

What Do You Need to Know About Hydrogen Stations?

A “hydrogen station” includes, at minimum, above-ground fuel storage tank(s), a compressor, a chiller, and a dispenser typically integrated into an existing gasoline or CNG station. As with natural gas, all the equipment is above ground. Like CNG, equipment can be distributed on the property to optimize space. In addition, hydrogen stations have multiple designs that include the option of making hydrogen on site.



Hydrogen Station Configurations

Delivery Method	Equipment at Station	Advantages	Disadvantages
Liquid Delivery	Liquid storage tank Heat exchanger Compressor Gaseous storage Chiller Dispenser	<ul style="list-style-type: none"> • Can store more fuel (greater capacity) 	<ul style="list-style-type: none"> • Much larger footprint • Potential for fuel boil off • Expense of two types of storage tanks
Gaseous Delivery	Gaseous storage Compressor Chiller Dispenser	<ul style="list-style-type: none"> • Smaller footprint than liquid • Equipment can be in various configurations 	<ul style="list-style-type: none"> • Least amount of storage capacity without multiple trailers/ storage tubes
On-site Electrolysis	PV system Water purifier Electrolyzer Compressor Gaseous storage Booster compressor Chiller Dispenser	<ul style="list-style-type: none"> • Make fuel on site • Potential to sell carbon credits 	<ul style="list-style-type: none"> • More equipment • Larger footprint • Can be more expensive
H2 from pipeline	Scrubber Gaseous storage Compressor Chiller Dispenser	<ul style="list-style-type: none"> • Larger capacity • Can require less storage 	<ul style="list-style-type: none"> • Station must be near pipeline • More equipment • Larger footprint

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Where does hydrogen come from?

Most hydrogen comes from natural gas, but you can also make hydrogen from solar or wind energy and water using an electrolyzer. Hydrogen from biogas (wastewater) or biomass (agricultural waste) is a promising future production method. Hydrogen from natural gas is usually produced at central facility and delivered. Electrolysis is usually done at the station.

Is hydrogen dangerous?

Hydrogen is as safe as other fuels; just different. It is a lighter-than-air gas that diffuses quickly. It is difficult to concentrate hydrogen enough to make it catch fire, let alone explode. The vehicles and tanks pass all safety tests.

Is hydrogen a gas or a liquid?

Hydrogen is a gaseous fuel that can be dispensed at two different pressures: H35, which is approximately 5,000 psi, and H70, which is 10,000 psi. Most stations have hydrogen delivered as a compressed gas, which is stored above ground in ASME-standard steel pressure vessels. Some stations have liquid hydrogen delivered as a liquid, which is stored above ground at a cryogenic temperature (-423°F/-253°C). When storing H2 as a liquid, it must be warmed into a gaseous state and compressed before dispensing.

How is hydrogen dispensed?

A hydrogen dispenser looks similar to a retail fuel dispenser and usually has two different hoses and nozzles, one for each pressure. Customers cannot attach the high-pressure nozzle to a lower pressure receptacle, similar to a diesel nozzle not fitting into a gasoline port.

When a customer activates the dispenser, hydrogen flows from the storage tanks to the dispenser and through the nozzle into the vehicle in a closed-loop system. If filling with H70, the hydrogen passes through a compressor and chiller before entering the dispenser. If the nozzle is not correctly attached to the vehicle, fuel will not flow. It takes less than five minutes to fill a passenger vehicle and about 10 minutes to fill a transit bus. When the tank is full, dispensing stops.

How much does hydrogen cost?

Retail stations in California are charging between \$12.85 to more than \$16.00 for a kilogram of hydrogen, which is equivalent to \$5.40 for a gallon of gasoline. Auto makers include free fuel with their vehicles for approximately three years. By 2020, the price of hydrogen is expected to be comparable to gasoline and continue to decrease.

Hydrogen is a low-carbon, non-toxic fuel that is domestically produced from local resources. Most hydrogen is made from natural gas, but increasingly it is made from water, biogas and biomass. For more than 75 years, hydrogen has been safely handled, distributed and dispensed. Building codes and technical standards are created around hydrogen's unique properties: small molecule, lighter-than-air, quick diffusion and gaseous state.

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