Push for carbon-free hydrogen accelerates in US

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A source of renewable and storable energy, hydrogen is experiencing a

breakthrough in the United States after years of sluggish growth as Biden administration climate policies spark major investments.

"America came from nowhere and now they're in the lead," Mark Hutchinson, CEO of Fortescue Future Industries, said of America's ascent in renewable energy in general and hydrogen more specifically, at last week's CERAWeek energy conference in Houston, Texas.

US hydrogen production already amounts to around ten million tons per year, about 10 percent of world volumes. But that output mostly consists of so-called "gray" hydrogen, which is produced from natural gas without capturing carbon dioxide emissions.

Thanks especially to the 2021 infrastructure bill and the Inflation Reduction Act (IRA), signed into law last year, US President Joe Biden has pledged to increase production capacity for low- and zero-carbon emission sources, which are known as "blue" and "green" hydrogen.

Blue hydrogen is produced from natural gas in which the carbon dioxide from the manufacturing process is captured. Green hydrogen is produced through renewable sources.

The new US funding pots are massive, including $8 billion dedicated to building a network of "clean" hydrogen hubs around the country.

The IRA also provides tax credits of up to three dollars per kilogram of green hydrogen, a big share for a fuel that normally costs between $4 and $5 to produce.

"The IRA has fundamentally changed the economics of hydrogen from renewable power," said Catherine Robinson, Executive Director, Gas, Power and Energy Futures at S&P Global Commodity Insights. It "allows it to compete with other forms of hydrogen."

Blue and green types should first go to "hard to decarbonize sectors", which are currently using most of the US gray hydrogen production, said Sunita Satyapal, Director for the US Department of Energy's Hydrogen and Fuel Cell Technologies Office.

This includes petroleum refining, steel milling and the production of ammonia, which is used in fertilizers.

"Swiss Army knife"

Beyond heavy industry, others are looking to this source of energy for its ability to be stored and transported. But just how much this will happen is a matter of debate.

Energy experts are bullish about the use of hydrogen in long-haul commercial transportation, where a hydrogen tank could be filled in seconds. By contrast, a vehicle like the Tesla Semi truck needs a half hour to recharge its much heavier engine.

"Ten to 15 years from now, hydrogen will basically be a new fossil fuel (as far as its use cases). It will replace natural gas for many applications and potentially replace diesel fuel for many transportation applications," said Paul Matter, co-founder of Power to Hydrogen, a US company focused on hydrogen generation and storage.

Developments are also underway for rail freight, aircrafts and cargo ships.

But skeptics see limits to hydrogen's diversification, noting that electrification is a more efficient option for cars because of the advantages of smaller batteries and the ease of establishing charging infrastructure.

The scientific journal Nature has warned about "overhyping hydrogen."

"Hydrogen should be used judiciously, to address emissions that can't be eliminated in other ways", Nature said in a November 2022 editorial, which also criticized talk of using hydrogen to heat homes.

"It's not the solution to everything," said Andy Marsh, CEO of Plug Power, based in Latham, New York, which bills itself as the world's largest supplier and user of liquid hydrogen, a concentrated form of the gas.

Nevertheless, he sees hydrogen as "the Swiss Army knife of this transition," offering "many, many mobility applications, where hydrogen is really the only solution."

Several new projects around US hydrogen have already been announced, but many more are anticipated once detailed IRA rules are finalized, expected during the second half of 2023.

Some large manufacturing plants have already been announced since 2021 in New York state and California.

"Scaling up can happen within a five to ten year timeline. It's been done before," said Alan Hayes, Head of Energy Transition Pricing at S&P Global Commodity Insights.

US Secretary of Energy Jennifer Granholm promised at CERAWeek to address problems with permit delays for new hydrogen facilities.

In Texas, two mega projects are on track, one south called Hydrogen City, the other far north with a price tag estimated at $4 billion. Long a stronghold of oil and natural gas, Texas is now vying to take the lead in US renewable energy.

"If you talk to anybody from Texas," says Hayes, "they love to tell you that,c7 'We get things built.'"

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