



Hydrogen in Pennsylvania: An Opportunity to Do It Right

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Abstract

It is imperative that our Commonwealth, our nation, and the global community eliminate carbon pollution wherever possible in order to reach net-zero carbon emissions by 2050. Here in Pennsylvania, as the nation's third-largest carbon emitter, we have both the opportunity and a moral obligation to be leaders in eliminating these emissions. Meeting the necessary climate goals will require an economy-wide approach where we transition as rapidly as possible from fossil fuel generation to clean renewable energy and then use that clean energy wherever possible.

While hydrogen and carbon capture and storage (also known as "CCS") are billed as "alternatives" to the continued burning of coal and fracked gas, both still rely on fossil fuels to exist. While we recognize that both technologies may have targeted applications, particularly as an energy source for hard-to-decarbonize heavy industries, it is not the panoply that its boosters present it as. Instead, the fossil fuel industry is presenting both technologies as a way to keep the gravy train running—pull in more taxpayer subsidies, federal grants, and low-cost loans—so it can continue to operate at a profit that it cannot do on its own.

In other words, CCS and hydrogen are being used as a front for continuing to subsidize and prioritize dirty fossil fuels. This is unfortunate because both technologies could play a role in a cohesive, statewide, net-zero energy strategy, but instead it's being offered as the silver bullet. We must reject the fracked gas industry's insistence that it can someday, somehow, and by its own accord be a "clean" energy source. The history of spills, explosions, deregulation, and climate denial by the industry has not instilled the trust necessary to assume it intends on suddenly being a good steward of our climate or environment.

Pennsylvania needs a state net-zero plan that truly sets the Commonwealth on a path to transitioning from fossil fuel power to clean energy, meaning prioritizing and supporting more energy efficiency and renewable energy projects, as well as targeted, niche technologies like CCS and green hydrogen. We need a real climate protection policy that limits carbon and methane pollution and drives investments in clean energy and efficiency as quickly as possible. Hydrogen and CCS may be useful tools in limited situations, but they are not the climate solution.

Background

Proposed Hydrogen Facilities in PA

The Biden Administration’s 2021 Bipartisan Infrastructure Law includes \$8 billion in funding for at least four regional “hydrogen hubs,”¹ and Pennsylvania recently announced its intention to site one of these hubs in the Commonwealth.² These hubs are intended to test different ways to produce, process, deliver, store, and use fracked gas in an alleged effort to wean industry off fossil fuels and to combat climate change.³ The assumption behind these regional hydrogen hubs is that industry will create facilities that will process dirty fracked gas and produce “clean” hydrogen that can be utilized by sectors which are otherwise hard to decarbonize. But with applications for funding opening in the Summer of 2022, it is important to understand what is actually being offered and where the real benefits of hydrogen could lie (hint: it’s not in these hubs).

In addition, there are other hydrogen facilities proposed across the Commonwealth. Lancaster County may soon see what has been labeled as a “green” hydrogen facility powered by a dam on the Susquehanna River.⁴ In Clinton County, gas industry backers are proposing to build a complex of “blue” hydrogen and carbon capture facilities alongside new chemical production facilities and more fracking operations.⁵ And in the northeast, a proposed \$6 billion gas-to-liquids project by Nacero would rely heavily on carbon capture technology in order to produce what the company claims is net zero emissions gasoline manufactured from fracked gas.⁶ Yet the carbon capture demands of the project appear to be enormous: a slightly larger facility proposed by Nacero in West Texas is estimated to produce more than 5.7 million metric tons of carbon dioxide annually.⁷

What is Hydrogen?

Hydrogen is being proposed as a “cleaner” alternative to methane (e.g., fracked gas). However, whether or not hydrogen is “clean” depends on the production process. When hydrogen burns or is processed in a fuel cell, the resulting product is water, which is clean. However, we must look at how the hydrogen is produced to fully understand its climate impacts.

Hydrogen can be derived from water through the process of electrolysis, but whether or not that process is clean depends on the source of the electricity it uses. If a renewable, zero-carbon energy source is used, the result is clean “**green**” hydrogen.

What is being proposed by the hydrogen hubs is, however, **not** green hydrogen. Instead, these hubs are being marketed as a new outlet to try to sustain the faltering fracked gas industry. Hydrogen derived from fracked gas and other fossil fuels is known as “**gray**” hydrogen and accounts for 95

¹ <https://www.energy.gov/bil/regional-clean-hydrogen-hubs>

² <https://dced.pa.gov/newsroom/gov-wolf-announces-aggressive-push-to-secure-clean-hydrogen-hub-in-pennsylvania/>

³ <https://www.bloomberg.com/news/articles/2022-04-08/biden-s-hydrogen-hub-plan-sparks-8-billion-race-among-u-s-states>

⁴ <https://stateimpact.npr.org/pennsylvania/2021/04/02/pennsylvanias-first-green-hydrogen-plant-planned-for-lancaster-county/>

⁵ <https://www.post-gazette.com/business/powersource/2021/08/15/A-laboratory-at-scale-a-hydrogen-carbon-storage-shale-drilling-and-urea-project-has-hit-the-industry-zeitgeist-at-just-the-right-time/stories/202108080048>

⁶ <https://www.timesleader.com/news/1520944/nacero-to-build-6b-natural-gas-to-gasoline-plant-in-luzerne-county>

⁷ <https://oilandgaswatch.org/>

percent of U.S. production. This steam reformation process requires combustion of fracked gas which produces carbon dioxide and carbon monoxide, both climate-impacting gasses.

Claims that hydrogen derived from fracked gas is “clean” assumes the use of CCS technology, creating “**blue**” hydrogen. However, this is problematic. To date CCS has not proven itself economically feasible in large-scale installations and limitations of capture efficiency along with other fugitive emissions means methane gas will still be released.

So rather than rely on complicated color codes, we focus on the end results: hydrogen is either produced with zero carbon, or it is polluting.

Carbon Capture and Storage (CCS)

CCS—a critical piece of the puzzle for any proponents pointing to the alleged climate benefits of almost all the proposed hydrogen facilities—is a process that captures some carbon dioxide emissions from sources (like coal-fired power plants) and either reuses or stores it so it will not enter the atmosphere.

Despite decades of development efforts, carbon capture remains both extremely expensive, unproven at the necessary scale, and largely unable to meet its own projections of success.⁸ Hydrogen must have highly successful carbon capture—90% or more—to approach “clean.” However, recent studies have found that hydrogen plants that utilize carbon capture only have a success rate ranging from 48% to 77%.⁹

PennFuture’s Positions

PennFuture recognizes that **clean “green” hydrogen** *may* be a useful technology toward meeting the climate goals of net-zero by 2050, but it can only be supported, subject to the following:

- 1. Renewable energy now.** Pursuing the myth that fracked gas could be a “bridge” to a clean energy economy has already wasted more time than we could afford to waste. If we are going to rely on hydrogen sourced from clean, renewable generation to meet our climate goals, we must prioritize the investment in that clean renewable generation now. Any use of fossil fuels to produce hydrogen in the interim may create short term reductions, but will also risk creating and perpetuating fossil fuel infrastructure which will be an impediment to reaching the necessary goal of net zero carbon emissions. Development and investment in renewable energy must be a number one priority.
- 2. Limited uses.** We must think of hydrogen not as a fuel, but as one of many potential energy storage mechanisms. If industries can use clean renewable energy directly, they should.

⁸ <https://www.cnbc.com/2021/01/31/carbon-capture-technology.html>;

<https://www.newscientist.com/article/2287551-inside-the-race-to-scale-up-co2-capture-technology-and-hit-net-zero/>

⁹ https://ieefa.org/wp-content/uploads/2022/02/Blue-Hydrogen-Presentation_February-2022.pdf

Where hydrogen may make sense is in “hard to decarbonize” industries such as heavy transportation, steel and cement manufacturing, and some chemical manufacturing where there is either no practical means to use renewable energy directly or hydrogen is already a key part of a chemical process. Such applications account for approximately 15 to 25% of all greenhouse gas emissions currently.¹⁰

Because existing markets for hydrogen are overwhelmingly supporting petrochemical processing and fertilizer manufacturing, any new hydrogen production process also raises the question of where markets will exist. Using clean hydrogen to support tangential polluting industries to fracking is counterproductive.

- 3. Stringent public health and environmental safety practices and regulations.** Any industrial development can have negative impacts on workers, local communities, and our environment. We must ensure strong protections in each of these areas and must not allow new development to increase burdens—particularly on environmental justice communities.

For example, hydrogen storage and transport is a particularly challenging and dangerous aspect of the technology, with the need for heavily pressurized tanks, extremely low storage temperatures, and likelihood of leaks. This will result in additional storage and transportation infrastructure—above and beyond the manufacturing facilities themselves—which will impact public health and safety. We must reduce to the maximum extent practicable negative environmental and social impacts of hydrogen development, including the design and siting of facilities and infrastructure, and apply sound environmental justice principles to all hydrogen projects.

Based on these positions, **PennFuture cannot support the proposed dirty hydrogen facilities** (including the regional hydrogen hubs), sought after by the fracking and petrochemical industry and Governor Tom Wolf, because of the increased use of fracked gas that will stem from them, the increased worker and community health impacts that will stem from them, and the increased environmental harms caused by the facilities and related infrastructure. We must prioritize our limited resources on renewable energy technology development and support clean, renewable energy projects in Pennsylvania now.

Policy Recommendations

If Pennsylvania is serious about developing a statewide net-zero carbon strategy that modernizes our energy industry; creates sustainable, family-supporting jobs; protects the environment; and increases economic competitiveness, it should advance the following policy recommendations:

¹⁰ Cement, steel, niche manufacturing, and heavy transport by sea and air comprise roughly 15% of emissions. The further 10% depends on the degree to which hydrogen is used for large-scale heating and other forms of transportation in which electricity is a capable but very expensive option, such as long-range trucking.

- **Pennsylvania needs to develop a cohesive, statewide net-zero energy policy that provides a true pathway to modernizing the state energy system.**
 - Direct the Pennsylvania Department of Environmental Protection (DEP), the Pennsylvania Department of Community and Economic Development (DCED), and the Pennsylvania Department of Conservation and Natural Resources (DCNR) to lead a multi-agency, community-based planning process to develop a statewide clean energy planning and corresponding legislative package to carry it out
 - Direct DCED to develop a broader economic development plan for Pennsylvania’s energy sector—one that meaningfully includes renewable energy development—and end support for subsidy-reliant petrochemical facilities

- **Pennsylvania must stop advancing more subsidies for fracked gas, petrochemicals, and other fracked gas-dependent technologies; and Pennsylvania should begin ratcheting down its centuries-long taxpayer support for fossil fuels.**
 - No tax breaks and credits for hydrogen facilities using fossil fuels
 - No incentives for using CCS on new fossil fuel facilities
 - No new tax breaks for petrochemical or fertilizer manufacturing facilities that use dirty energy
 - Track and reduce fossil fuel subsidies by requiring annual reports on the purpose, progress, cost, and success of DCED’s tax credit, grant, and loan programs. In addition, the Governor’s Budget Office must track fossil fuel subsidies and set targets for their removal

- **Pennsylvania must facilitate and support the development of truly renewable energy sources, including solar, wind, and in some cases, green hydrogen.**
 - Fund and support truly renewable energy projects—like appropriately-sited solar and wind—so they have a fair shot in the energy market compared to fossil fuel sources that have benefited from over a century of preferred policies
 - Instruct state agencies, including DCNR and DCED, to develop, cultivate, and support renewable energy projects and attract out-of-state parties to develop renewable energy in Pennsylvania
 - Prioritize the research and development of renewable energy through state investments in innovation, such as the Ben Franklin Partnerships
 - Develop a targeted incentive for demonstrating “green” hydrogen as a viable technology for heavy industry, like cement and steel manufacturing

- **Pennsylvania must ensure that environmental justice is at the forefront of any projects.**
 - Ensure DEP applies its Environmental Justice Policy to any and all applicable permits, including in a similar way to how the legislature ensured petrochemical projects subsidized through HB 732 had to meet labor union requirements
 - State government generally should account for public health risks on environmental justice communities when continuing to permit the build out of petrochemical projects, which includes CCS