

# What is Hydrogen?

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Hydrogen is a colorless and odorless gas at surface temperatures and gravitational pressures. It is the most abundant element in the universe. However, it is rarely found alone, as it is usually bonded with other elements in nature. Although not widely used today as an alternative transportation fuel, this element has the potential to be developed as a major emissions-free alternative fuel option. Government and private industry are currently working towards this goal.

## How is Hydrogen Produced?

Hydrogen is produced from a variety of domestic resources including fossil fuels, nuclear energy and biomass. Many methods of production are currently being developed, such as natural gas reforming, renewable electrolysis and gasification. The environmental impact of production varies according to the method used.

The most widely used method is natural gas reforming, which accounts for about 95% of hydrogen production in the U.S. The process uses “synthesis gas” which is created by reacting natural gas with high-temperature steam or partial oxidation. The synthesis gas is then used to react with water to produce hydrogen.

## Advantages of Using Hydrogen

It can be domestically produced from resources such as natural gas, coal, solar energy, wind, biomass, and nuclear energy.

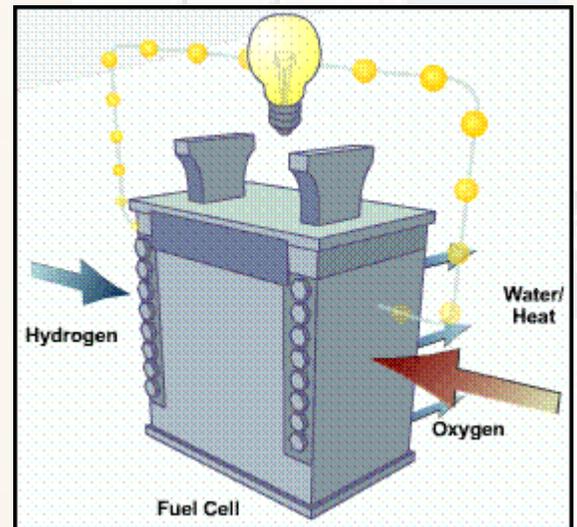


Figure 1: U.S. Department of Energy

- It can be produced with near-zero green house gas emissions
- Once produced, it generates power without emitting harmful pollutants.
- It can be used for other applications, such as back up generators, and grid electricity production.
- Hydrogen cells can be used to store energy that compensates for the intermittency in renewable energy production.

## What Vehicles Run on Hydrogen?

The type of vehicles that can operate on hydrogen are called fueled-celled vehicles. No light-duty vehicle of this type is commercially available to consumers. However, test vehicles have been made in different organizations. Developing heavy-duty vehicles in the testing and pre-production phase exist today. Among these are the Van Hool's A330 fuel cell bus, New Flyer's H40 LFR hydrogen fuel cell bus, Vision Motor Corporation's Tyrano electric/hydrogen fuel cell hybrid tractor and the Zero Emission Terminal Tractor (ZETT). The private industry has begun development of hydrogen energy kits that can be installed in trucks and cars.

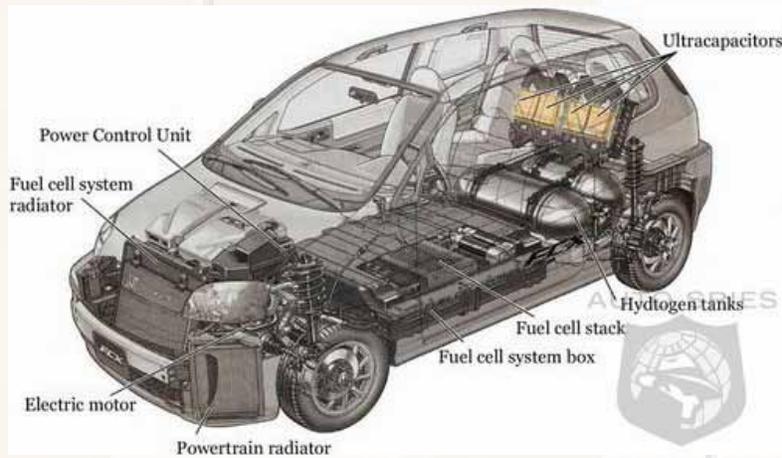


Figure 2: <http://www.autospies.com>

The fuel-cell vehicle technology is still in the development phase. The Department of Energy and its partners are currently working to develop methods of production and distribution that are both cost-effective and environmentally friendly.

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The South Florida Regional Planning Council.  
3440 Hollywood Boulevard, Suite 140  
Hollywood, Florida 33021

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