PIOGA Pennsylvania Independent Oil & Gas Association

JUST THE FACTS

Hydrogen Initiatives Advancing Technology

The U.S. oil and gas industry is leading research and investing significantly in the development of hydrogen as an energy source, which is seen as a valuable long-term contributor to climate-related goals of reducing carbon. While the applications of hydrogen as an energy source are still in their early phases, the importance of this technology is reflected in the allocation of $8 billion in the 2021 Federal Infrastructure Act to spur its development. Under the provisions of the law, the U.S. Department of Energy (DOE) will use the funds to identify the location of four "hydrogen hubs" across the country and support them.

Here are a few facts about this emerging technology and the role energy producers are playing in its development.

What Is Hydrogen?

Hydrogen is the most abundant element in the world, and is currently used in petroleum and metals refining, fertilizer and chemical production, and food processing. A pure form of hydrogen does not exist naturally, and must be separated and segregated for use. There are currently three general methods to separate hydrogen:

- Traditional production, which involves Steam Methane Reforming (SMR), and primarily uses natural gas as a feedstock (and may use coal) and does not capture CO2 emissions. This production method results in what is often called "gray hydrogen."
- Production using Carbon Capture, Utilization and Storage (CCUS), which generally involves SMR with the addition of carbon capture technology, and results in what is usually called "blue hydrogen.
- Electrolysis, which splits water (H2O) to isolate the hydrogen, and results in what is often referred to as "green hydrogen."

About 95% of global hydrogen is produced using either natural gas or coal as a feedstock. Hydrogen produced with natural gas and paired with CCUS technology has great potential to be scalable as a low-carbon fuel source. As of 2022, hydrogen production accounts for about 6 percent of natural gas demand.

Global production of hydrogen is expected to grow significantly in the next decade. Production reached a total of 60 million metric tons in 2018, and is expected to increase to around 300 million metric tons in 2030. According to the World Economic Forum, the European Union is currently investing the most in developing new hydrogen projects, at a pace of $4.56 billion annually. The Federal Infrastructure Investment and Jobs Act's allocation of $8 billion in funding for hydrogen projects here reflects the potential for new production facilities in the U.S.

Markets/Infrastructure/Workforce

One of hydrogen's most important markets will be for use in heavy industry and among large users of energy, including steel and chemical production, automobile manufacturing, plastics and trucking, to name just a few. One of the criteria expected to be important in the DOE's evaluation of potential hydrogen hubs is the availability of these "off-takers" in the regions under consideration for investment. The availability of pipelines, compressors, fractionation plants and other infrastructure is a second priority that will be needed to justify the DOE's decision to invest in developing a regional hub facility. Storage and transportation infrastructure are also important factors in assessing the strengths of different areas of the country.

Last, the availability of an adequate and trained workforce will be an important factor in evaluating a region's current and future ability to support the development of hydrogen technologies.

Western Pennsylvania Potential

A coalition of western Pennsylvania and international companies, initially made up of U.S. Steel, EQT Corp., Shell Polymers, Mitsubishi Power, Norway-based Equinor, GE Gas Power, and Marathon Petroleum Corp, started an alliance early this year to advance an initiative for the region to become a hub for hydrogen production and carbon-capture technologies.

The group plans to promote the potential of the three-state Appalachian Basin to the DOE as a regional hub and pursue available federal funds that were included in the Infrastructure Law, and filed an Implementation Strategy Request for Information with the DOE in March regarding the development of a hydrogen hub in the Appalachian Basin.

The Facts

Technology focusing on the increased use of hydrogen as an energy source is happening rapidly, both in the U.S. and around the world. The $8 billion initial investment being managed by the DOE will jump-start the research and development work being completed by the private sector to advance and improve the economics of those technologies, reducing future CO_2 emissions in the process.

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