

Hydrogen

What is hydrogen?

Hydrogen is the most abundant element found in the universe, and a fundamental building block of sustaining all known life. It is colorless, odorless, tasteless and non-toxic. When two hydrogen atoms are combined with oxygen, it forms water. The Sun is comprised principally of hydrogen, which releases energy through nuclear fusion. As such, hydrogen has long been recognized for its significant energy potential. Hydrogen exists as a gas at standard temperatures found on Earth but condenses to liquid form if chilled to extreme temperatures (minus 423 degrees Fahrenheit).

How are natural gas and hydrogen related?

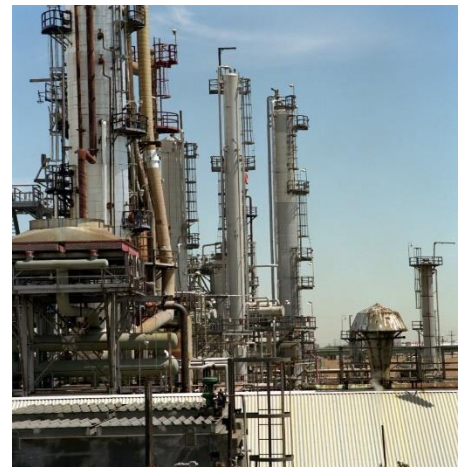
Hydrogen only exists in a compound form on earth. To realize its potential energy, hydrogen must be separated from its compound element partner. [Methane](#) (CH₄) is the primary component of natural gas and is comprised of one carbon atom bonded to four hydrogen atoms. By utilizing varying processes, such as steam methane reforming, the hydrogen atoms can be separated from the carbon atom and harvested for their energy potential.

What are the economic benefits of hydrogen?

Like natural gas, hydrogen is a diverse fuel source with many different applications. Technological advancements continue which will allow hydrogen to be used as a fuel to generate electricity and in heavy industry and transportation. Additionally, hydrogen can be blended with natural gas for heating and used in additional applications within homes, businesses, schools and other facilities without releasing emissions into the atmosphere.

Hydrogen can also power vehicles through the use of fuel cell technology, which converts on-board hydrogen into electricity to power the vehicle without combustion.

Like other energy resources, the use of hydrogen can help diversify the nation's energy portfolio. Energy diversity enhances our economy's resiliency while safeguarding consumers from price fluctuations and supply disruptions. Similar to domestic natural gas production, the use of domestically derived energy from hydrogen strengthens our nation's security by reducing reliance on foreign sources of energy.



Facility reforming natural gas to produce hydrogen.

Source: U.S. Department of Energy

How is hydrogen transported and stored?

Hydrogen can be transported in a gaseous state via pipeline, similar to oil and natural gas pipeline transport. Nearly 2000 miles of hydrogen pipelines currently exist in the U.S. Additionally, cryogenic liquid tankers can transport hydrogen in a liquid form. Hydrogen can be stored as a gas in high-pressure tanks, or as a liquid in cryogenic tanks. It can also be converted to ammonia for storage and transportation. Ammonia is important for the agriculture industry, as it serves as a key component of many fertilizers.

What are the potential hazards related to hydrogen?

If not handled appropriately, hydrogen can be prone to combustion. However, unlike some other fuels, hydrogen is significantly lighter than air, meaning that if it is released it typically rises into the atmosphere and disperses rapidly. Several federal agencies, such as the U.S. EPA, OSHA, PHMSA and FERC regulate the production, transport and storage of hydrogen.