

Hydrogen 101

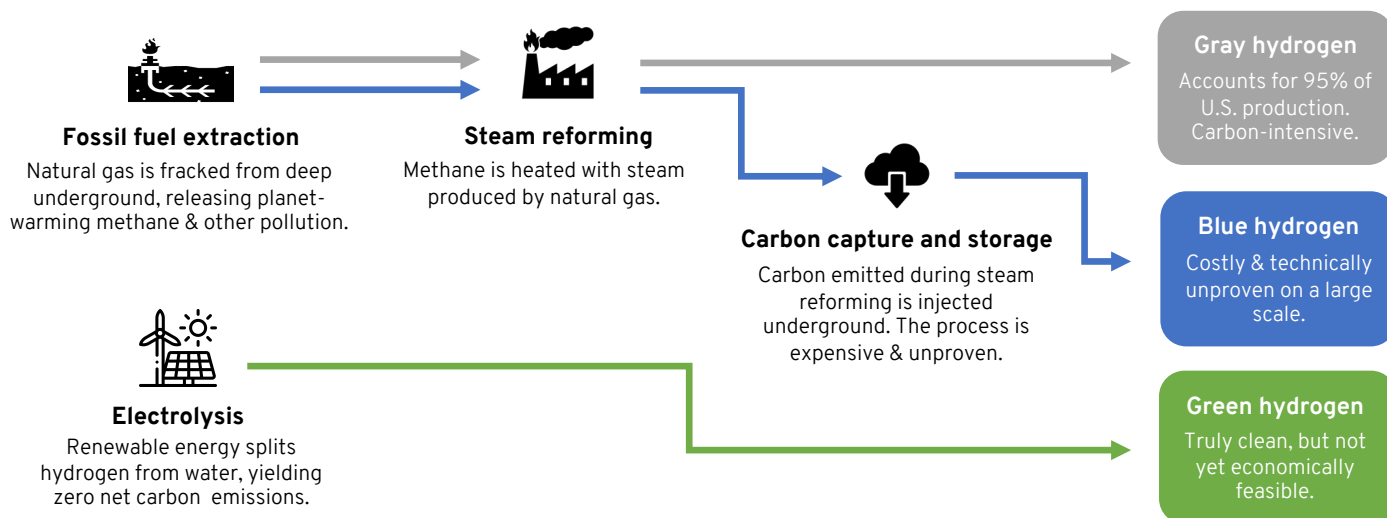
A backgrounder on hydrogen and its uses in the Ohio River Valley.

Hydrogen's economic viability and carbon footprint depend on how it's produced:

Gray hydrogen is derived from fracked natural gas, a process which releases planet-warming methane and other pollution. The fracked gas is heated via steam reforming, yielding hydrogen. Gray hydrogen accounts for 95% of U.S. production.

Blue hydrogen is exactly the same as gray hydrogen, except that some carbon emitted during the steam reforming process is then injected underground in a process called carbon capture and storage (CCS). CCS is expensive and not yet technically feasible on a large scale. It should be reserved for special cases, not used to justify more fossil fuel usage. Because of its reliance on CCS, blue hydrogen has not been proven on a large scale.


Green hydrogen is produced by using water and electrolysis powered by renewable energy, such as solar or wind. The net process is truly clean, creating zero carbon emissions. Only green hydrogen has the potential to both meet the need cost effectively and eliminate CO₂ emissions, though it is not yet economically competitive.



✓ What should hydrogen be used for?



Heavy-duty, long-distance transportation



Cement, steel, and other industrial uses

Clean, green hydrogen should be reserved for the few sectors that are difficult to electrify. Hydrogen only has a climate benefit for those uses if it eliminates or drastically reduces greenhouse gas emissions, which gray and blue hydrogen cannot do.

✗ What should hydrogen not be used for?



Light- and medium-duty transportation



Utility-scale electricity generation



Heating residences and buildings

Even green hydrogen should not be used for sectors where clean, renewable electricity is an easier and less expensive solution. Falling prices for renewable energy will outcompete many of hydrogen's possible applications.

Learn more:

For more information about gray, blue, and green hydrogen and their uses, visit www.ohiorivervalleyinstitute.org.