

How far are we from a hydrogen economy?



Hydrogen fuel

Hydrogen fuel is a zero-emission fuel that burns with oxygen. When hydrogen gas is burned in air, only water vapor is produced. Therefore, it is a completely non-polluting fuel. This fact has led some people to propose an energy economy based entirely on hydrogen.

Hydrogen can be produced in two ways. First, it can be separated from oxygen molecules in water through an electrolysis process. Electrolysis can be driven by renewable energy sources, such as wind, water and solar energy, so it does not produce any

emissions. The disadvantage is that it is very expensive to do so without the use of fossil fuels. It can also be produced by separating it from the hydrocarbon chain in fossil fuels (steam reforming), a process that itself produces greenhouse gas emissions. As of 2018, about 95% of this is produced from fossil fuels. Currently, in order to get this clean energy at an affordable price, you have to use "dirty" energy.

Current uses

Of the hydrogen currently produced around the world, 55% is used for ammonia synthesis, in refineries (25%) and methanol production (10%), with only about 10% of all other applications, including for fuel cells or internal combustion engines.

Hydrogen is considered to be an energy source of the future. However, by producing hydrogen from natural resources, coupled with carbon capture and storage (a set of abatement technologies that sequester CO₂ underground), it has been demonstrated that large-scale and low-emissions hydrogen production already exists. Thus, along with other key abatement options, large-scale deployment of hydrogen production could jumpstart the energy transition.

Trends

The International Energy Agency (IEA) says clean hydrogen is now enjoying unprecedented political and commercial momentum, with a rapidly expanding number of policies and projects around the world. It concludes that now is the time to scale up the technology and reduce costs to make hydrogen widely available. Current global government policy support for hydrogen deployment is greatest for buses, passenger cars and refueling stations.

The IEA found that the future of hydrogen depends on government support, as more than 70 percent of investment in the energy transition will come directly from governments or be driven by government policy.

Transportation

In transportation, the competitiveness of hydrogen fuel cell vehicles depends on fuel cell costs and refueling stations, while for trucks, the first priority is to reduce the price of hydrogen delivery. Automakers and environmentalists have long hailed fuel cells as a revolutionary technology that reduces tailpipe emissions and is two to three times more efficient than internal combustion engines that use gasoline. The next challenge is to build a network of hydrogen stations so that car owners can refuel their vehicles.

California has 30 such stations, enough to allow owners to drive throughout the state without worrying about running out of hydrogen, and it intends to expand them to 100 by 2020. So far, sales of fuel-cell vehicles have been limited to that state.

Japan is seeking to promote hydrogen energy globally, and it already has support from 30 countries for its plan to build 10,000 hydrogen refueling stations worldwide within 10 years.

Conclusion

The more serious problem with developing a hydrogen economy is that hydrogen is currently expensive in terms of money and energy costs relative to other energy solutions. It must be produced by burning coal or oil to produce the required electricity, which is virtually non-polluting, or by nuclear power. In any energy production plan, the entire process, from start to finish, and all its implications must be taken into account.

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