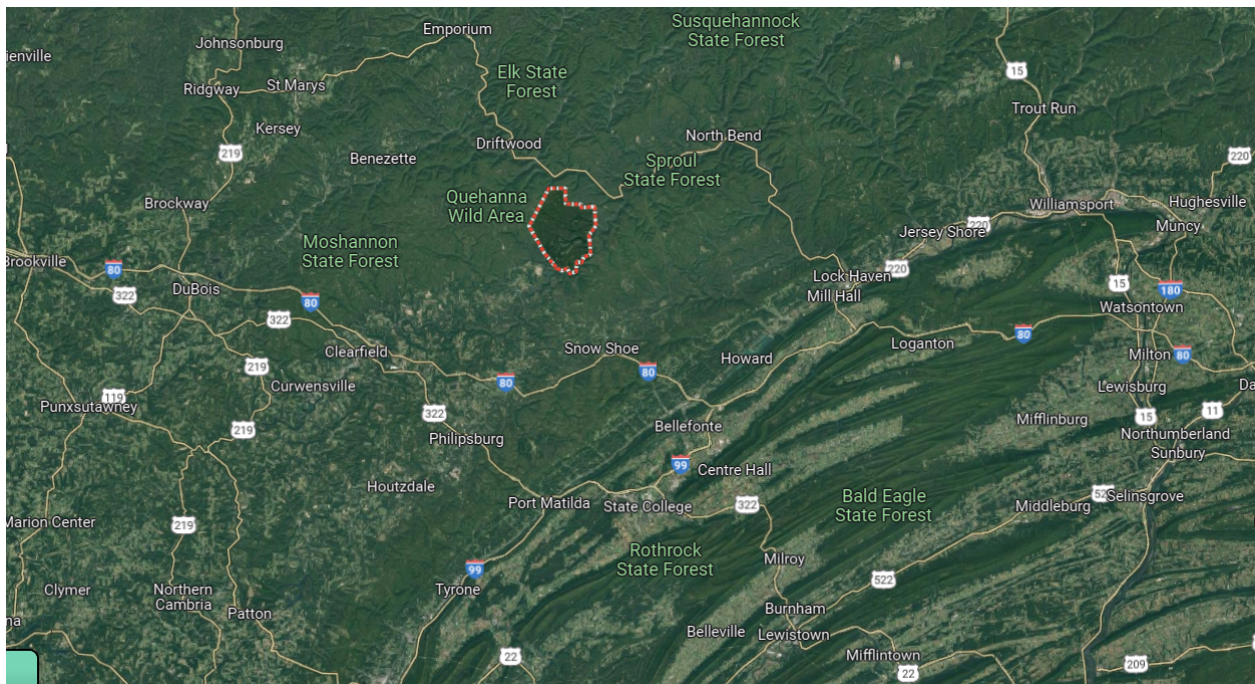


## What do we know about the KeyState to Zero Project?

### Background

KeyState to Zero is a proposed industrial facility that would take fracked gas and turn it into “blue” hydrogen and products such as diesel exhaust treatment and ammonia (which would be sold to make fertilizers) and for other industrial, manufacturing, and medical uses. The project, spearheaded by Pennsylvania-based businessman and KeyState CEO, Benjamin “Perry” Babb, has garnered attention as the first facility in Pennsylvania that would combine fracked gas drilling with on-site carbon capture and sequestration (CCS). CCS is a process that is intended to capture carbon dioxide (CO<sub>2</sub>) pollution from smokestacks and industrial sources and store it in deep underground geologic formations.



(Note: The red outline is West Keating Township. **Source: Google Maps**)

The project is proposed to be situated on a large tract of undeveloped forested land in West Keating Township, Clinton County, where a company called Frontier Natural Resources LLC owns several drilling leases. Methane gas (CH<sub>4</sub>) fracked on site would be converted into hydrogen (H<sub>2</sub>), which results in CO<sub>2</sub> pollution as a byproduct. The hydrogen would then be combined with nitrogen to manufacture ammonia and urea to be used as fertilizers. These products would be transported by rail and truck and the remaining CO<sub>2</sub> would theoretically be sequestered underground on site, despite there being no feasibility studies exploring if it's even possible at the proposed site.

## What is Blue Hydrogen?

The idea of “clean” hydrogen has become popular in recent years among policymakers and the fossil fuel industry as a potentially cleaner source of energy that can be made from fossil fuels, but not emit greenhouse gases when combusted. However, hydrogen can be produced in multiple ways with different power sources, each of which results in different climate impacts. The “cleanest” form is “green” hydrogen, which uses renewable energy to split water molecules into hydrogen energy. Green hydrogen is currently [only 1%](#) of the global hydrogen supply. Gray hydrogen, which accounts for 95% of the global hydrogen supply, is created by using methane-generated steam to break apart methane.

“Blue” hydrogen, one of the proposed products of KeyState to Zero, is made from methane gas, only with the added step of CCS. Safely, securely, and permanently storing carbon underground has yet to be proven at commercial scale and certainly not at any sites in Pennsylvania, making this “blue” hydrogen project purely theoretical. The [vast majority](#) of CCS projects worldwide to date have either failed or dramatically underperformed projected capture rates. There is no current manufacturing facility similar to KeyState to Zero that permanently holds its captured CO2 onsite.

Oil and gas companies are promoting blue hydrogen as a “bridge fuel,” using the same language and strategy used for decades in promoting methane gas. Blue hydrogen is the latest false solution these industries are promoting to protect their market share and delay the necessary transition to clean, renewable energy.

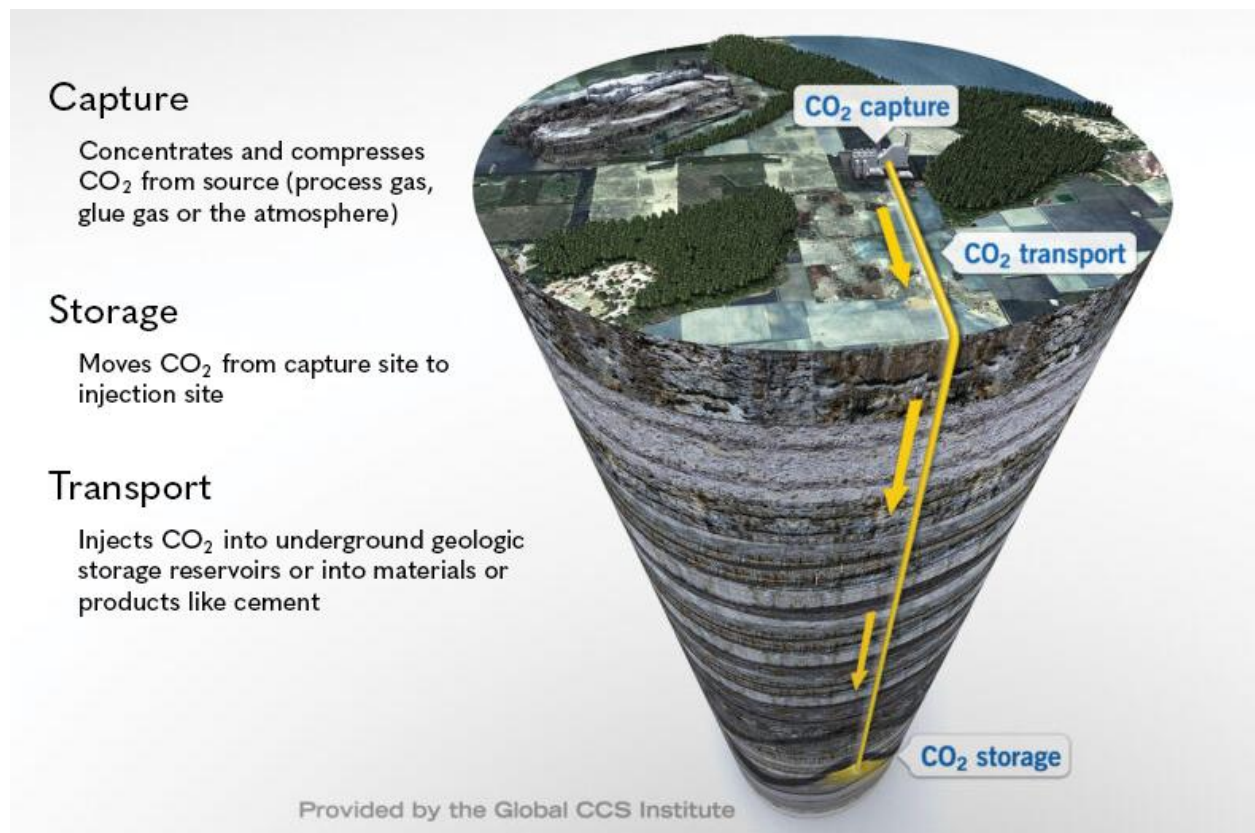
## Environmental Concerns

The production of blue hydrogen is capable of resulting in large amounts of greenhouse gas emissions, primarily from upstream fugitive methane emissions. Hydrogen, while itself not a GHG, is capable of interacting with GHGs in the atmosphere to compound their warming effects; it is an “indirect” GHG. Hydrogen is also the lightest element in the universe and extremely leaky. Hydrogen atoms are so small they can diffuse into metals, embrittling them, creating leak and explosion risks. Research [indicates](#) that fugitive hydrogen emissions can be 11 times more potent than CO2 at heating the atmosphere over a 100-year period.

The storage of CO2 through CCS also poses risks to the environment and public health. Capturing and storing the CO2 itself is expensive and energy-intensive. CO2 is odorless and colorless. Because CO2 is heavier than oxygen, if it leaks from pipelines or underground storage, it could replace the oxygen in a given space and could lead to asphyxiation. High concentrations of leaks from this infrastructure can also prevent combustion vehicles from operating. CO2 quickly causes confusion, respiratory trouble, and can lead to death within minutes of exposure. Stored CO2 can also acidify and leak, contaminating drinking water supplies.

Perry Babb has offered no projections on emissions from the project. There are only two commercial-scale blue hydrogen facilities in operation in North America. The one in the U.S., in Texas, reported 2.4 million metric tons of GHG emissions in 2020, mostly CO<sub>2</sub>. And a 2021 [study](#) showed that blue hydrogen has marginally less GHG emissions than gray hydrogen, about 9-12% less. The authors of the study (Robert Howarth and Mark Jacobson) indicate that this factor, combined with the unproven assumption that captured CO<sub>2</sub> can be completely and permanently contained, means that “the use of blue hydrogen appears difficult to justify on climate grounds.” In addition, they suggest that going forward, analyses of the impact of blue hydrogen projects should include upstream emissions from gas development and the heat and process energy to run carbon capture systems.

The proposed site is largely hilly, undeveloped forest. Clinton County is part of the PA Wilds, an initiative of the Department of Conservation and Natural Resources (DCNR) to preserve areas of outdoor tourism and recreation. According to proposals, products would be transported by rail and truck. However, there are few developed roads and limited rail, meaning that developers will have to expand roads and rail to allow for construction and access to fracking wells. The PA Wilds is also home to the largest elk population in the northeast United States and contains multiple state game lands, state parks, and state forests, including Sproul State Forest, the largest in the state forest system. DCNR has also asserted the need for extensive evaluation of potential sequestration sites to account for potential leaks or groundwater contamination. To date, there have been zero “characterization” wells (or test wells) drilled in Pennsylvania to determine the viability of underground carbon storage. Pennsylvania is also home to hundreds of thousands of undocumented, unplugged orphan oil and gas wells, which leak methane and other pollutants into the air and groundwater, posing significant risks and potential challenges when drilling any CO<sub>2</sub> injection wells.



(Source: [Global CCS Institute](#)) Note: For KeyState to Zero, carbon would be stored onsite.

Frontier Natural Resources is the partner company listed on the project proposal. A small company incorporated in 2014 and based in Bellefonte, PA, Frontier owns leases on the land where the project is located. Despite limited drilling activity, Frontier has been issued multiple violations by the Department of Environmental Protection (DEP) for each of their four wells; these violations were considered outstanding as of 2021.

### **Subsidies for Carbon Capture and Sequestration (CCS)**

In recent years, carbon capture and sequestration has been embraced by state and federal elected officials and investors as a potential tool to address the climate crisis. The Biden administration and Congress have made significant federal investments to develop CCS technology. The November 2021 Infrastructure Investment and Jobs Act included \$8 billion for the U.S. Department of Energy to provide funding to establish six-to-ten regional hydrogen hubs, among which there must be at least one dedicated to fossil-based production of hydrogen coupled with CCS technology. On October 13, 2023, the Department of Energy [announced the selection](#) of seven regional hydrogen hubs to enter negotiations to finalize project details and the potential to be awarded funding. KeyState to Zero is listed as a project under the Appalachian Hydrogen HUB (ARCH2) that would span Pennsylvania, Ohio, and West Virginia. The August 2022 Inflation Reduction Act also offers generous tax credit incentives to CCS



projects, including an expansion of the 45Q tax credit that incentivizes carbon capture and gives projects a seven year window to begin construction.

### **Unproven and Costly Technologies**

There are many unknowns with the KeyState to Zero project. The combination of blue hydrogen with diesel exhaust treatment and ammonia production has not been shown to be commercially viable. There is one proposed facility similar in nature to KeyState to Zero slated to be built in Louisiana at a cost of \$4.6 billion. In addition, it is also clear that the economic outlook for blue hydrogen projects is increasingly coming under [greater scrutiny](#).