Georgetown hydrogen energy storage

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As part of a $7 billion investment in hydrogen, the U.S. Department of Energy is committed to building a network of hydrogen facilities and pipelines centered in southeast Pennsylvania. Critics are questioning the project"s expense and its net savings in carbon emissions.

And residents of potential host communities -- particularly the hard-pressed city of Chester, Pennsylvania, where some of the MACH2 facilities are planned -- are concerned that they will bear the brunt of the potential risks and health hazards that hydrogen production and transport could bring.

Still, scaling up low- or zero-carbon hydrogen production wasn"t considered financially viable until passage of the Bipartisan Infrastructure Law in 2021 and the Inflation Reduction Act in 2022, which offer substantial tax credits to producers of clean hydrogen.

Today, some proposed hubs are planning on producing "blue" hydrogen -- that is, hydrogen created using natural gas but with the resulting carbon emissions captured and stored underground. Representatives of the MACH2 hub say that 82 percent of their production will be "green," meaning powered by solar and wind; 15 percent will be "pink" -- powered by the Salem and Hope Creek nuclear plants, in southern New Jersey; and the remaining 3 percent will be "orange" -- powered by biogas, which is produced when organic matter decomposes in an anaerobic environment.

The lack of specificity has unnerved environmental and community groups. The Delaware Riverkeeper Network, an environmental advocacy nonprofit, is alarmed by what it sees as a lack of proper safety precautions. Part of MACH2"s plan involves repurposing old fossil fuel infrastructure to carry hydrogen. Like many aspects of the project, what that means isn"t yet clear.

MACH2 officials are currently creating an inventory of underutilized infrastructure, according to Matt Krayton, the communications lead for the hub. He says the hub would likely repurpose existing pipeline rights of way -- every pipeline needs approval from landowners whose property would be crossed -- and possibly the pipelines themselves, which would be re-sleeved with a hydrogen-safe polymer to prevent leaks.

Some 1,600 miles of hydrogen pipelines are already operating across the U.S., and Nick Barilo, executive director of the Center for Hydrogen Safety at the American Institute of Chemical Engineers, noted that all combustible fuels carry a certain amount of risk, and hydrogen is no more dangerous than natural gas. "The U.S. industry has been using hydrogen for over a century," Barilo said. "Safety knowledge and best practices for the production and transportation of hydrogen are well-established and mature."

In some potential host communities, like Chester, Pennsylvania, assurances like Barilo"s fall flat. Fifteen miles outside of Philadelphia, the city once bustled with manufacturing and heavy industry. But after World War II,

plants began to shutter, and the city entered a long decline. By 2020, its population was half its 1950 peak.

Today, a third of Chester residents live in poverty, and the city, which declared bankruptcy in 2022, is host to 11 industries classified by the DEP as hazardous, including one of the largest incinerators in the nation. Chester"s asthma rate is double the state level, according to an analysis conducted by the Center of Excellence in Environmental Toxicology, at the University of Pennsylvania. "These [industries] assault us every day," said Zulene Mayfield of Chester Residents Concerned for Quality Living. "And it is sanctioned by the state."

"These projects are often placed in areas that have less political power and representation," said Kearni Warren, a local outreach coordinator for the Clean Air Council, an environmental health advocacy organization. "We should have the right of refusal when it comes to projects that put our health and safety at risk."

When MACH2 finalizes its arrangements with the DEP and formally begins Phase 1 of the project, which includes a community engagement plan and detailed plans for building sites, residents may start to see if their skepticism is warranted. But the industry still faces headwinds over its potential costs and benefits.

Although burning hydrogen produces no direct greenhouse gas emissions, hydrogen that leaks into the atmosphere, according to a 2022 research paper published in Atmospheric Chemistry and Physics, increases concentrations of other greenhouse gases, like methane, ozone, and water vapor. "Any time you"re handling [hydrogen], producing it, transporting it, storing it -- [the molecule] is so small that the risk of leaks is significant," said Talor Musil, a field manager at the Pennsylvania-based nonprofit Environmental Health Project.