Carbon Capture, Utilization & Storage (CCUS) Overview

What is CCUS?

CCUS is a collection of technologies to capture carbon dioxide (CO_2) from major point sources, including power generation and industrial facilities that use natural gas.

How it works



Images Source

Meeting global energy and climate goals with CCUS

Once it is captured, there are a variety of ways that the CO2 can be used, shipped or stored. It can be used for on-site industrial needs, transported in compressed form by pipeline, ship, rail or truck for several applications, or injected into deep geological formations for permanent storage — otherwise known as longterm geologic sequestration. ⁴

⁴ A new era for CCUS – CCUS in Clean Energy Transitions – Analysis - IEA

NORTHERN APPALACHIA CCUS APPLICATIONS

We would use CCUS in the production of blue hydrogen as part of our proposed ecosystem, or hub. In basic terms, a hydrogen hub is a cluster of assets that incorporates a number of hydrogenbased energy services. These services, in conjunction with high-volume storage, match the supply and demand of a variety of surrounding industries.

Because of the geological, workforce and market-access advantages that Ohio, Pennsylvania and West Virginia share, there is no better place in the United States to place a hydrogen hub. Not only do we sit on the largest natural gas field in the country — a major feedstock for blue hydrogen — but we also have salt, limestone and sandstone formations that provide favorable conditions for large-scale carbon dioxide storage. This region possesses a highly developed natural gas pipeline infrastructure that can transport hydrogen to markets.



APPALACHIAN ENERGY FUTURE Advancing Our Region's Clean Energy & Industrial Evolution

OHIO · PENNSYLVANIA · WEST VIRGINIA





Reinventing Northern Appalachia for the 21st century

Our proposed regional hydrogen hub and carbon capture ecosystem honors Northern Appalachia's past while powering our future. It's what our communities have been waiting for.

The Appalachian Energy Future Vision

There has never been an opportunity so perfect for our region. This ecosystem will serve as a model for the rest of the country on how to advance the clean energy evolution sustainably. Our vision for the Appalachian Energy Future is:



Forward thinking. We live in an age of rapid change. With this ecosystem, we can futureproof the region for continued resilience and growth, ensuring Northern Appalachia remains a global energy and manufacturing powerhouse.



Innovative. Our region has always been innovative: The commercial oil industry began here, and our steel helped win World War II. Fastforward to today, and we're producing the natural gas that fuels the world. This ecosystem, like what came before it, will define our region for generations to come.



Elevating communities. This ecosystem will create jobs across the region, ushering in a new era of economic prosperity for our communities. We will also prioritize equity and environmental and energy justice, and help empower others to take part in this endeavor.



Collaborative. This can't happen without the region working together. We are three states but one region. Together, we're unstoppable, because we have the people, the resources and the expertise, not to mention world-class universities, laboratories and industrial/manufacturing capabilities.



Decarbonized. The hydrogen we will manufacture will help decarbonize our industrial base, with emissions stored away safely thanks to CCUS technologies, in the fight against climate change.

DEFINING OUR REGION'S NEXT ERA

Our proposed ecosystem consists of a hydrogen hub and carbon capture, utilization and storage (CCUS) technologies:

- A hydrogen hub would produce clean hydrogen from our abundant natural gas and convert it into lowcarbon fuels. Hydrogen applications include fuel for airplanes, cargo ships, tractor-trailers and more, and it is also used as a fuel source and/ or production feedstock by sectors such as food and beverage; primary and fabricated metal; plastics and rubbers; and fertilizer.
- CCUS technologies capture carbon emissions and store them safely away to prevent them from entering the atmosphere.



Advancing Our Region's Clean Energy & Industrial Evolution

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A powerful partnership for the region's progress

We are an industry-led alliance of interested stakeholders connecting companies from the energy, industrial, manufacturing and other sectors with community leaders and others to develop a regional hub for hydrogen and CCUS. We are taking a long-term, large-scale, regional approach to support collaboration among public and private stakeholders across borders and sectors.



Blue Hydrogen Overview

What is blue hydrogen?

Blue hydrogen is produced when natural gas is split into hydrogen and carbon dioxide through steam reforming, which brings together natural gas and heated water in the form of steam. The hydrogen is then supplied for end-use applications, while carbon capture, utilization and storage (CCUS) technologies trap and store the carbon.¹

How it works



Achieving net-zero emissions with blue hydrogen

Blue hydrogen can serve as an ideal transitional step in the decarbonization of the economy.² According to the U.S. Department of Energy, 95% of hydrogen is produced from natural gas, making it the cheapest and most advanced method of hydrogen production available. Hydrogen can also serve as a replacement for natural gas and, to an extent, be blended into existing pipeline networks as a low-carbon fuel.³

Why Northern Appalachia for blue hydrogen?

Our region is home to major energy and industry producers and end users, and one of the world's largest natural gas basins. Northern Appalachia is a middle point between the East Coast and Great Lakes population centers, creating economics of scales to protect jobs and contribute to job growth and economic prosperity across the tristate region. We are poised to meet America's energy needs while leading the low-carbon and industrial evolution.

¹ The hydrogen colour spectrum | National Grid Group ² HYDROGEN STRATEGY Enabling A Low-Carbon Economy

³Hydrogen Hubs: The State of Play - Great Plains Institute

HYDROGEN FACTS

- Hydrogen is the most abundant chemical element, estimated to contribute 75% of the universe's mass
- It is the lightest of all elements, yet it has an extremely high energy density
- Hydrogen contains approximately three times as much energy as oil

HOW IS BLUE HYDROGEN USED?

Sectors within the tri-state region that use hydrogen include:



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