

***h*₂Trillium Energy and Manufacturing (*h*₂TEAM) Complex**

Clean Hydrogen Power & Manufacturing



Integrated Energy Systems—Closed Loop Manufacturing (IES-CLM) Initiative
Reindustrializing the Former Portsmouth Gaseous Diffusion Plant (PORTS) in Pike County, Ohio

The Central Appalachia “*h*₂Trillium Energy and Manufacturing” (*h*₂TEAM) Complex

This low carbon power generation and manufacturing initiative is a bipartisan, labor-focused, functioning Public-Private-Partnership (PPP) operating in the “Heart of Appalachia”. Ohio University’s Voinovich School of Leadership and Public Service and the Southern Ohio Diversification Initiative (SODI) coordinated the successful 12-year effort to establish this transformational reindustrialization and economic development strategy. Based on their work in the production of clean hydrogen and power generation Newpoint Gas, LLC was introduced to the project in August of 2020 and is now the *h*₂TEAM private anchor partner. The partnership also includes the three DOE Applied National Labs known as the Tri Labs (INL- the DOE Nuclear Lab, NREL-the DOE Renewable Energy Lab, and NETL-the DOE Fossil Energy Lab), organized labor leaders, the Southern Ohio Diversification Initiative, and Ohio University. Plans for large-scale clean hydrogen production utilization, manufacturing, and low carbon process research, as outlined here, are the fastest and most feasible path forward to create jobs in coal-impacted and former nuclear communities.

Shovel-Ready Project Development

Building on the existing extensive transportation and power distribution infrastructure, *h*₂TEAM breaks ground in 2023 with a shovel-ready project development strategy, including a 0–4-year timeline to launch a clean power generation and manufacturing facility. Low-carbon fuel and power facilitate the development of this world-class “Integrated Energy System-Closed Loop Manufacturing” (IES-CLM) Complex. The IES-CLM complex utilizes circular economy principles to optimize low-carbon processes, enhance efficiencies, reduce/consume waste, and foster regional cluster development in Central Appalachia. *h*₂TEAM will produce jobs in support of the following opportunities and the potential to include additional energy producing and manufacturing processes:

1. **Clean hydrogen for use in sustainable manufacturing with strategically selected manufacturers to be co-located at the IES-CLM Pike County site.**
 - **Green Cement Production – Building and Construction**
 - **Low Carbon Silica / Silicon Semiconductor and Solar Panel Manufacturing**
2. **95%+ Clean Hydrogen fueled power generation.**
3. **Sustainable transportation fuels (road, rail, aviation).**
4. **A product and process development site to test technologies using biomass, coal, plastic, and or organic material as feedstock in the production of low-carbon energy and other marketable byproducts.**

These efforts are further enhanced by the availability of deactivated coal production/powered infrastructure and retired industrial facilities in the region that can be transitioned to support the *h*₂TEAM complex and other sites in Central Appalachia. Production of additional feedstock for supplementary fuel and manufacturing options supporting the “spoke and hub” concept to attract additional energy producers and manufacturers to the area. By design, this complex extends job creation in the region. Further, it develops low-carbon technologies, manufacturing, and fuel production, compounding the Heart of Appalachia’s positive social, economic, and environmental impact.

The nexus of the targeted region is the US Department of Energy (DOE) former Portsmouth Gaseous Diffusion Plant (PORTS), a 3,777-acre property located in rural Pike County, Ohio, and the 50-mile area radius that encompasses southern Ohio, southern West Virginia, and eastern Kentucky. The h_2 TEAM team considers this area the “Heart of Appalachia” and includes many of the nation’s most economically and socially distressed communities impacted by the global energy transition. In addition, the financial consequences of the energy transition to industry sectors such as steel, aluminum, and chemical facilities have also been shuttered or relocated outside the area, further devastating the region.

Newpoint has entered into an agreement to purchase up to 248 acres at the Piketon site for Phase 1. The company will utilize concepts and processes developed for a similar clean hydrogen project in New Mexico. This larger \$1.51B h_2 TEAM-Newpoint project establishes a regional foundation for related end-user products to be produced at the IES-CLM Complex. Real-time and shovel-ready, h_2 TEAM launches a clean regional hydrogen hub servicing a range of public and private sector customers.

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

Color Key:

- Water System
- Electrical System
- Hydrogen System
- Natural Gas
- Solid Fuel Inputs
- Waste Heat Recovery System
- Steam System
- Intermediate Processing
- Intermediate Gasses
- Renewable Fuel Source
- CO2 System

Inputs:

- Air
- Electricity
- Water
- Natural Gas
- Renewable Natural Gas
- Steam
- Coal
- Electricity
- Water
- Natural Gas
- Renewable Natural Gas
- Water
- Nuclear Fuel
- Electricity
- Electricity
- Hydrogen
- Aggregate
- Biomass
- Recycling Plastics Bale
- Electricity

Main Units:

- ASU Air Separation Unit
- Methane Reformer
- Pyrolysis
- Natural Gas Internal Combustion Generation
- Small Module Reactor
- Green Cement
- Pyrolysis
- Syngas Treatment
- Exhaust Treatment
- Fischer-Tropsch Process
- Electrolysis
- Hydrogen Boiler
- Compression
- Integrated Steam Loop
- Dry Cooling Condensers
- Steam Turbine
- CO2 Sequestration
- Switchyard
- Process Heat
- Low Carbon Cement
- Liquid Fuels

Outputs:

- Hydrogen
- CO2 Sequestration (Geologic Formation)
- Water (For Reuse)
- Electricity (To Grid)
- Process Heat (To Manufacturers/Processors)
- Low Carbon Cement (To Construction)
- Liquid Fuels (To Refinery)

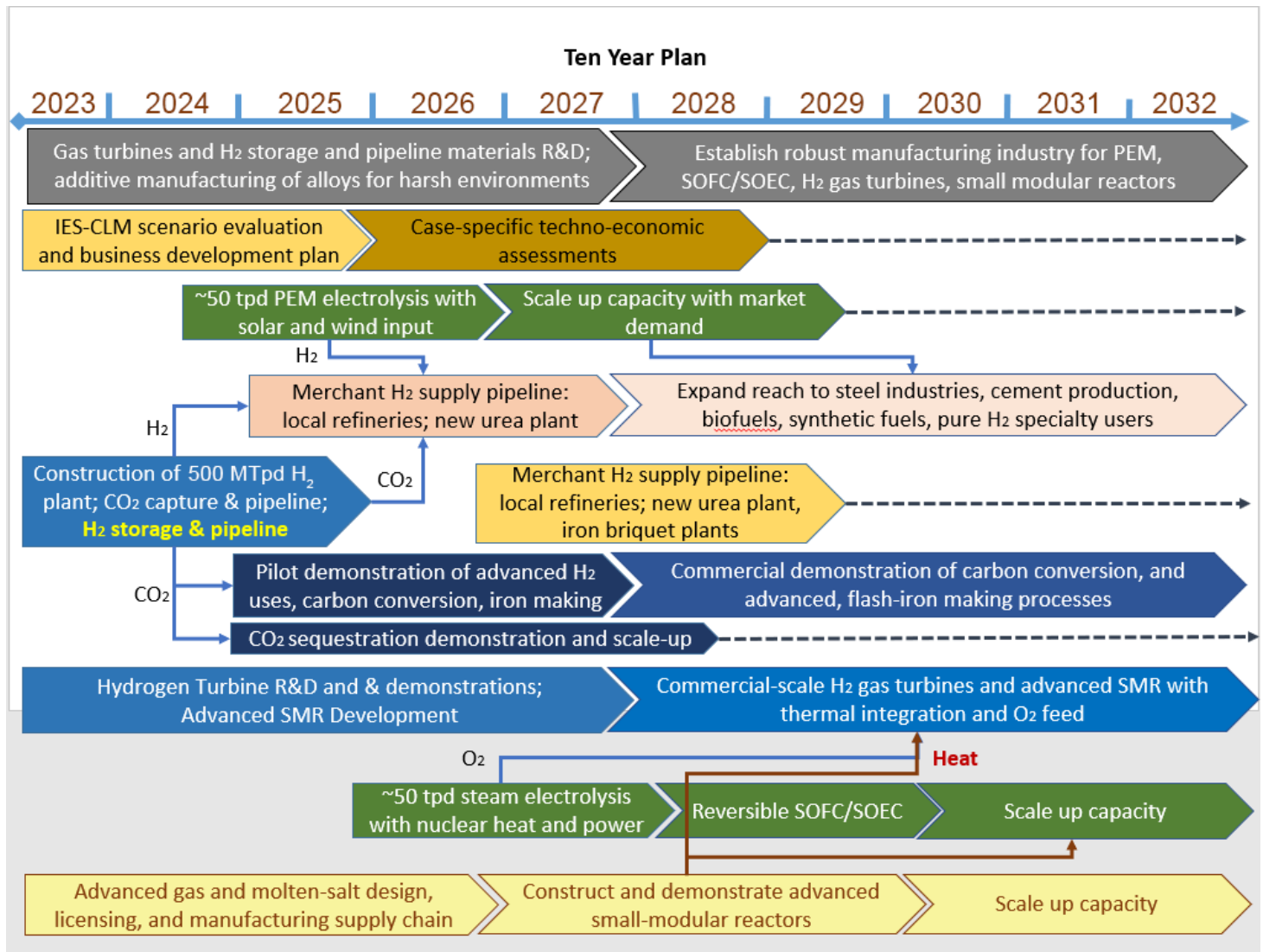
- 500+ MT of clean hydrogen per day.
- 225+ MW of clean hydrogen-fueled power generation for on-site sustainable closed loop manufacturing.
- Establish a laboratory for the development and testing of large-scale low-carbon fuel production processes such as the pyrolysis of coal, plastics, and other organic material.
- High quality silica and carbon to be used as feedstock in manufacturing semiconductors, solar panels, and batteries.
- Low-carbon sustainable aviation and transportation fuels.
- Hydrogen fuel and power to support on-site metals recycling including contaminated nickel and copper from DOE facilities.
- *h*₂TEAM repurposes regional deactivated coal-fired power plants (CFPPs) and stranded industrial assets. Utilizing decarbonized hydrogen to generate baseload dispatchable low-carbon power creates enduring jobs for union workers in their own communities.

Translates Regional Aspirations into a Sustainable Business Model

h₂TEAM supports the diversification of one of America's most emblematically distressed regional economies, delivering concrete results by identifying what is needed in Central Appalachia to best prepare, attract, develop, and sustain 21st century industries. The initiative illustrates the advantages that come from converting a federal liability into a national asset while revitalizing the regional economy. This project creates hundreds of high-paying union jobs, fosters the development of new processes and technologies, and reduces carbon emissions contributing to global climate goals. *h₂TEAM* translates regional aspirations into a business model that creates hundreds of construction and long-term jobs, improving the quality of life in the tri-state region and our country.

h₂TEAM Delivers

- Federal, state, and local priorities on new long-term job creation in distressed communities now by utilizing the existing coal / industrial infrastructure in Central Appalachia while building a sustainable low carbon economy
- Climate goals by utilizing large scale clean hydrogen for power generation and manufacturing
- The recently announced DOE Priorities for Hydrogen Hubs and Energy Earthshot
- DOE advanced nuclear small modular reactor (SMR), mini and micro-reactor initiatives
- Further expansion of renewable power by providing clean baseload dispatchable power to stabilize the grid
- Benefits from strong bipartisan interest and support as an 'all of the above' energy strategy for decarbonizing the grid and industries, bolstering national security, and actualizes "Envisioned & Made in America" manufacturing
- Support of the National AFL-CIO and Energy Futures Initiative Labor Energy Partnership
- Support of organized labor in Ohio and West Virginia



Ten-Year Timeline - Major Activities

The Ten-Year Plan lays out h_2 TEAM's major activities for achieving its goals, starting now with proven technologies while developing new technologies to produce and utilize clean hydrogen, at scale, in the future. By applying existing hydrogen production processes, hydrogen is being transformed from a carbon-emitting hydrocarbon-derived fuel to a fuel that builds on an economically feasible and environmentally sustainable foundation.

Dry Cooling - No Freshwater Required

The power generation industry is the largest consumer of fresh water in the US, requiring 133 billion gallons per day in 2015 (48.5 trillion gallons annually). The h_2 TEAM complex can be configured to provide a closed-loop power generation system, requiring no freshwater for cooling from outside sources. This process highlights the essential energy-water nexus that is vitally relevant by insisting first on mindful resource conservation and second on avoiding unnecessary water consumption.

Water Produced from Hydrogen Fueled Power Generation

Newpoint has also developed a patent-pending clean hydrogen water production technology that captures the water produced in hydrogen combustion. The clean-deionized water produced in Newpoint's process provides an excellent opportunity to supply the ultra-high-purity water source required in the production of green hydrogen. For example, a 100 MW clean hydrogen-fueled power generation facility produces approximately 100,000,000 gallons of water annually. The Phase 1 - 225 MW of hydrogen-fueled power produced at the h_2 TEAM complex could supply the deionized green hydrogen feedstock with the potential to add **100+ MW of zero-carbon fueled power**.

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