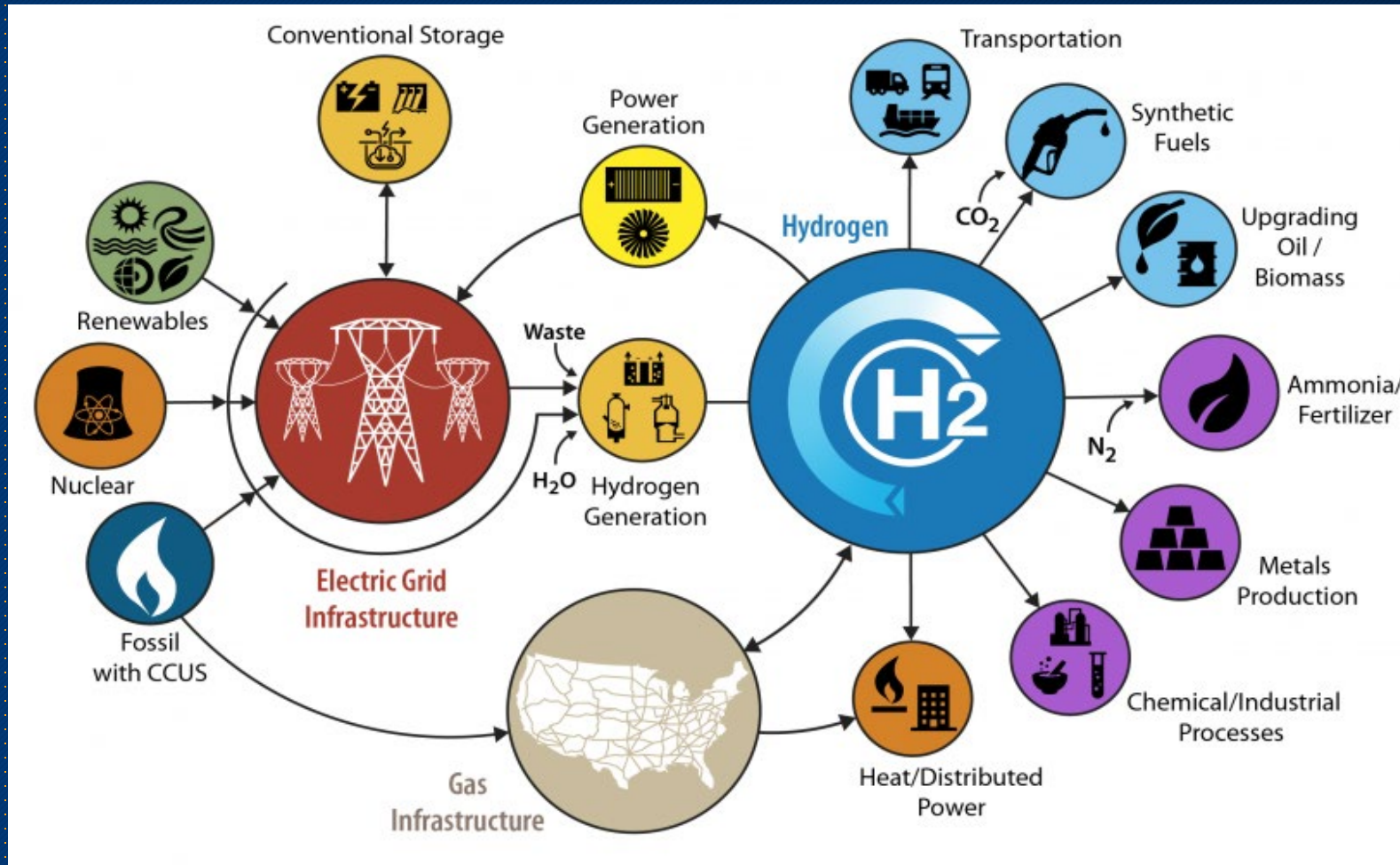


WV Hydrogen Hub Coalition

2022



What is a Hydrogen Hub?



What is a Hydrogen Hub?

- The BIL authorizes and appropriates \$8.0 billion over the five-year period encompassing fiscal years 2022 through 2026 to support the development of at least four H2Hubs that:
 - Demonstrably aid achievement of the clean hydrogen production standard developed under section 822(a) of Energy Policy Act of 2005 (EPAAct 2005);
 - Demonstrate the production, processing, delivery, storage, and end use of clean hydrogen; and Can be developed into a national clean hydrogen network to facilitate a clean hydrogen economy.

DOE - Technical Objectives

- **Feedstock Diversity:** at least one H2Hub shall demonstrate the production of clean hydrogen from fossil fuels, one H2Hub from renewable energy, and one H2Hub from nuclear energy.
- **End-Use Diversity:** at least one H2Hub shall demonstrate the end-use of clean hydrogen in the electric power generation sector, one in the industrial sector, one in the residential and commercial heating sector, and one in the transportation sector.
- **Geographic Diversity:** each H2Hub will be located in a different region of the United States and leverage energy resources abundant to that region, including at least two H2Hubs in regions with abundant natural gas resources.
- **Employment:** DOE shall give priority to regional clean hydrogen hubs that are likely to create opportunities for skilled training and long-term employment to the greatest number of residents in the region.

Timeline

- February 15, 2022 - Senators Manchin & Capito, Representative McKinley and Governor Justice announce the launch of the West Virginia Hydrogen Hub Coalition.
- February 25, 2022 - Senators Manchin & Capito, Representative McKinley & Governor Justice convene organizational meeting.
- March 21, 2022 - West Virginia Hydrogen Hub Coalition's official response to the US DOE is submitted.
- April 28, 2022 - Bipartisan members of West Virginia's legislative leadership are welcomed to the West Virginia Hydrogen Hub Coalition.
- July 28, 2022 - West Virginia Hydrogen Hub Coalition engage industry leaders to discuss next steps.
- August 5, 2022 - Request For Information (RFI) due to the West Virginia Hydrogen Hub Coalition.



Tri-State Region Hub Efforts

A variety of hub efforts were in formation in the early months of 2022 claiming to represent the “Tri-state Region” or individual states within the region including:

- In2Market - Pittsburgh (*EQT, Battelle, US Steel, etc.)
- Ohio Clean Hydrogen Hub Alliance (*Battelle)
- Midwest Nuclear Hydrogen Hub - University of Toledo
- Shell/Equinor Hub - Northwest Ohio
- Tennessee (Chemours, TC Energy, TVA)
- Pennsylvania - Announced intentions to apply.



Hub Efforts - Current Status - WV/OH/PA

- In2Market - Will not apply, but will support a Tri-state effort as a facilitator
- Ohio - Still shows public intentions to apply individually, however Battelle suggests they will go along with a Tri-state effort.
- Great Lakes - Recently asked WVU to sign their MOU, are focused on Nuclear. *Recently as in 8/8/2022.*
- Shell/Equinor/US Steel - This trio announced intentions to develop a hydrogen hub effort on 8/16/2022, but continue to express interest in a Tri-State effort.
- Tennessee - Chemours has expressed interest and offerings to abandon Tennessee efforts for the opportunity to join a Tri-State effort, all of their assets reside in West Virginia (Belle, Parkersburg)
- Pennsylvania - Various meetings with our office and other entities we are in close contact with.



WV H2 Hub Coalition - Current Status

- Working w/ Coalition Members & Allegheny Science & Technology (Contracted by State of WV), to evaluate RFIs and review recommendations of groups/companies to team for proposal.
- MOU drafts and meetings with interested entities.
- Optimistic of early/mid September announcement of initial plans and team members.

What to Expect From DOE?

H2HUB

Pacific Northwest

- Port communities
- Tribal communities
- Extensive renewables
- 8 jobs per \$1M invested in H2

California

- Diverse populations
- Extensive infrastructure
- Emissions regulations
- 40,000+ jobs

Southwest

- Tribal and Hispanic communities
- Underutilized solar
- Nuclear power
- Up to 2B tonnes/yr emission reduction potential

Central U.S.

- Ample wind
- Geological storage
- Railway transport
- Nuclear resources
- >630,000 tonnes/yr CO2 reduction

Great Lakes

- Major national corridors
- Nuclear power
- 60,000+ jobs

New England

- Offshore wind
- Fishing communities
- Backup power and winter heating
- ~120K tons CO2/year reduction

Appalachia

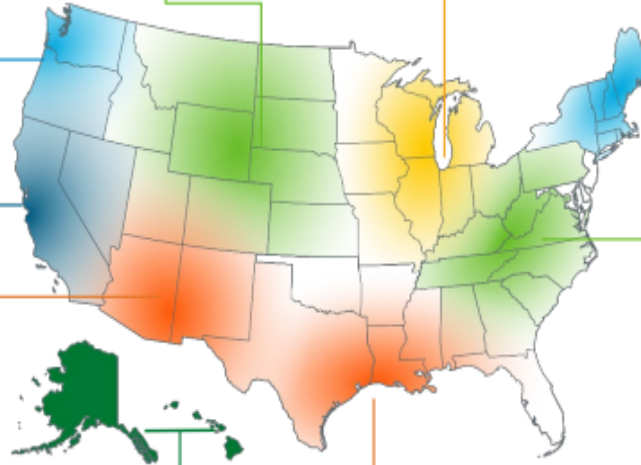
- Retiring fossil plants
- Mining, refining transferable skills
- Carbon capture and sequestration
- 70,000 tons/yr H2 production

Gulf Coast

- Existing infrastructure
- Multiple opportunity zones
- Renewable resources
- 1,000s of jobs
- Chemical industry

Alaska and Hawaii

- Extensive renewables – geothermal, solar, ocean
- Backup power
- Isolated communities
- 86,000 tonnes/yr emission reduction





	Application	Phase 1: Detailed Plan	Phase 2: Develop, Permit, Finance	Phase 3: Install, Integrate, Construct	Phase 4: Ramp-Up & Operate
	Pre - DOE funding	Up to \$10M DOE Funding , Non-Federal Cost Share ≥ 50%, 12-18 Months	TBD DOE Funding, Non-Federal Cost Share ≥ 50%, 2-3 Years	TBD DOE Funding, Non-Federal Cost Share ≥ 50%, 2-4 Years	TBD DOE Funding, Non-Federal Cost Share ≥ 50%, 2-4 Years
Engineering, Procurement, Construction, Operations	<ul style="list-style-type: none"> • Conceptual Design • Technical Readiness • Project Schedule • Total Project Cost Estimate 	<ul style="list-style-type: none"> • Engineering & Design Documents • Technical Maturation Plans • Integrated Project Schedules 	<ul style="list-style-type: none"> • Mature Engineering & Design • Technical Risk Management • Execution ready schedule & cost estimate, PM Tools • Operations Plan 	<ul style="list-style-type: none"> • Ongoing execution reporting • Interim Go/No-Go reviews 	<ul style="list-style-type: none"> • Ongoing performance Reporting • Technical risk updates, tracking • Final TPC accounting
Business Development & Management	<ul style="list-style-type: none"> • Business Strategy • Team Description • Workforce Plan • Finance Plan • Market potential analysis 	<ul style="list-style-type: none"> • Project Management Plan • Risk Management Plan • Financial modelling • Site selection 	<ul style="list-style-type: none"> • Finalized project structure, management, financing • Ongoing risk management • Final legal, workforce, procurement agreements • Feedstock & Offtake Plans 	<ul style="list-style-type: none"> • Ongoing execution reporting • Ongoing risk management 	<ul style="list-style-type: none"> • Updated financial analyses • Revised growth plans • Updated Risk Management
Permitting & Safety	<ul style="list-style-type: none"> • Safety history/culture description • Regulatory approval timeline overview 	<ul style="list-style-type: none"> • Initial Hydrogen Safety Plan (HSP) & Site Safety Plan • Physical, Information, Cyber Security Plans • Environmental & Regulatory preparations 	<ul style="list-style-type: none"> • Execution ready HSP and security plans • Permits & approvals in place for construction 	<ul style="list-style-type: none"> • Ongoing permit, environmental, safety reporting • Permits & approvals in place for operations 	<ul style="list-style-type: none"> • Ongoing permit, safety, and security reporting
Community Engagement & Impacts	<ul style="list-style-type: none"> • Initial Equity Plan addressing community engagement, Justice40, community consent or benefits agreements, job quality, workers rights, etc. 	<ul style="list-style-type: none"> • Stakeholder engagement and Community Consent or Benefits Agreement drafts 	<ul style="list-style-type: none"> • Finalized Equity Plan, Agreements • Community development targets identified, tracking plans 	<ul style="list-style-type: none"> • Ongoing reporting on Equity Plan activities 	<ul style="list-style-type: none"> • Revised community engagement plans for operations • Ongoing reporting and evaluation
Technical Data & Analysis	<ul style="list-style-type: none"> • Lifecycle Analysis • Techno-economic Analyses 	<ul style="list-style-type: none"> • Project Production Model • Updated Lifecycle and Technoeconomic Analysis 	<ul style="list-style-type: none"> • Final Lifecycle & Technoeconomic Analyses • V&V and Project Completion Testing Plans 	<ul style="list-style-type: none"> • Periodic analyses updates • V&V data collection • Project completion testing and performance ramp V&V 	<ul style="list-style-type: none"> • Validated performance model • Finalize lifecycle and technoeconomic analyses • Dissemination of analyses, lessons learned

Conclusion