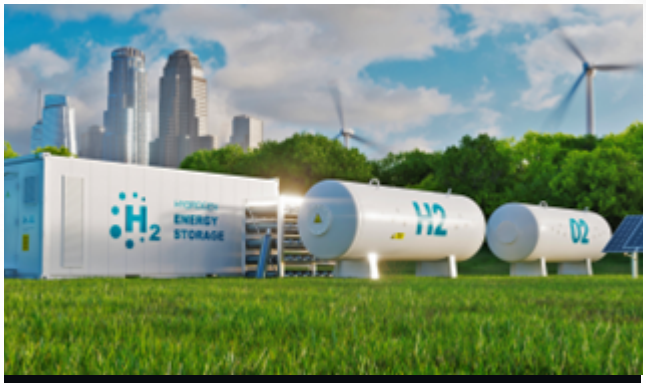
W&J | CENTER FOR ENERGY POLICY & MANAGEMENT

Harnessing Hydrogen: Exploring Local & Regional Opportunities in Appalachia



What actions, if any, should the Appalachia governors take to support hydrogen hubs in their states?

- Incentivize clean hydrogen markets
- Attract private and public capital beyond DOE startup funds
- Build hydrogen hub innovation and physical and human infrastructure, including a skilled clean hydrogen technical workforce

Executive Summary

While harnessing hydrogen via regional hydrogen hubs presents potential job creation, economic development, and environmental opportunities for the tri-state region, the path forward is unclear. A number of economic, environmental, policy, and technological challenges to development and deployment exist. In addition, local and regional governmental bodies lack a knowledge base to assess the costs and benefits of the burgeoning industry. Further, the effectiveness, economic efficiency (benefits and costs), equity, and ease of political and public acceptability of the harnessing hydrogen option needs to be compared relative to other energy and environmental opportunities for the region.

What is a Hydrogen Hub?

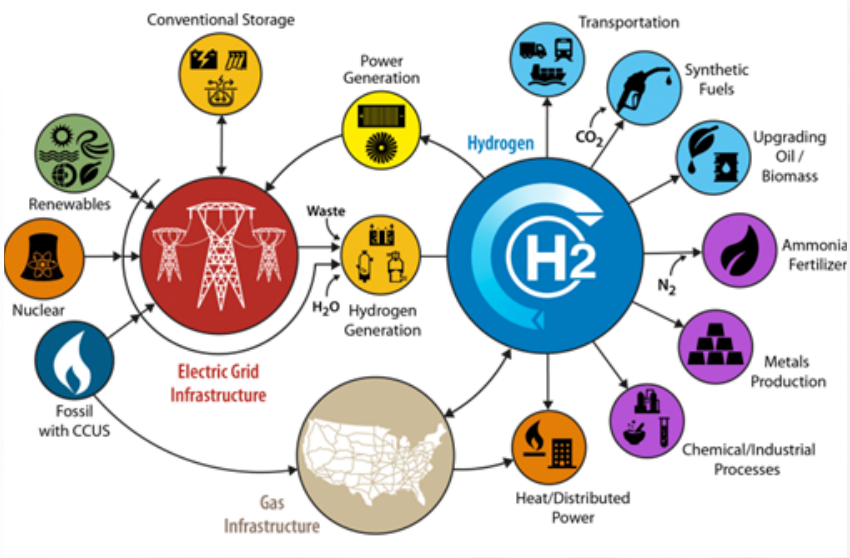
Hydrogen is called the "Swiss Army Knife of Clean Energy" because it can be produced from many energy sources including fossil, renewable, and nuclear energy and can provide energy for many applications including transportation, chemical production, business and energy heating, and electricity generation.

The goal of a Hydrogen Hub is to produce clean hydrogen from multiple energy sources to serve the energy needs of industry, chemical production, power generation, transportation, and distributed power for residential and commercial heating. Hydrogen hubs are in the early stage of development with investments occurring worldwide.

The figure on the right provides an overview of a hydrogen hub. Different energy options (left side) can power the hydrogen generation process. In some cases, hydrogen can be generated from the energy source and in other cases, the energy source is used to generate electricity which is then used to process hydrogen.

Hydrogen can be used either directly to provide electricity to the grid or through pipelines as a gas similar to natural gas (middle of figure).

In terms of end use (right side), hydrogen can be used for transportation (blue), chemical and metals production (purple), and heat/distributed power (orange) for commercial and residential sources.



Opportunities and Challenges in Locating a Hydrogen Hub in Appalachia

The U.S. Department of Energy (DOE) identified a number of advantages for locating a hydrogen hub in the Appalachian region. Among these are the possibility of using readily available fossil fuel resources with carbon capture while transitioning in the future to renewables. The region also has access to significant natural gas and saline CO2 storage plus salt, limestone, and sandstone formations for CO2 or hydrogen storage. Possible end users include power generation and the steel, cement, and chemical industries. The region's many distressed communities could benefit from the economic development provided by a hub.

To discuss the possibility of an Appalachian hydrogen hub, Washington & Jefferson College's Center for Energy Policy & Management hosted a symposium entitled "Harnessing Hydrogen: Exploring Local & Regional Opportunities in Appalachia" on October 4, 2022. This day-long, in-person symposium, attended by 113 participants from local and county governments, regional governing bodies, nonprofits, and industry explored the potential development of hydrogen energy and carbon capture, utilization and storage (CCUS) and a federally-funded clean hydrogen hub with a focus on Ohio, Pennsylvania, and West Virginia (tri-state region).

Among the challenges to locating a hydrogen hub in the region identified in the symposium were that the Appalachian Plateau is utilized by both resources going out (e.g., active coal mining, natural gas, oil) and going in (e.g., energy storage of methane and hydrogen, carbon sequestration, wastewater disposal). As a result, hydrogen will need to compete with a number of alternatives. This is particularly important when it comes to the issue of the ownership and access to the very limited pore space within the reservoirs where carbon or hydrogen would be stored. Coordination of all these activities is now, and will continue to be, a challenge. Furthermore, for a hydrogen economy to be successful in the region will require:

- Developing the necessary infrastructure
- Recruiting end users for the hydrogen produced
- Reducing regulatory hurdles
- Building not just a project, but an ecosystem in collaboration with governments, industrial partners, local communities, and unions.
- Preparing a workforce with the needed skills.
- Recognizing that each region is going to need different business models to drive end users.

What Actions, If Any, Should the Appalachia Governors Take to Support Hydrogen Hubs in Their States?

At the end of the event, symposium participants voted on how they would prioritize policy options that responded to the above question. Provided below are the list of prioritized policy options:

1. Incentivize Clean Hydrogen Markets
2. Attract Private and Public Capital Beyond DOE Startup Funds
3. Build Hydrogen Hub Innovation & Physical and Human Infrastructure, Including Skilled Clean Hydrogen Technical Workforce

When asked what actions Appalachian Governors should NOT take, about 40% of participants indicated they liked all the options presented. These other options, not in the type priority, but supported by many were:

- Establish H2 Hub Governance to Monitor Achievement Targets
- Avoid Local Community Challenges That Resulted from Shale Era State Policies

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For More Information: This policy brief, written by Dr. Deborah D. Stine, Founder, Science & Technology Policy Academy, is based on a summary of a symposium entitled "Harnessing Hydrogen: Exploring Local & Regional Opportunities in Appalachia" hosted by Washington & Jefferson College's Center for Energy Policy & Management. See https://www.wjenergy.org/ for more information.

Credits: Hydrogen Hub Picture, United Nations; Hydrogen Hub Graphic, U.S. Department of Energy