

Renewable Hydrogen

What is hydrogen fuel?

Hydrogen, like electricity, is an energy carrier rather than an energy resource. Both electricity and hydrogen can be generated via both traditional and renewable energy sources. Hydrogen is used for a range of applications as an industrial gas, however, it is increasingly being used as a clean fuel for fuel cell vehicles (FCVs), to power stationary fuel cells, or in power-to-gas and energy storage applications.

When fueling FCVs, hydrogen is pumped as a compressed gas, which is non-toxic, colorless, and odorless. FCVs are able to replicate today's current driving experience in traveling 300 to 400 miles on a tank of hydrogen fuel, and refueling in just three to five minutes. FCVs are zero-emission vehicles as the only tailpipe emission is water vapor.

Renewable Hydrogen Production through Electrolysis

Electrolysis is a common method used to produce hydrogen. Electrolysis involves the separation of water into its constituent elements - hydrogen and oxygen - by use of an electric current. By using electricity from solar or wind sources, hydrogen can be renewably generated and stored for later use as a zero-emission transportation fuel.

On their own, renewable technologies often produce power intermittently (e.g., only when the sun is out or the wind is blowing), so hydrogen can also increase reliability by providing an energy storage medium. Hydrogen, renewably produced during off-peak periods and stored, can provide constant power using fuel cells or engines when the renewable power is not available.

Renewable Hydrogen Production through Biogas

Wastewater treatment plants, landfills, food/beverage processing facilities, wineries, breweries, factory farms, and other facilities generate tons of organic waste as a byproduct of daily operations. This waste - sewage, effluent, food or animal waste - can be expensive to remove and burdensome, even toxic, to store. However, increasingly these sites are adopting anaerobic digesters to convert the organic waste into renewable biogas. While some facilities combust biogas to generate electricity, there have been a number of demonstrations and deployments around the country using biogas to fuel stationary fuel cell systems providing clean electricity and heat for the facility. In some cases, the fuel cell systems have been configured for tri-generation, providing a stream of pure hydrogen fuel as well for fueling local fuel cell vehicles.