energy Jobs. Former official with IBEW
- April 20-DOE Headquarters
 - Karan Skelton, WH domestic policy and distressed communities. Senior Advisor to Secretary Granholm, former US Sherrod Brown staffer, former IEBW official

- Jennifer Kropke, Director of Energy Jobs- Former official with IBEW
- July 27-Karen Skelton WH domestic policy and distressed communities. Senior Advisor to Secretary Granholm. Former staffer with US Sherrod Brown. Former IEBW official. Kate Gordon, Senior Advisor to Secretary Granholm. Former energy advisor to California Governor Gavin Newsome.
- June 16-DOE Tri- Labs (INL, NREL, NETL)
- June 18-Presentation at the PORTS site to Ike White, DOE EM1, and other DOE officials
- July 15-Presenatation at the PORTS site to Nicole Nelson-Jean, EM3 on PORTSfuture work
- September 22-Kate Gordon, Senior Advisor to Secretary Granholm, former energy advisor to California Governor Gavin Newsome, DOE Headquarters and Hannah Reid, Special Assistant, DOE.

Congress

- US Senator Brown State Director, John Ryan
- April 8- Congressman Tim Ryan's Deputy Chief of Staff, Ryan Keating
- April 8-US Senator Rob Portman's Energy Advisor, Kevin Hoggatt
- April 21-Senate Energy Committee, Zahava Urecki who staffs US Senator Joe Manchin for the committee
- May 24-Alex Scharfetter, District Director-Rep. Brad Wenstrup (OH-2)
- July 6-Congressman Tim Ryan to discuss and plan for July 9th labor/energy company roundtable
- July 12-Congressman Wenstrup's office-update with Alex Scharfetter, District Director

Labor Leaders

- April 19-Mike Knisley Ohio Building Trades Council
- May 6-Trampas Puckett, Business Representative-Indiana/Kentucky/Ohio Regional Council of Carpenters IKORCC
- May 10-Ohio State Building Trades Council-Mike Knisley, Mark Johnson, Bobby Cole
- May 17-Trampas Puckett--Business Representative-Indiana/Kentucky/Ohio Regional Council of Carpenters IKORCC
- May 19 -Tim Burga, Ohio AFL-CIO President
- May 26- Steve White Executive Director, West Virginia AFL-CIO affiliated construction trades
- May 27-Bobby Cole and UA plumbers and pipefitters political and energy directors
 - Russ Breckenridge with the UA Political and Legislative Department,
 - Wendell Hibdon the UA Director of Energy and Infrastructure
 - Kenny Ruggles the International Representative for UA in Ohio and West Virginia.
 - Willie Koester, state lobbyist for The Ohio State Association of Plumbers and Pipefitters.
- June 17 IBEW: Steve Crum (Int'l Rep), Frank Cloud (Int'l Rep), Dan Shirey (Local 575)
- July 7, 2021-Ohio AFL-CIO President, Tim Burga, Brad Markell National AFL-CIO Energy and Climate Advisor, Matthew Smith-Ohio AFL-CIO Legislative Director, David Foster,Energy Futures Initiative (formerly at DOE under Obama)
- July 9-Congressman Tim Ryan, Ohio Building Trades (Bobby Cole), USW (Herman Potter), IBEW (Steve Crum), UA (Kenny Ruggles), AFL-CIO (Mike French), Paul Davis (site security) and other union reps, SODI, Hecate Energy, and Newpoint Gas
- August 12-Union leaders labor steering committee meeting
- September 9-Union leaders labor steering committee meeting
- September 23- Union leaders labor steering committee meeting

Site Reindustrialization Overview Calls

- April 19-Jeff Finkle, President and CEO, International Economic Development Council
- April 21-Piketon Council of Governments (COG), DOE EM HQ, DOE PPPO, and EM1.
- May 4-Glenda Bumgarner, President of Appalachian Partnership Inc.
- May 4- Mike Jacoby, President, Katy Farber, Vice President, Ohio Southeast (JobsOhio)
- May 5-Sunday Creek Horizons, Zack Space
- May 10-Orano group working with SODI on advanced nuclear siting study
- May 12-Marshall Plan, Grant Ervin, the Sustainability Director for the City of Pittsburgh
- May 14-Kristen Estell, ReImagine Appalachia Common Ground in Climate Change and Economic Transition
- May 18-Sunday Creek Horizons, Piketon Council of Governments, Ted Strickland, Mark Shauer, SODI, Remington Road Group
- May 26 -Blackstone/Lightstone (energy investors), Newpoint, Hicks Partners
- May 26 -Vlad Petrovic European Solar Foundry
- June 3-AEP Matt Cybulski, Senior Economic and Business Development Manager at AEP economic development
- June 7-Ohio Geological Society and Battelle regarding CCS
- June 8-Save Csonka, Executive Director, Commercial Aviation Alternative Fuels Initiative (CAAFI)
- June 8- Marshall Plan, Grant Ervin, the Sustainability Director for the City of Pittsburgh
- June 9- Ohio Geological Society and Battelle regarding CCS
- July 1- Energy Futures Initiative, Melanie Kenderdine
- July 14- Steve Csonka, Executive Director, Commercial Aviation Alternative Fuels Initiative (CAAFI)
- July 15-Tom Flexon with Kindle Energy
- July 26-BDOzone, Clean Energy Works, Ecostart, ATIP, and CAAFI on biomass to sustainable aviation fuels opportunities
- August 9-Save Csonka, Executive Director, Commercial Aviation Alternative Fuels Initiative (CAAFI)
- August 10-Sunday Creek Horizons on behalf of Pike County Council of Governments
- August 10- BDOzone, Clean Energy Works, Ecostart, ATIP, and CAAFI on biomass to sustainable aviation fuels opportunities
- August 17- Sunday Creek Horizons on behalf of Pike County Council of Governments
- August 17-American Sustainable Business Council (ASBC) on joint project opportunities
- August 18-Evan Blumer on carbon projects
- August 24- American Sustainable Business Council (ASBC) on joint project opportunities
- August 25-Air Liquide/Air Gas call to discuss possible synergies with hydrogen hub
- August 30-Carbon Solutions LLC
- September 13- Steve Csonka, Executive Director- CAAFI
- September 14-Jeff Dimick, Alternative Clean Energy Group
- September 15- Steve Csonka, Executive Director and Chris Tindal, Assistant Director, CAAFI
- September 16-David Levine, CEO and co-founder of the American Sustainable Business Council (ASBC)
- September 22- Steve Csonka, Executive Director-, CAAFI and Newpoint Gas
- September 27-Group leading the Nuclear Siting Study at PORTS, Orano, Southern Company, SODI, and EPRI
- September 30-Regoin 5 US Economic Development Association Regional Representative, Ellen Heinz

Ongoing Technical Assistance, Public Outreach, Education, and Engagement for Property Transfer and Future Use: property transfer, STEM, and entrepreneurship activities

Property Requests Response Guidelines

Initial planning for this activity began in Grant Year 3 and during Grant Year 4, OU and SODI continued to gather information from other former DOE sites on how property transfer and reuse have been effectuated. At the request of SODI, Ohio University, in collaboration with SODI, will develop tools/templates for requests for property when SODI deems appropriate. This includes SODI requests to DOE for property and includes private sector requests to SODI for property. OU will: assist SODI in developing a property transfer plan, phased-implementation schedule, and a proposal protocol for property transfer requests; identify areas on the site that are not good candidates for building (and remove them from consideration in the property transfer proposal process); define steps for the transfer process and identify documentation needed for each involved party; establish criteria for reviewing proposals and business plans that are submitted for consideration; develop a process for making requests that may include producing GIS maps for areas that are 'build-able' based on the needs of the requester; and developing metrics and standards for assessing/monitoring proposals and performance. Deliverables and due dates will be jointly determined by Ohio University and SODI. SODI has tabled this activity for the time being and we will resume this activity at the request of SODI.

Draft electronic version of report in PDF format-target date-TBD by SODI

Final electronic version of report in PDF format-target date-TBD By SODI

STEM Activities

Science, Technology, Engineering, and Mathematics (STEM) enrichment activities are designed to encourage regional students to learn about and engage in activities in STEM disciplines with the goal of encouraging students to pursue careers in these in-demand fields that provide well-paying employment opportunities. These activities may help prepare the future workforce in the region to be job-ready when site reindustrialization efforts are realized. PORTS future STEM activities are summarized in Figure 7 and described below.

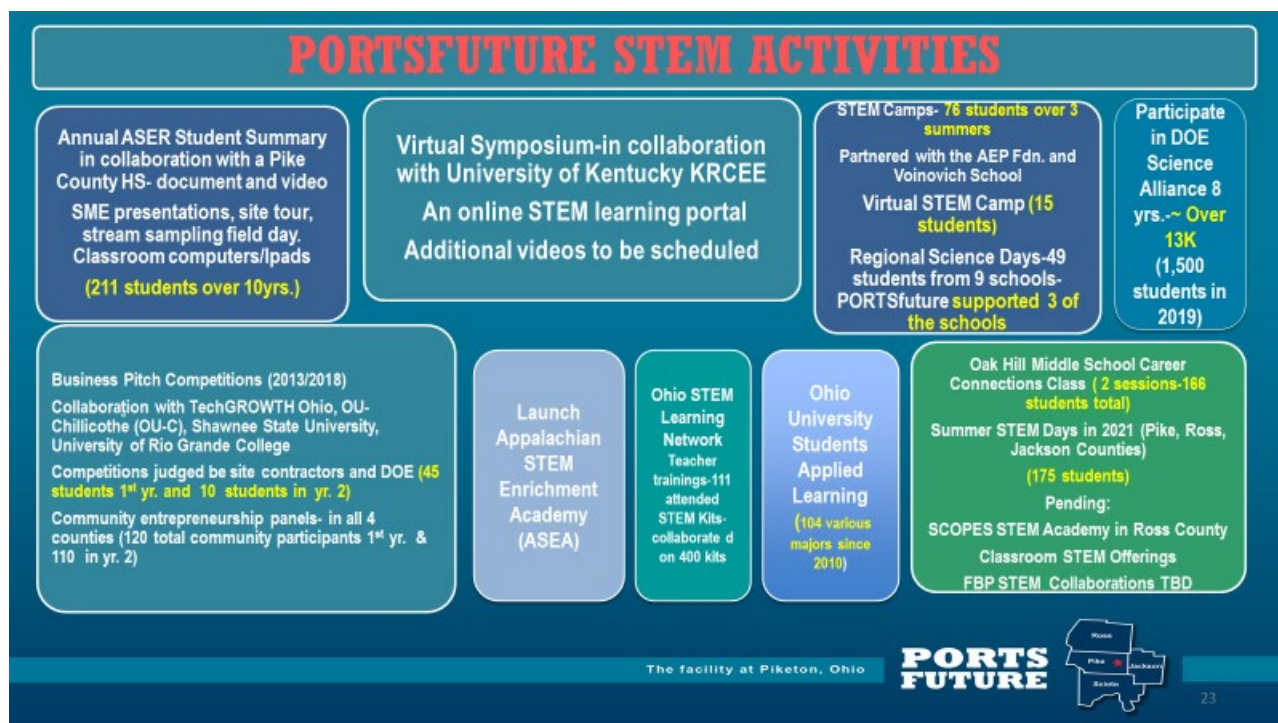


Figure 7-PORTSfuture STEM Activities Cumulative

ASER 9 & ASER 10

ASER 9 (primarily funded under a separate activity within the grant). Ohio University worked with the chemistry teacher and 42 students at Piketon High School in Pike County to produce the 9th Annual Site Environmental Report Student Summary. This summary provides information to the public regarding the U.S. Department of Energy's progress on cleanup work at PORTS. During the 2019/2020 academic year, students received Subject Matter Expert (SME) seminars on site history, site cleanup and other environmental engineering topics and participated in a classroom presentation from DOE to provide an overview of the site. The applied field learning experience did not occur due to the movement to online learning necessitated by the global coronavirus/COVID-19 pandemic of 2020. The final student-generated report and video was completed by August 31, 2020.

ASER 10 (primarily funded under a separate activity within the grant). Ohio University worked with the chemistry teacher and 9 students at Eastern High School in Pike County to produce the 10th Annual Site Environmental Report Student Summary. This summary provides information to the public regarding the U.S. Department of Energy's progress on cleanup work at PORTS. During the 2020/2021 academic year, students received Subject Matter Expert (SME) seminars on site history, site cleanup and other environmental engineering topics and participated in a classroom presentation from DOE to provide an overview of the site. The DOE PORTS site tour and applied field learning experience did not occur due to the movement to online and/or restricted learning modalities necessitated by the global coronavirus/COVID-19 pandemic. The final student-generated report and video was completed by August 31, 2021.

Virtual Summer STEM Camp-Summer 2020

Held August 3-6 in 2020 in virtual format due to pandemic. For summer 2020, enrollment was capped at 20 and 18 students registered for the camp. However, because of last minute changes within the school districts regarding extra-curricular offerings, our camp synchronous session attendees (plus one who engaged offline because of a conflict) totaled 15. Registration preference was given to the PORTS four-

The virtual academy will address the resource limitations in Ohio Appalachia and is a collaboration across several programs at Ohio University with joint funding and/or resource support from DOE PORTSfuture, American Electric Power (AEP) Ohio Foundation, Ohio STEM Learning Network, OHIO Museum Complex, and Ohio University's Voinovich School of Leadership and Public Service. This enables the programs funding this effort to leverage funds across regional STEM efforts. Cross-promoting STEM offerings will expand reach and impact by increasing the volume of student participants and improving long-term access to STEM career pathways information for regional students. The virtual academy will reach wider audiences than if each STEM effort were to develop virtual learning opportunities separately. The online nature of this effort enhances the value of the investments across programs as the content is created once and can serve thousands of regional students. Marketing efforts will encourage ongoing use of the academy offerings. See ASEA outline in figure 9 below.



Figure 9-ASEA outline

The ASEA will initially focus on six career tracks including water, energy, remediation, technology, engineering, and sustainability. The online platform will also allow for sessions to be added over time and expanded as resources allow. For immediate impact, materials can be quickly launched through social media to publicize resources, how to access, and to announce ongoing additions to the virtual academy over time. The goal is to soft launch the ASEA during the fall of 2021 so that teachers can utilize the materials in their classrooms during the 2021/2022 academic year.

Regional Science Days 2021

The District 12 and District 14 Science Days serve students from most of southern and southeastern Ohio, including Ross and Jackson Counties in District 12 and Pike and Scioto Counties in District 14. Students in grades 5-12 can compete by presenting their original projects following either standard scientific method or engineering design principles. Through inquiry-based project learning, students gain skills in posing a research question, creating a hypothesis, method development, data collection, data analysis, and written and oral communication. The Ohio Academy of Sciences has developed standards linkage for science fairs across grades 5-12. Students earning a superior at their school fair qualify to compete at their District Fairs and those earning superiors at District qualify to compete at State Science Day held at The Ohio State University in Columbus each May. High school students in both districts have the additional

opportunity to qualify for the Buckeye Science and Engineering Fair which allows them to compete for a spot at the International Science and Engineering Fair; high school students in District 12 have the opportunity to compete for a spot at the International Fair straight from the district. The potential for learning, exposure to a community of engaged young scientists, and competition for scholarships and awards for students from southern Ohio is unparalleled.

PORTSfuture funding was intended to increase participation in science fairs by students and schools in the four-county region: supporting teachers and connecting students with scientists from the University; providing staff to coordinate with and support schools in the four-county region; supporting district fair operations; and connecting students from the four-county region with university resources. Due to the pandemic, participation was reduced from previous years; however nine schools did participate with a total of 49 students.

Summer STEM Days

A total of 176 regional youth in Pike, Jackson, and Ross counties engaged with Ohio University staff and students in hands-on activities to learn about water quality and residential storm water pollution mitigation at county fairs during July and August.

Ohio University's Voinovich School of Leadership and Public Service PORTSfuture Program sponsored these activities for one day at each of the three county fairs as part of the program's Summer STEM Days outreach. A Scioto County Summer STEM Day event scheduled for September was cancelled due to the surge of COVID infections related to the Delta variant. Ohio University led fair goers in activities that included interacting with a storm water display which shows residential storm water pollution accumulation for mitigated and non-mitigated scenarios by activating rain simulations. These simulations illustrated to what extent storm water collects residential pollutants for each scenario. Youth were educated on simple mitigation techniques that can be taken at home to reduce residential storm water pollution such as using rain barrels, washing cars on pavement rather than grass, and cleaning up leaves, yard waste, and pet waste from lawns.

The youngsters also played "pH Bingo" by utilizing pH strips to test a variety of common substances. The youth tested for a range of pH levels from acidity and alkalinity and marked the corresponding pH levels on their 'bingo cards'. Substances they tested included acidic liquids such as orange juice, lemon juice, coffee, tea, soda, vinegar, hot sauce, body wash, and dish soap; neutral substances such as tap water; and alkaline substances such as egg whites, antacids, baking soda, and everyday household spray cleaner. Youth were educated about the pH scale and the differences between substances. See picture of Pike County fairgoers in figure 10 below.



Figure 10-Pike County fairgoers explore PORTSfuture water quality activities in August 2021

These Summer STEM Days events provided an engaging opportunity for participants to explore science techniques through hands-on activities. PORTSfuture outreach efforts strive to inspire regional youth interest in STEM careers for the future. The goal is to engage youth as early as possible to begin to encourage them to think about career options and educational and training pathways to achieving career aspirations.

Ohio STEM Learning Network (OSLN) Southeast Ohio Hub

Ohio University is now hosting the OSLN southeast Ohio regional hub. This effort is led by Dr. Nancy Stevens a Distinguished Professor in Biomedical Sciences at Ohio University. See <https://osln.org/hubs/>. The Ohio STEM Learning Network has seven OSLN hubs across Ohio that commit to: design, launch and sustain a STEM platform school; capture, amplify and accelerate related STEM research and development; and advance a coherent STEM education and economic development strategy.

PORTSfuture will partner with the Ohio University OSLN Southeast Ohio Hub to assist when applicable in activities such as:

- STEM teacher training sessions: PORTSfuture co-sponsored three sessions this grant period with 111 educators attending. See flyer in Appendix 2.
 - Sessions included:
 - Teaching Science Through Inquiry in January 2021
 - Examples of Subtle Shifts for Promoting Student Inquiry, February of 2021
 - Incorporate More Student Inquiry in Your Science Lessons, March of 2021
- Utilizing our Appalachian STEM Enrichment Academy (ASEA) materials to assist with summer school student learning remediation for student falling behind due to COVID
 - Collaborated to produce and distribute ~400 kits for schools throughout OSLN region. Our PORTSfuture efforts targeted the DOE four-county footprint.
 - These kits were taken to or mailed directly to schools for distribution by the teachers to a class of students. Kits included materials such as: small beaker, test tube, pipette, petri dish, ruler, magnifying glass, pH strips, forceps, and activity sheets.
 - The Appalachian STEM Enrichment Academy was promoted through these kits as well.
 - All 400+ OSLN-GVS STEM Kits were distributed to schools in Athens, Jackson, Noble, Pike, Ross, Scioto, Vinton, and Lawrence counties. We are awaiting additional teacher survey feedback to gauge success. We discussed the possibility of creating more kits with OSLN funding in FY22.
- Additional OSLN collaborations for the coming academic year are being discussed including supporting the OSLN Design Challenge focused on “Infrastructure-inspiring students to answer how to build a better world”. We will seek out collaborative and crossover opportunities with Science Fair, school outreach activities, Believe in Ohio and other pitch programs, Fluor’s STEAM Ahead program, and more.

Virtual Symposium

Grant Year 5 included maintenance of the Virtual Symposium, which is a collaboration between the Voinovich School of Leadership and Public Service at Ohio University (OU) and the Kentucky Research Consortium for Energy and the Environment at the University of Kentucky (UK). These activities are funded by grants administered by DOE’s Office of Environmental Management Portsmouth/Paducah Project Office. Primarily funded under a separate task, the Virtual Symposium provides ongoing access to scientific and technical presentations for STEM education interests. The video presentations, Powerpoint presentations, and project reports can serve as useful Science, Technology, Engineering, and

Math (STEM) education tools for area schools, colleges, and universities. The Virtual Symposium also provides valuable information to the public at large about projects related to OU activities conducted at the DOE Portsmouth Gaseous Diffusion Plant (PORTS) site near Piketon, Ohio and UK activities conducted at the DOE Paducah Gaseous Diffusion Plant (PGDP) site near Paducah, Kentucky. We intend to add several videos in the coming year which may include videos on economic impact modeling/workforce identification, utilizing geographic information systems (GIS) and other data, PORTS site assets overview, and/or others to be decided. The Virtual Symposium can be viewed at: <https://www.portsfuture.com/virtual-symposium-2/>

Science Alliance

Due to the global pandemic, the DOE Science Alliance for October 2020 was cancelled. In previous years, PORTSfuture was delighted to participate in the DOE PORTS annual Science Alliance event held in October that provides over 1,500 high school students access to a variety of interactive kiosks to learn about careers in environmental and engineering fields. The Voinovich School's Raccoon Creek/Watershed team and AmeriCorps volunteers have in the past provided a display that included a live stream table with live fish and macroinvertebrates for the students to explore and learn about stream health and stream cleanup methods. We look forward to Science Alliance resuming in the years to come.

New STEM Classroom Learning Opportunities Being Explored for Budget Period 6 (pending normal in-school classroom access)

SCOPES (Science Cooperative of Physicians and Elementary Students) STEM Sessions

Title of presentation: Internet of Things and Smart Tech

Curriculum summary: The program begins with a presentation on the basics of the Internet of Things (IoT) with age-appropriate examples like "Alexa". The class then splits into small groups and circulates between demonstrations of drones, virtual reality cars, and a weather station. Staff and undergraduate student teams meet in small groups with the students to provide feedback. In the second session, the students will meet at the OU-Chillicothe campus computer center for hands-on computer programming related to smart technologies, microprocessors, sensors, and LEDs. This group is part of a STEM pull-out program at Unioto local school. The program finishes with a discussion about Arduino coding to prepare the class for the second meeting at the OU-Chillicothe computer lab where they will learn the basics of computer programming applied to an mBot.

Title of presentation: "AI + IoT + Sharing Economy"

Curriculum summary: Discussion and demo about Artificial Intelligence (AI) and Internet of Things (IoT), the Sharing Economy, and STEM careers. Two additional sessions to discuss and give demonstration about AI + IOT + Sharing Economy with IT/IoT career connections and pathways could be scheduled in Grant Year 6.

Additional classroom STEM offerings

STEM activities previously developed by OU can be offered onsite in classrooms across the four-county area in southern Ohio. We have created a body of work around renewable energy, the Internet of Things/smart technology, water quality, physical features of lakes and streams, acid mine drainage, analyzing chemical and biological data, and collecting water quality data as a citizen scientist that translates across ages and grades. Working with local teachers, we can customize single class period sessions to their curriculum needs and interests. Hands-on activities augment these programs when possible. Career pathway discussions are integrated into programs for middle and high school students.

Exploring Opportunities for Onsite Academic Initiatives

During Grant Year 4, DOE PORTS inquired about exploring opportunities for utilizing the PORTS site for academic research and teaching initiatives for Ohio University faculty and students in the region. DOE

PORTS offered to provide access to the site, data, and Subject Matter Experts (SMEs). Various faculty have expressed interest and will attempt to capitalize on DOE's generous offer if/when able to do so. The pandemic during the 2020/2021 academic year precluded the ability to explore onsite academic initiatives; however, Ohio University will keep this offer in mind when health restrictions related are lifted.

Interest expressed from OU faculty and researchers at the Ohio University Athens campus includes the following and may be pursued during the next academic year or when public health conditions allow:

- Voinovich School faculty hydrologist expressed interest in utilizing the site for class field trips for a multidisciplinary course in Watershed Management. This would include a site tour and discussion of storm water management on site, a pump and treat system, a site slurry wall on the south boundary, sediment ponds near the switchyards and the disposal cell, and wetland and headwaters mitigation from the disposal cell.

Student research ideas utilizing the site/site data/site SMEs might focus on the water impacts of climate induced extreme weather events including exploring the rainfall-runoff characteristics of the previously industrialized area of the site and developing predictions for how that would vary with extreme weather events. The outputs of this modeling could be used to: model different infiltration scenarios and plume migration in a changing climate; examine storm water infrastructure resiliency in a changing climate; establish and monitor geomorphological, flow, and sediment transport characteristics of streams on site; and model future conditions.

- Voinovich School faculty ecologist focused on bioenergy and biomass products, expressed interest in utilizing the site for class fieldtrips to demonstrate remediation and legacy infrastructure, and is interested in the site's phytoremediation projects for research/student research.
- Associate Dean for Industry Partnerships at the OU Russ College of Engineering and Technology (RCE&T) will discuss with the Dean and the RCE&T Center and Institute Directors and extend DOE's offer to provide access to the PORTS site, Subject Matter Experts (SMEs), and data for faculty interested in pursuing academic endeavors. He will also speak with engineering student clubs, as they may be interested in site tours or access to data and SMEs.

Transportation Study/Traffic Impact/Thoroughfare Impact Study (pending)

At the request of SODI, OU began exploring the planning of a transportation study/traffic impact/thoroughfare impact study. This activity is currently tabled until SODI's site reindustrialization initiatives are more fully formed.

SODI Operational and Project Funding, SODI Financial Plan

An on-going activity in Grant Year 5 in partnership with SODI was exploring a financial plan for SODI. The financial plan will be employed in collaboration with SODI to increase SODI's capacity to obtain the resources necessary to transform PORTS into an Integrated Energy Systems-Closed Loop Manufacturing (IES-CLM) Complex and to pursue complementary missions and facilities.

Initially in the near-term, economic development funding is needed to establish a project development team with a full-time person to lead and coordinate the rollout of a Master Plan and subsequent Execution/Implementation Plans, including a Financial Plan, that are in harmony with State of Ohio and regional economic development strategies and efforts to the maximum extent possible. Additionally,

funding is needed for site readiness activities/analysis, identifying potential project opportunities, and other activities to prepare PORTS for transformation. In summary, the initial economic development funds are to be used for:

1. Expansion of Asset Recovery efforts
2. Compensation for a Project Development Team, Project Leader, and Professional Support Staff
3. Development of a Master Plan for transforming PORTS
4. Development of Execution/Implementation Plans

After the initial planning is complete, funding will be needed to execute and implement plans for rebranding and promoting PORTS transformation to an IES-CLM complex in a phased approach that is sequentially compatible with DOE's cleanup efforts. Funding will be needed to identify and engage industries on specific projects for inclusion in the IES-CLM complex. Long-term funding should be project-based and funding will be needed to ensure that projects are synergistically integrated within the present and future aspects of the IES-CLM complex.

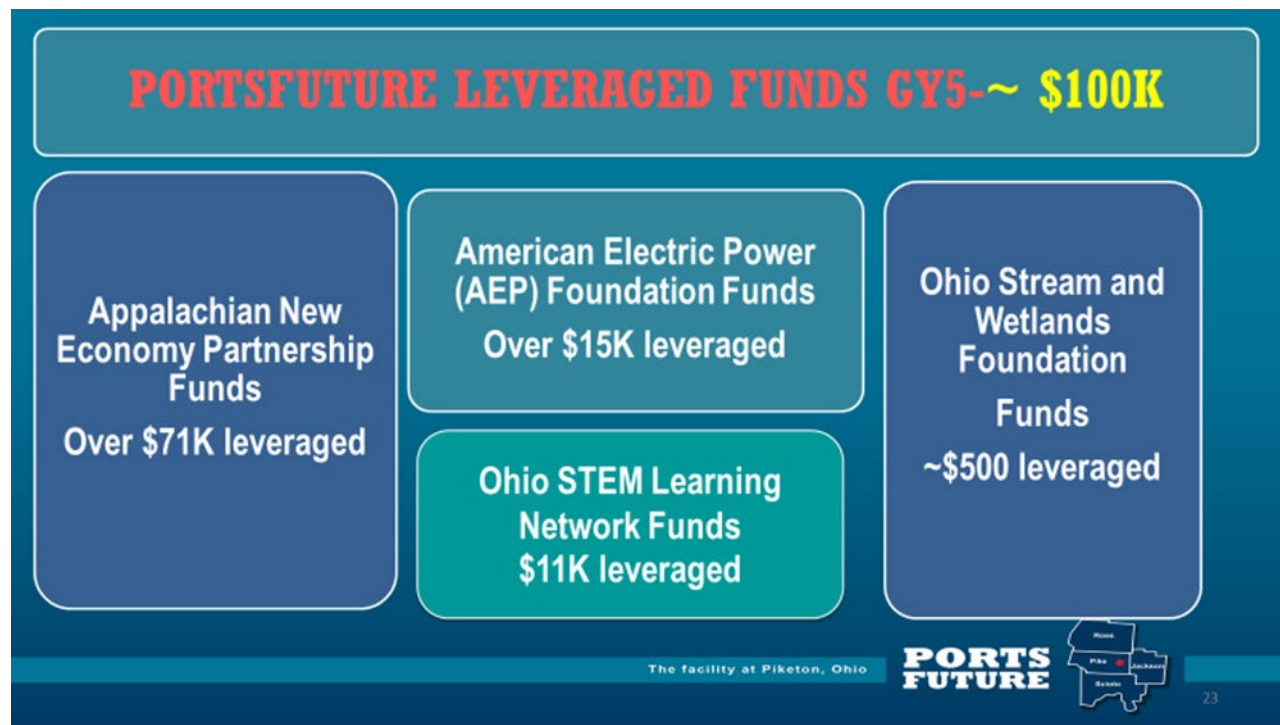
Pursuing additional funding resources

Accomplishments in Grant Year 5 include:

- PORTSfuture prepared a proposal to submit to US Senator Sherrod Brown's community projects funding initiative. The proposal requested \$500K for SODI for use in their operations and site reindustrialization effort. The proposal was submitted by our strategy consultants via Senator Brown's online proposal portal. The proposal has proceeded to the final stage and all indications appear that the funding will be granted to SODI. The SODI federal community project funding award date will be determined by Senator Brown's office.
- PORTSfuture has assembled and is leading a team to pursue a DOE Energy Earthshot Hydrogen Hub to be sited on SODI parcels at the PORTS reservation. We have a functioning partnership to launch an integrated energy hub-driven initially by hydrogen--that includes: three DOE National Labs (INL-the DOE Nuclear Lab, NREL-the DOE Renewable Energy Lab, and NETL-the DOE Fossil Energy Lab); private industry partners working in clean hydrogen to power, blue/green hydrogen, renewable energy and advanced nuclear; the building trades; Ohio University (coordinating this partnership); and SODI. This effort has been named 'The Ohio Valley Green Energy and Manufacturing (GEM)' initiative. This strategy to launch the long-planned for Integrated Energy System-Closed Loop Manufacturing (IES-CLM) Complex utilizing decarbonized hydrogen initially which will play a significant role in addressing the issues associated with the emerging nexus between, energy, water, climate, food, and waste and is an extremely effective approach to combatting climate change. [Potential funding for this initiative is expected to potentially range in the hundreds of millions of dollars.](#)
- PORTSfuture tracks and summarizes available sources of new state and federal initiatives related to infrastructure improvements, industrial park improvements, and other related programs for which SODI may qualify. PORTSfuture will assist SODI as requested in pursuing these opportunities.
- PORTSfuture continues to advise SODI on public/private partnerships aligned with SODI's work. Ohio University offers to support SODI in pursuing such partnerships if SODI chooses to do so as part of the aforementioned SODI financial plan.
- Congressional Legislation Updates on proposed Congressional bills that can impact PORTS reindustrialization efforts and the surrounding Appalachian region are reviewed periodically with SODI.

PORTSfuture Leveraged Funds for GY5

As stated previously, our work is carried out through collaborative partnerships which enhances our effectiveness and longevity. Whenever possible, PORTSfuture seeks to leverage additional dollars to expand the impact of our work. In GY5, PORTSfuture leveraged approximately \$100,000 of other funding to support our efforts. This includes securing over \$71,000 to support site reindustrialization and outreach efforts from the State of Ohio award to the Voinovich School known as the Appalachian New Economy Partnership. Outreach efforts were also supported by American Electric Power (AEP) Foundation funds (>\$15,000), Ohio STEM Learning Network funds (\$11,000) and Ohio Stream and Wetland Foundation funds (~\$500). See figure 11 below.



OU PORTSfuture data reports from previous grant years supporting site repurposing efforts:

[Habitat Mapping of the Land and Vicinity of the United State Department of Energy \(DOE\) Portsmouth Gaseous Diffusion Plant \(PORTS\) Pike County, Ohio.](#) Under this 2-year task, OU compiled a fully georeferenced database from DOE, State, and public sources; completed a data gap analysis of the georeferenced data; and created a detailed land cover map of the PORTS site, including a 1-mile buffer around the site. Report and land cover map available at: <https://www.portsfuture.com/habitat-and-land-use-plan/>

[Wetland and Primary Headwater Streams Mitigation Conceptual Design Plan.](#) The task resulted in the preparation of a mitigation conceptual design plan, including a wetland mitigation bank proposal, which could be used by PORTS to compensate for potential unavoidable losses to waters of the United States (Clean Water Act Section 404 jurisdictional wetlands and headwater streams as regulated by Ohio EPA). This task applied to only the approximately 3,000 acres of federally owned lands outside of the central high security zone and to such other proximate lands that may be identified as potential locations for headwater stream mitigation. Wetland mitigation analysis and planning was limited to federal lands outside the central high security area. Report available at:

Stakeholder Outreach, Partnerships and Networking Support

Various entities have expressed interest in supporting/assisting SODI's reindustrialization efforts, with activities to be determined as appropriate. PORTSfuture also collaborates with SODI in regional outreach, partnership building, and networking support activities to: inform site stakeholders and citizens of site reuse activities; engage economic development professionals and elected officials; identify private sector interests aligned with site reindustrialization goals; broaden contacts with potential collaborators; develop partnerships; elicit regional support; and share information to support SODI's site reuse mission. These activities are summarized in Figure 12-PORTSfuture Stakeholder Outreach Activities.

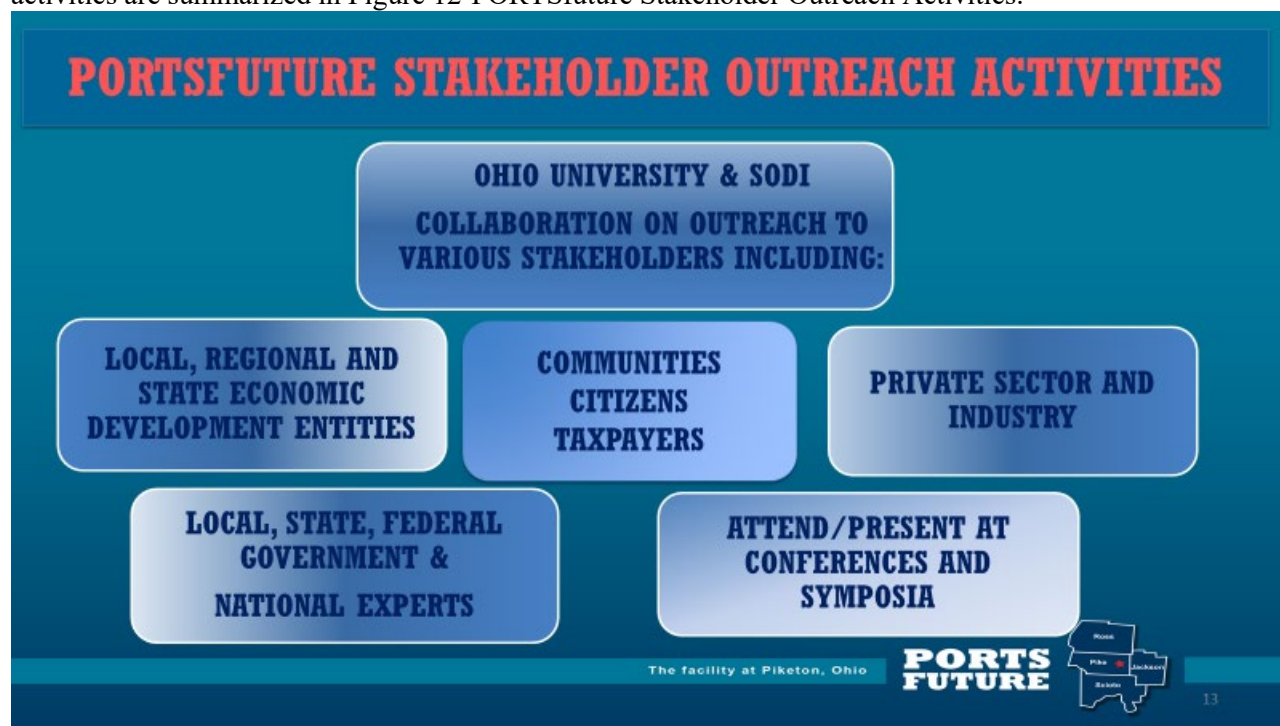


Figure 12-PORTSfuture Stakeholder Outreach Activities

Dissemination of Program Activities

Project website, www.portsfuture.com is used widely to disseminate information, resources, reports, videos, and other deliverables.

Press releases are developed for specific events and activities when applicable, especially related to STEM and other outreach events.

Presentations are provided to stakeholders such as economic development entities, elected officials, federal offices, labor leaders, private companies, investors, community groups, Site Specific Advisory Board along with frequent contact with other regional site stakeholders and other related regional initiatives.

DOE Public Open Houses, 2021

Each year DOE typically holds public open houses. DOE EM PPPO and DOE PORTS lead the coordination and roll out of two series of Community Open Houses in the four-county area near the PORTS site. The purpose of the Open Houses was to inform the public at large about site cleanup and site

reindustrialization efforts. Kiosks included the Site Specific Advisory Board (SSAB), the community reuse organization (SODI), OU's PORTSfuture Program, and site cleanup contractors featuring asset recovery, onsite waste disposal facility, and workforce information. PORTSfuture attends the events and displays work products including the interactive PORTS site concept planning and regional assets maps, economic impact and workforce analysis data, and general site reindustrialization materials. Open houses were not held in Grant Year 5 due to the global pandemic.

Various Meetings and Presentations Highlighting PORTSfuture Program to Elevate Site Cleanup and Site Reindustrialization Efforts Held During Grant Year 5 were cited on pages 17-19 above.

Collaborations

DOE-Related Entities such as US DOE National Laboratories and Community Reuse Organizations

The PORTSfuture Program connects with various experts at DOE National Laboratories and community reuse organizations around the country to seek information to inform our program activities and to discuss PORTSfuture Program activities in support of DOE EM cleanup and preferred community future use.

This past grant year, we established a partnership with the National Energy Technology Laboratory (NETL), Idaho National Laboratory (INL), and the National Renewable Energy Laboratory (NREL) for the purpose of jointly pursuing funding to launch the Ohio Valley GEM IES-CLM initiative and to specifically secure a DOE Energy Earthshot Hydrogen Hub project to be sited on SODI parcels at PORTS.

Energy Communities Alliance (ECA)

ECA is a non-profit, membership organization of local governments for communities that host, are near to, or impacted by U.S. Department of Energy activities. ECA convenes meetings and workshops for these entities to share information, discuss/establish policy positions, and promote community interests related to environmental, regulatory, and economic development needs/concerns and the specific impacts at the local level. As an institution of higher education, Ohio University/PORTSfuture is a non-voting member of the Energy Communities Alliance. PORTSfuture participates in conferences and national meetings held by ECA, has an OU Executive in Residence who serves on their nuclear working committee, and we utilize materials disseminated by ECA to inform our grant activities.

PJM Interconnection, LLC

PJM is a regional electricity transmission organization (RTO) and PORTSfuture maintains contact with PJM on grid capacity and potential grid and load needs to help better identify PORTS viability as an electricity transmission and distribution hub. This past grant year PORTSfuture secured the PJM database of coal fired power plants designated to be deactivated in their service area. Our hydrogen partners can evaluate the possibility of converting some of the deactivated plants to produce electricity using decarbonized hydrogen. These regional plants could serve as 'spokes' to the hydrogen hub being pursued through the DOE Energy Earthshot Hydrogen Hub initiative.

Coal Research Center

A key consideration in site reuse is maintaining connection to the OU Russ College of Engineering and Technology (RCET) Coal Research Center, one of the nation's leading academic energy research organizations developing innovative and responsible engineering solutions to issues surrounding domestic energy sources. From clean coal technology to alternative biofuels development, the energy research supports the long-term viability of both our energy resources and our natural environment. Source: <https://www.ohio.edu/engineering/ohio-coal/index.cfm>. Alternative uses of coal in additive

manufacturing could play a key role in the development and operation of an IES-CLM complex and contacts with RCET are ongoing.

Institute for Corrosion and Multi-Phase Technology

A key consideration in site reuse is maintaining connection to this Institute at Ohio University that researches new ways to address the corrosion of pipelines in partnership with a global gas and oil industry alliance. Pipelines will be a key infrastructure component for an IES-CLM complex.

Biomass, bio-digesters, bio products, and co-production systems

The PORTSfuture program continues to collaborate with faculty researchers at Ohio University who are exploring opportunities for developing biomass, bioenergy and bio products coproduction systems that will simultaneously enhance ecosystem services. Biomass, bioenergy, and bio products could play a key role in the development and operation of an IES-CLM complex and contacts with biomass, bioenergy and bio products researchers are ongoing.

Related OU academic departments

The PORTSfuture program continues to engage with faculty and researchers from economics, engineering, chemistry, public administration/public policy, etc....when applicable to advance grant activities.

Office of Research and Sponsored Programs

The Vice President for Research and Creative Activity and Dean of the Graduate College at Ohio University and the Director of OU Corporate Engagement and Industry Partnerships through the PORTSfuture grant have engaged with SODI and DOE to learn more about the site reindustrialization effort. These offices remain committed to providing support to the effort, when possible, specifically with linking OU researchers to site reindustrialization efforts and assisting with developing industry partnerships.

OU Entrepreneurial Ecosystem

Small Business Development Center (SBDC), Procurement Technical Assistance Center (PTAC), TechGROWTH Ohio, OU Innovation Center, OU LIGHTS, Social Enterprise Ecosystem (SEE), and OU Tech Transfer Office provide expert entrepreneurial education, business assistance, and capital resources in support of small business development, procuring government contracts, and venture development in Appalachian Ohio and provide specific services/events in partnership with the PORTSfuture grant to the DOE four-county area around the site as requested.

OHIO for Ohio

Ohio University is committed to educating students, improving communities, and impacting the local, regional, and statewide economies through six OU campuses and two OU regional centers around the State. OU has recognized the PORTS site reindustrialization initiative as an important priority for regional economic development in southern Ohio and numerous OU officials are providing input and offering insights to the activities of the OU DOE grant.

Workforce Development

OU continues to explore opportunities to support regional workforce strategies for southeast Ohio and relevant adjacent counties. A regional approach is more market-based and creates scalable benefits and funding attraction to support better solutions. These efforts are led by Mike Zimmer, Esq., who is an Executive in Residence at Ohio University.

Research conducted and presented at OU/DOE grant quarterly meetings by Mike Zimmer shows that this approach frames an Ohio River Valley workforce that strategically positions the region to attract large-scale economic development initiatives that are not limited by state boundaries. Research also shows 20%-40% of workers may commute across state lines based on project or industry sector. The goal is to

partner with workforce pilots with lifecycle outcomes to measure worker skills to jobs, gaps, existing training and new training resources, and post-performance goal evaluations by worker in key locations such as the Piketon area.

Initial focus of interest to PORTSfuture is on energy jobs, skills required, career paths, retention practices for blue collar, green collar, and white-collar positions and workforce needs in region. Jobs of the future include skills development for demands in advanced and additive manufacturing, construction management, transportation and driving, warehousing/ logistics, algorithms, automation, coding, building operations and maintenance (O&M), customer service and experience, environmental tech, waste management, healthcare, fitness and wellness, and professional services, accounting, and financial support. Additionally, PORTSfuture continues to collaborate with the Ohio Manufacturers Association Appalachian Ohio Manufacturers Workforce group focused on discussing how industry partnerships can assist with economic and workforce development in Appalachia Ohio.

National experts and thought leaders

Ohio University's PORTSfuture grant leverages and incorporates University resources and relationships by engaging well-respected national experts and thought leaders in our grant activities. These august individuals provide valuable guidance and feedback to our work and raise the visibility of efforts to repurpose the facility. The following serve in an ongoing and/or in-depth consultative capacity to our site repurposing and ongoing technical assistance, public outreach, education, and engagement for property transfer and future use grant activities:

- Mike Zimmer, Esq.: Attorney/International Energy Business Development expert and Ohio University Voinovich School and Russ College of Engineering and Technology Executive in Residence.
- Dr. Benjamin Cross, P.E.: Founder and CEO of NuSynergy Energy LLC and an Ohio University Voinovich School Executive in Residence, formerly with Savannah River National Laboratory.
- Jeff Finkle: President and CEO of the International Economic Development Council (IEDC) and Ohio University Voinovich School Appalachian New Economy Partnership Fellow.
- Dr. Mark Weinberg: Dean of the Voinovich School of Leadership and Public Affairs at Ohio University
- Rob Painter: Senior Executive in Residence at Ohio University Voinovich School. Rob is an OU alum with an incredible career in the field of GIS/Data/Cyber and venture capital including working for the government, CIA, Google, and other endeavors. He can advise/assist grant efforts based on his connections in federal, defense, data, and technologies spaces with a specific interest in exploring using the site as part of a national energy security strategy and as a possible site for a government data center, Midwest operations center, or other private sector data centers.
- Dr. Joe Shields: Vice President for Research and Creative Activity and Dean of the Graduate College at Ohio University.
- Dr. Kevin King: Director of Corporate Engagement and Industry Partnerships at Ohio University.

- Dr. Greg Browning: President of Capital Partners. Co-Chair of the Voinovich School of Leadership and Public Service. Former Ohio University Board of Trustee. Former Director of the State of Ohio Office of Budget and Management and former Senior Policy Advisor to Governor George V. Voinovich.
- David Wilhelm: Chief Strategy Officer for Hecate Energy, Co-Chair of the Voinovich School of Leadership and Public Service. Former Chair National Democratic Committee and former campaign manager to President Bill Clinton.

Industry Discovery and Networking

Ohio University participates in (at times with SODI and DOE) exploratory/opportunity meetings/informational meetings on an ongoing basis to identify entities/resources that could contribute to moving the IES-CLM complex and PORTS site reindustrialization initiative forward. During Grant Year 5, the following entities have joined and serve as the key cohort for the IES-CLM initiative that has been branded as Ohio Valley Green Energy and Manufacturing (GEM):

Ohio Valley GEM Valley Cohort

Collaborating under MOU for the “All of the Above” approach for clean energy and manufacturing:

- Local DOE designated community reuse organization-Southern Ohio Diversification Initiative (SODI). SODI’s advanced nuclear small modular reactor partnership will be included in this effort
- Green energy developers and renewable supply chain developers
- Clean hydrogen as fuel developers and deactivated CFPP reclamation to convert to clean H2P
- Blue/green hydrogen producers
- Worker advocacy organizations and unions
- Various energy and manufacturing industries

Figure 13 Ohio Valley GEM Cohort

JobsOhio and Appalachian Partnership for Economic Growth-Recently Rebranded to Ohio SE

Through JobsOhio, the State of Ohio has six network partners throughout the state focused on economic development efforts for their assigned geographic region. The Appalachian Partnership for Economic Growth (APEG) has recently rebranded and changed its name to Ohio SE. This entity is the southern and eastern Ohio state economic development partner that serves 25 rural counties. These JobsOhio network partners serve as a visible point of entry for site selectors and industries interested in locating operations in Ohio. JobsOhio and Ohio SE strive to attract new companies to the region and expand existing companies to grow jobs and create wealth in southern and eastern Ohio. PORTSfuture and SODI continue to maintain a productive working relationship to elevate awareness of the PORTS site and site assets to the state level to advance site reindustrialization goals.

Ohio Conservative Energy Forum

This group is a 501(c)3 public policy, non-profit that is focused on promoting an all-of-the-above energy strategy with an emphasis on renewable energy development around the state. They strive to broaden support for renewable energy to conservative voters/policy makers by educating/informing on the economic, workforce, and tax base benefits of developing renewable energy projects in Ohio. They are interested in the PORTS IES-CLM complex progress as the co-location of energy production and energy consumption for manufacturing is of great interest to them as well. They also have an interest in energy policy and its impacts on growing renewable energy around the state. We can keep them in mind as potential collaborators for the future as appropriate.

Cielo-Trash to Fuel

PORTSfuture reached out to Cielo to learn more about their operations. Cielo is based in Canada and focused on expanding in Canada and USA and looking to develop 40 partnerships and facilities in the next 3 or so years. Their model is superbly aligned with the PORTS IES-CLM concept and they are all in on the approach related to closed-loop/integrated systems. Cielo is on a 3-4 year ramp up/expansion time and they are very interested in keeping in contact with us on the site as an opportunity for one of their projects.

Hecate Energy

Hecate Energy serves as an anchor power generation partner in the Ohio Valley GEM IES-CLM complex with their focus on sustainable energy production. Hecate Energy is currently siting large solar farms in southern OHIO and possibly a solar panel manufacturing initiative that could be sited in the Pike/Scioto/Lawrence Counties region. Synergies exist with their efforts and frequent discussions and partnering is ongoing.

Newpoint Gas

Newpoint Gas LLC is a privately held multi-fuels processing, conversion, and purification company. A design and build firm with over two decades innovating zero emissions oil & gas production and processing plant sites. Newpoint serves as anchor power generation partner in the Ohio Valley GEM IES-CLM complex. Newpoint's process incorporates methane reforming with hydrogen purification to separate the hydrogen and carbon dioxide pre-combustion. The carbon is sequestered underground, and the pure hydrogen is used as fuel to produce steam-driven dispatchable power generation.

Newpoint Gas, LLC converts retired coal-fired power plants (CFPP) to use blue/green hydrogen as fuel with three precedent-setting results. In upcycling the retired generation station, Newpoint achieves (1) net zero carbon dispatchable power, (2) provides employment opportunities in cutting edge hydrogen energy technology to the CFPP's displaced workforce and, (3) includes the ability to supply commercial scale clean-fresh water, which is produced during hydrogen combustion in power generation. Frequent discussions and partnering are ongoing.

American Electric Power (AEP) Ohio

PORTSfuture has had continuous contact with AEP Ohio's economic development office to keep them informed of site reindustrialization efforts and to explore synergies and possible collaborations as our industry discovery work for SODI continues.

Ohio Manufacturers' Association (OMA)

The Ohio Manufacturers' Association is a member organization comprised of a vast array of industries. OMA focuses on protecting and growing Ohio manufacturing endeavors throughout the State of Ohio. Ohio University was invited to present an overview of the DOE grant project to the Ohio Manufacturers' Association Energy Committee and to discuss the IES-CLM complex's closed-loop manufacturing concept in 2017. Members were very supportive of the IES-CLM complex concept because closed-loop manufacturing would greatly help industries in driving down the costs of manufacturing as well as ensuring a reliable and affordable source of energy for their production processes. Synergies exist and

contact with OMA is ongoing. During Grant Year 5, OMA continues to discuss their efforts in expanding their membership from southeast Ohio industries as well as updates us on OMA workforce efforts. Frequent discussions and partnering is ongoing.

Summary and next steps

Ohio University is honored to remain a part of, and to continue to add value to, DOE, SODI, and site contractor collaborative efforts on informing end-state configuration to support viable site repurposing, ultimately resulting in cost savings/cost avoidance and reducing the EM footprint at PORTS. The activities executed under the *Site Repurposing Continuation and Ongoing Technical Assistance, Public Outreach, Education, and Engagement for Property Transfer and Future Use* activities created public value and served the public interest by informing site cleanup and future use planning, while being mindful of leveraging the existing public assets of the PORTS site and the region to create regional economic stability.

The activities and information cited in this report serve to advance SODI's goal to develop an Integrated Energy System-Closed Loop Manufacturing (IES-CLM) complex at the site. It is important to restate and emphasize that these activities were carried out in a manner that was responsive to the stated future-use preferences of the public at large in the four-county region near the site. These preferences were identified during various DOE and Ohio University public engagement efforts and with the involvement of numerous site stakeholders including: SODI; Site Specific Advisory Board (SSAB); community-at-large; local, state, and federal elected officials; county, regional, and state level economic development officials; private sector interests; and national experts. These preferences continue to be sustained through ongoing contact with the same stakeholders.

Ohio University remains committed to building on the momentum gained to continue the vital activities reported on in this document. DOE, SODI and OU have identified the following areas in which Ohio University can continue to add value. Additional details for some of these activities will be presented in the Budget Period 6 Work Plan. Proposed future activities include:

- Continuing to carry out work depicted in the OU Current Grant Activities graphic shown earlier in this report in Figure 1.
- Continue to identify IES-CLM complex industries and related industry needs to support expansion in the region and/or at the PORTS site. Conduct targeted industry site infrastructure analysis to inform sequencing for D&D including conducting a comparison of current site conditions versus conditions needed to support commercial use in specific targeted industry sectors to inform DOE decisions on property transfer.
- Viable clusters for future development that have been identified included energy, advanced manufacturing, and transportation/logistics. Convene roundtables when requested by SODI to focus on developing Public Private Partnerships for Advanced Manufacturing and Transportation/Logistics Sectors.
- Identify siting requirements such as utilities and other assets to be left in place resulting in cost avoidance for DOE. Utilize GIS to display information when appropriate.
- Upon request and with the approval of DOE, update the utility matrix and permit inventory. The utility matrix provides an at-a-glance view of utilities' current capacity, current usage, excess capacity, and other notes of importance for industries looking to site operations at PORTS. This could serve to identify assets to preserve rather than demolish, resulting in the potential for DOE cost

avoidance in this effort. Incorporate the management of site ecological assets/natural capital assets management as appropriate. The use of this matrix is subject to DOE discretion.

- Develop and assist with the execution of a site repurposing implementation plan and SODI Resource Manual as requested/as appropriate and incorporate Federal Programs as appropriate.
- Site Services Agreements: Work with DOE PORTS and site contractors to develop site services agreements to facilitate and streamline new businesses' ability to access needed site services when locating on parcels transferred to SODI for site reindustrialization.
- SODI Website Launch and Positive Public Information Campaign: Collaborate with SODI to promote the website and available transferred parcels to audiences that include industry prospects, businesses, nonprofits, economic development professionals, and general inquiries.
- Property Requests Response Guidelines: In collaboration with SODI, develop tools/templates for requests for property. This includes SODI requests to DOE for property and includes private sector request to SODI for property.
- Produce data and GIS needed to support these efforts (e.g., this may include maintaining existing data dashboards, GIS products, creating profiles of regional economies-and/or other data to be determined).
- Conduct economic impact analysis, workforce analysis, and other types of data analysis for IES-CLM related industries.
- Assist SODI in developing and executing a financial plan to increase SODI's capacity to obtain the resources necessary to transform PORTS into an Integrated Energy Systems-Closed Loop Manufacturing (IES-CLM) complex and to pursue complementary missions and facilities.
- Continue to identify and engage external and/or private sector resources that could be interested in utilizing site assets for future business development and job creation in the region.
- Develop a public information initiative utilizing regional and national influencers and thought leaders to articulate the value of the PORTS site for economic development and elevate the visibility of the site reindustrialization efforts.
- Continue and/or expand Science, Technology, Engineering, and Mathematics (STEM) enrichment activities designed to encourage regional students to learn about and engage in activities in STEM disciplines with the goal of encouraging students to pursue careers in these in-demand fields that provide well-paying employment opportunities.
- Continue to expand existing partnerships and develop new partnerships to advance site reindustrialization efforts.
- Continue to disseminate program information through websites, presentations, news releases and/or conferences as appropriate.
- Continue to inform and update key regional and political stakeholders on activities and progress.

- Leverage other funding opportunities where possible and especially pursue opportunities to bring private sector dollars and/or public private sector partnerships to the PORTS site. This includes building upon current initiatives with entities such as:
 - commercial partners interested in exploring opportunities at the site
 - university partners interested in conducting RD & D in advanced energy/renewable energy endeavors at the site, and
 - technology commercialization experts, private sector venture capitalists and pre-seed fund resources interested in investing in Southern Ohio companies.
- Other activities will be defined in collaboration with program partners.



Appendix 2 Ohio STEM Learning Network Professional Development Opportunities flyer



Ohio University is excited to announce the re-launch of the Ohio STEM Learning Network (OSLN) Southeast Hub! We will be sharing STEM resources and opportunities for developing partnerships between K-12, higher education, community, and businesses to connect and spread STEM efforts throughout the southeast region of the state. Online STEM professional development opportunities are available for K-12 teachers.

1-hour webinars are being offered via Zoom

FREE with certificates of attendance

[CLICK HERE TO REGISTER](#)

For more information:

Jacob White, jacob.white@ohio.edu (740) 597-1281



Facilitator Jacob J. White, Ph.D.
Senior Executive in Residence
Ohio University Voinovich School of
Leadership and Public Affairs

Wednesday, January 20, 2021 | 3:30-4:30 PM

Teaching Science Through Inquiry

What is scientific inquiry, and what does it mean to teach science through inquiry? This session will overview a framework for understanding the teaching of science as existing across a continuum of student inquiry. Classroom examples will be considered.

Wednesday, February 17, 2021 | 3:30-4:30 PM

Examples of Subtle Shifts for Promoting Student Inquiry

This session will overview a framework for how teachers can modify their current science lessons to incorporate subtle shifts that allow for increased student inquiry. Participants will consider a "traditional" science lesson and then observe examples of how the lesson has been modified to promote specific aspects of inquiry.

Wednesday, March 17, 2021 | 3:30-4:30 PM

Incorporate More Student Inquiry in Your Science Lessons

This session will provide participants with practice applying subtle changes to existing lesson plans in an effort to increase student inquiry. Participants will be provided with sample lesson plans and will be tasked with applying their own ideas for subtle modifications that will promote specific aspects of inquiry.



Co-Funded by U.S. Department of Energy EM PPPO, PORTSfuture Program, AEP Ohio Foundation, and Ohio University's Voinovich School of Leadership and Public Affairs